Ocular Manifestations of Systemic Disease in Dogs

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Introduction

- Cincinnati, Ohio
- Ohio State Univ College of Vet Medicine, Class of 2010
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Lots to Learn!
Normal Dog Fundus
Normal Dog Fundus
Infectious Diseases

- Viral Diseases
- Bacterial diseases
- Systemic fungal diseases
- Algal diseases
Canine Distemper Virus

- Single stranded RNA paramyxovirus
- Bilateral conjunctivitis
- KCS
  - Mononuclear and neutrophilic inflammation causing degeneration of the lacrimal gland
  - Secondary corneal disease
  - Resolves in 4-8 weeks as animal recovers
Canine Distemper Virus

• Chorioretinitis/Retinochoroiditis
  – Multifocal, non-granulomatous
  – Peripheral to mid-peripheral tapetum
  – Non-tapetum (acute phase)
• Optic neuritis (Intra vs Retrobulbar)
  – Blindness
  – Mydriatic, no PLRs
• Inflammation of the optic radiations or visual cortex
  – Blindness, Normal PLRS
CDV inclusions
Ehrlichia canis

- Gram negative intracellular bacteria
- Diagnosis
  - Blood smears
  - Serology
  - PCR
- Ocular signs
  - Result from thrombocytopenia and/or vasculitis
  - Presenting complaint in 1/3 of cases
  - Typically bilateral
Ehrlichia canis

- **Uveitis = #1 sign**
  - Anterior > Post, pan
  - Bilateral > Unilateral
- **Retinal hemorrhages**
- **Engorged retinal vessels with perivascular infiltrate**
- **Retinal detachment**
- **Optic neuritis**
- **Orbital hemorrhage**
- **KCS**
- **Necrotic scleritis with uveal prolapse**

*Figure 4. Orbital cellulitis in a dog with monocytic ehrlichiosis (E. canis). Notice the severe periorcular swelling and profound hemorrhagic crusting on the eyelids.*
Rocky Mountain Spotted Fever

- Conjunctivitis/chemosis
- Anterior uveitis (mild)
- Petechiae of the conjunctiva, iris and retina (vasculitis)
- Hyphema
- CNS signs- nystagmus, blindness
Tetanus

- Neurotoxin (tetanospasmin) of *Clostridium tetani*
- Horses, humans > dogs, cats
- Enophthalmos from retraction of globe
- Protrusion of nictitans
Blastomycosis

- Ocular signs in up to 50% of cases
- Ocular signs as only sign in 3% of cases
- 50% of cases have bilateral involvement
- Recurrence in up to 20% of cases

Area where Blastomycosis is found
Blastomycosis

- Anterior uveitis
- Chorioretinitis - best prognosis
  - Subretinal granulomas
  - Exudative retinal detachment
  - Retinal or vitreal hemorrhages
- Endophthalmitis
- Lens capsule rupture (41% histopath)
- Optic neuritis - worst prognosis
- Orbital cellulitis
Can look like retrobulbar neoplasia!
Treatment

- Itraconazole 5 mg/kg PO daily
- Fluconazole- CNS signs
- Topical corticosteroids for uveitis
- Atropine for normotensive eyes
- Topical glaucoma medications if needed
- Enucleate blind, painful eyes
- Eye as nidus for infection?
  - Budding yeast seen on histopath in eyes of dogs treated with itraconazole
  - Unique immunology of the eye
• Role of systemic corticosteroids?
  – WITH Itraconazole!
  – Target choroidal inflammation
  – Dose ranged from 0.2-1.4 mg/kg/day (mean of 0.7 mg/kg/day) for mean of 3 months
  – 74% of eyes were visual and improving at last recheck
  – 67% of eyes with endophthalmitis retained vision
  – Blasto is not usually found in anterior chamber
  – Anterior uveitis = extension of posterior inflammation
  – No adverse affect on survival rate (92% got better)
Other Systemic Fungal Diseases

- Histoplasmosis
- Cryptococcus
- Coccidioidomycosis
- Aspergillosis
Prototheca

- *P. zopfi, P. wickerhamii*
- Hemorrhagic diarrhea
- Blindness may be presenting complaint
- Anterior uveitis
- Secondary glaucoma
- Chorioretinitis
- Retinal detachment
- Culture/cytology of vitreous
Diabetes Mellitus

ONE WORD

DIABEETUS
Diabetes Mellitus

- Cataracts
  - 75% 1 year after diagnosis
  - 80% 1.5 years after diagnosis
  - 60% of cases at presentation
- Reduced corneal sensitivity
- KCS
- Pleomorphism and polymegathism in corneal endothelium
- Diabetic retinopathy
Mechanism of Diabetic Cataracts

Glucose $\rightarrow$ Sorbitol $\rightarrow$ Fructose

Aldose reductase

Hexokinase

$\text{NADPH}_2 \rightarrow \text{NADP}^+$

$\text{NAD}^+ \rightarrow \text{NADH}_2$

Sorbitol dehydrogenase
Diabetic Cataracts

• Rate of progression depends on:
  – Age of disease onset
  – “Individual”
  – Amount of AR
  – Duration of diabetes
  – Severity of hyperglycemia?
Diabetes and Lens Capsule Rupture
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Miniature Schnauzers

• The worst breed for diabetes, rapidly forming cataracts and lens-induced uveitis!!
Treatment = Phacoemulsification!
Goals and Treatment Until Surgery

• Get them as well-regulated as possible
• Treat any underlying infections (UTIs)
• Control/prevent lens-induced uveitis
  – Prednisolone Acetate SID-QID
  – Flurbiprofen SID-QID
  – Atropine or Tropicamide SID-BID
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Aldose Reductase Inhibitors

- Kinostat OU TID
- Cataract scores after 1 year of tx did not significantly increase from those of enrollment
- No cataracts in 54% treated eyes
- No systemic side effects
- Delays cataract formation
- Not helpful for advanced cataracts
- Prevent need for surgery?
• Diabetics 1.5x more likely to be diagnosed with KCS than non-diabetics after phaco
• Diabetic small breeds have 1.6x higher risk of KCS than non-diabetic small breeds
• Diabetes NOT a risk factor for KCS in large breeds
Diabetic Retinopathy

- 21% of diabetic dogs
- Microaneurysms
- Retinal hemorrhages
- Dorsotemporal tapetum
- No apparent changes in vision
- Median time to development 1.4 years
- Did not exclude other potential causes
- Role of VEGF?
  - No significant difference in AH conc of diabetic vs nondiabetic
  - Lack of intraocular VEGF production protective?
Hyperadrenocorticism

- Non-healing corneal ulcers
- Corneal calcification
- Hyperlipidemia lesions
- Hypertensive lesions
- KCS
- Tear production and ulcers can improve with Cushing’s tx
Other non-infectious diseases

- Other endocrine diseases
- Metabolic diseases
- Neoplastic diseases
- Immune-mediated diseases
Hyperlipidemia

• Primary
• Secondary
  – Hypothyroidism
  – Diabetes Mellitus
  – Hyperadrenocorticism
  – Pancreatitis
  – High fat diet
  – Renal disease
  – Hepatic disease
Hyperlipidemia

- Ocular findings:
  - Lipid keratopathy
  - Lipoid aqueous
  - Lipemia retinalis
- Treat underlying cause
- Check thyroid levels
- Diet
Ocular Signs of Lymphoma

- Most common secondary intraocular neoplasm
- Present in up to 37% of cases
- 2\textsuperscript{nd} most common presenting complaint
- Uveitis
- Retinal hemorrhage
- Stage 5 disease
- Usually bilateral
- 30-40\% shorter lifespan
Multiple Myeloma
Bleeding Disorders

• Primary and secondary hemostasis
• Platelet counts < 50,000
• Do a physical!
• Common offenders:
  – ITP
  – Infectious causes of thrombocytopenia
  – Neoplasia
  – Anticoagulant Rodenticide
Treat the underlying cause!
Hypertension

- Ocular Lesions
  - Retinal hemorrhage* (40% of cases)
  - Hyphema
  - Retinal detachment
  - Subretinal edema
- 62% of hypertensive dogs have at least 1 ophthalmic lesion
- 50% of hypertensive dogs have ≥ 2 lesions
- Presence of lesion = ~60% spec and sens
Hypertension

• No sign diff in BP between dogs with and without ocular lesions
• Phenylpropanolamine
  – Causes hypertension at therapeutic doses
  – Can cause ocular lesions!
• No significant diff in ocular lesions of hypertensive dogs between those on and not on meds
Hypertension

• Do an ophtho exam on hypertensive dogs
• Check BP in dogs with suspicious ocular lesions
• Just being on anti-hypertensive meds may not be enough to control or prevent ocular lesions!
Uveodermatologic Syndrome

- Similar to Vogt-Koyanagi-Harada syndrome in humans
- T–lymphocyte mediated autoimmune attack directed against melanocytes
  - Skin lesions = Th1
  - Ocular lesions = Th2
- Ocular lesions precede skin lesions
- Subset of patients without skin lesions?
Uveodermatologic Syndrome

- “Northern” Breeds
  - Akita
  - Husky
  - Samoyed
- Really any breed!
- Any age
- Specific HLA types associated with an increased risk of disease
Ocular Manifestations of UDS

• Sudden or gradual blindness
• Granulomatous anterior uveitis / panuveitis
• Bullous retinal detachments
• Depigmentation of the nontapetal fundus and/or iris
• Secondary changes
  – Glaucoma
  – Cataract
Dermatologic Manifestations of UDS

- Vitiligo and Poliosis
  - Nasal planum
  - Eyelids
  - Lips
  - +/- scrotum
  - +/- footpads
- Lichenoid dermatitis
- Histiocytic, small mononuclear and giant cell infiltrates
Treatment and Prognosis

- Systemic immunosuppression
- Repigmentation!
- Topical ocular meds
  - Anti-inflammatories
  - Mydriatics
  - Anti-glaucoma agents
- Guarded Prognosis
  - Lifelong tx
  - Relapses
While their owners sleep, nervous little dogs prepare for their day.