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Intraocular Pressure:
Not Too High, Not Too Low….Just Right!

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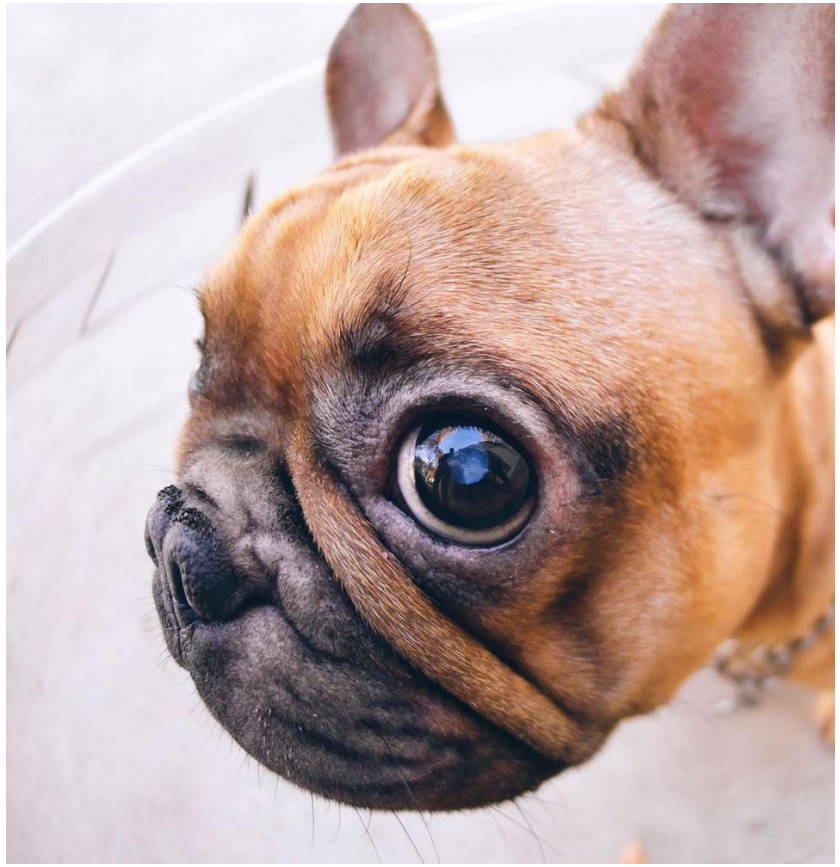
Overview

- Exam Details
- Ophtho Equipment
- Tonometry
- Patient Restraint
- Importance of checking IOP
- Uveitis and some associated diseases
- Glaucoma- Primary vs Secondary

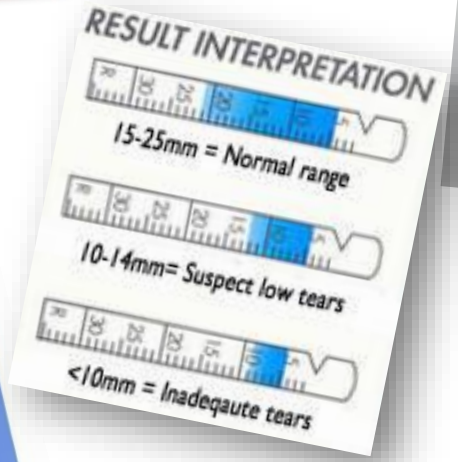


https://animalvisioncenterva.com/library/uveitis-causes-and-treatment/

Examination Details

- Comprehensive Patient history
- Auscultate heart and lungs
- TPR and Weight
- Body palpation and visual examination of the body
- Evaluation of body and coat condition
- Basic exam of ears, eyes, mouth, gums and teeth
- Yearly Check-Ups ideally include
  - +/- Vaccinations when appropriate
  - +/- Blood Pressure –especially for geriatric pets
  - +/- Bloodwork
  - +/- Urinalysis
  - +/- Intraocular Pressure – Good to start tracking early
- If presenting for an ocular concern
  - +/- Schirmer tear test, +/- fluorescein stain, +/- IOP measurement.

Ophthalmology Examination



How do we check IOP?

Rebound Tonometry

Rebound Tonometry

- Provides the fastest measurement
- Painless-Does not require topical anesthesia
- Does not require calibration
- Standard AA batteries
- Minimal Maintenance-Probe Base Cleaning/Changing
- Species Specific-Dog, Cat, Rabbit, Horse

Applanation Tonometry

- Requires topical anesthesia
- Requires the device to be calibrated by the user
- Not species-specific
- Requires special 3V batteries
- Probe tip covers can be difficult to put on

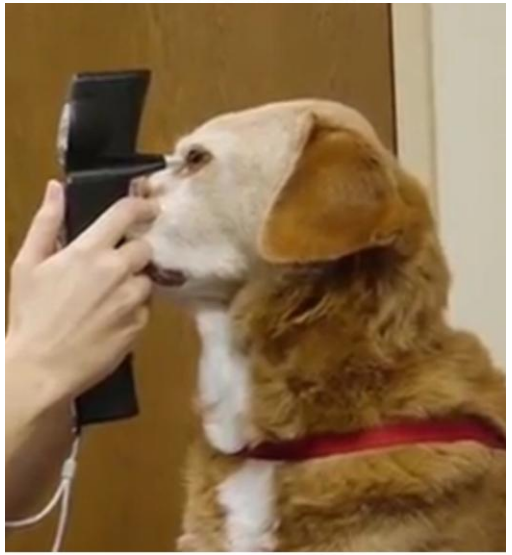
Indentation Tonometry

- Requires topical anesthesia
- Not species specific
- Requires very specific assembly
- Requires lengthy care and maintenance
- Patient needs to be supine or looking up

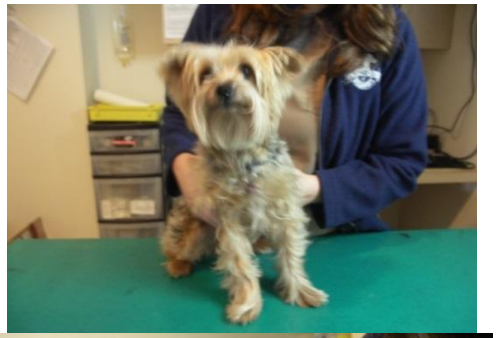
Patient Restraint

- Try to keep the patient looking straight ahead
- Hold behind the head and under the jaw
- Avoid applying pressure to the jugular area
  - This is especially important when taking IOP with any style tonometer.
  - This includes not holding the neck area or having a collar/lead that is too tight.
  - Avoid neck leads when walking ophthalmic patients. Use a shoulder lead or body harness.

Improper restraint can falsely elevate the IOP results, or it can cause an eye to proptose or rupture



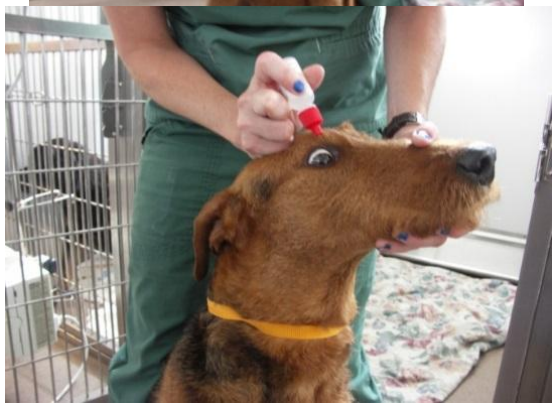
Patient Restraint



- Avoid pressing on the globe and eyelids
- Hold the eye open from the upper eyelid if needed
- Helps to keep a hand on the forehead area above the eye

Challenging patients:

- Muzzles are not always helpful in an Ophtho exam
- Premedicate their anxiety
- Fear Free Techniques
- Wrap in a blanket and perform the “Big Flip”
- Keep calm and pray



What other factors affect IOP results?

- Patient behavior and stress level
- Presence of ocular/corneal disease (anterior lens luxation)
- Corneal thickness
- User inexperience with tonometer
- Pharmacologic effects (topical, oral, inhalant)
- Time of day

Why is it so important to monitor IOP more routinely?

- The focus in IOP measuring is on elevated IOP, but low IOP is an issue too.
- Normal IOP ranges from 12mmHg to 20mmHg – depending on the species it can vary slightly
- IOP should be similar in both eyes when healthy
  - Larger differences between eyes can be indicative of an issue
- Lower IOP <10 mmHg = inflammation in the eye (uveitis)
- Higher IOP >25 mmHg = increased pressure in the eye (glaucoma)
- When low IOP is noted, it should be monitored and treated, as it can smolder and cause more inflammation and damage the eye, which leads to high IOP and glaucoma- Early detection! Screen patients!
  - Easy to make tonometry part of yearly exams (and artificial tears!). Get them used to it as puppies, follow their trends, and know their normal values.
- Redness of the eye is often noted as “just conjunctivitis”.

“Conjunctivitis” Presentations

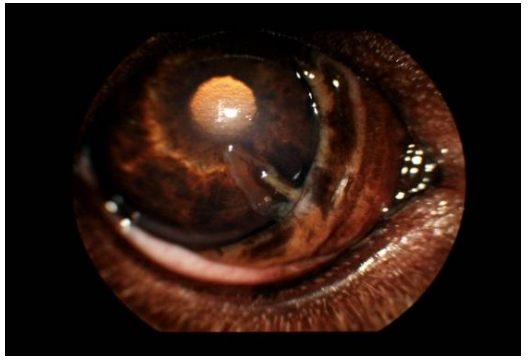
KCS

KCS

Glaucoma

Allergic/Follicular

Uveitis

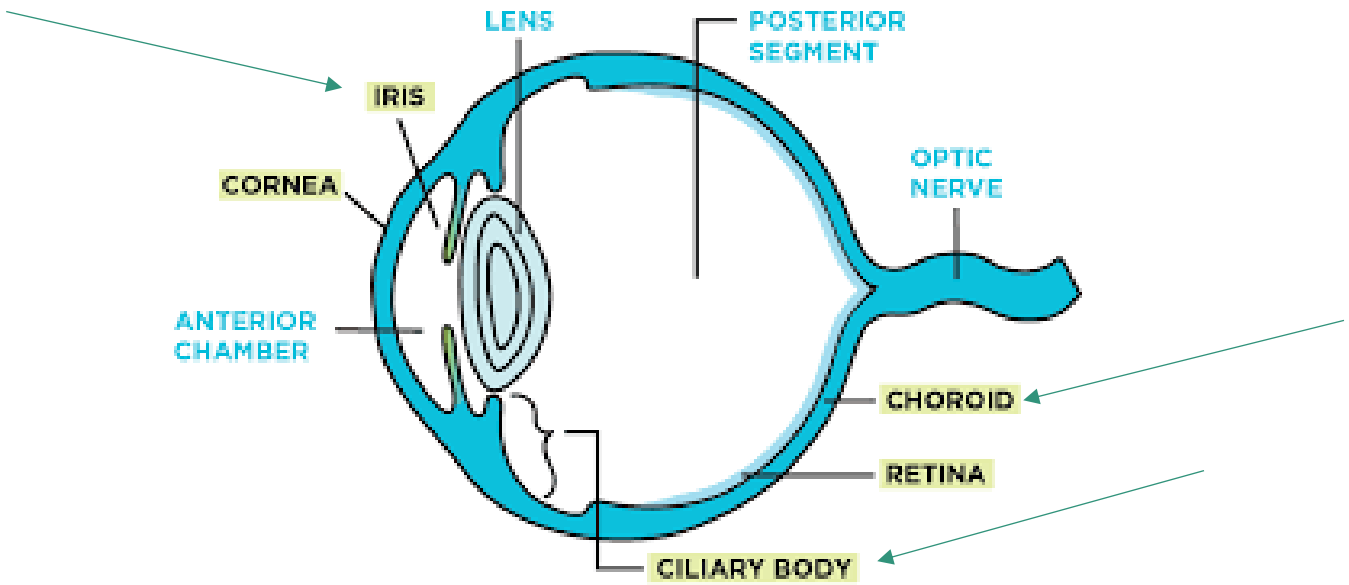


Foreign Body

We have IOP the measurements but what can they mean for our patient?

Low IOP and Uveitis

- Uveitis is the term used for inflammation of uveal tract parts.
  - The uvea is the middle layer of the eye (sclera outermost and retina innermost)
  - The uveal tract consists of three parts:
    - Iris Controls the amount of light entering the eye with the pupil
    - Ciliary Body–Contains the ciliary muscle to change the shape of the lens, to focus, and produce aqueous humor.
    - Choroid -Vascular tissue that helps provide blood and nutrients to the retina. Also contains the tapetum which is the highly reflective layer that enhances low-light vision (“eye glow”)



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Typical signs of anterior uveitis

Acute signs of uveitis

- Ocular discomfort
- Light sensitivity (Photophobia)
- Increased tearing (Epiphora)
- Vision issues
- Miotic pupil (small closed pupil)
- Blue iris can appear yellow in color
- Corneal edema (swelling of the corneal layers)
- Hypopyon (white blood cells in the anterior chamber)
- Hyphema (blood in the eye)
- Lower IOP readings are usually noted
  - If uveitis is suspected in an eye but the IOP is normal, it can mean that the eye is already starting to develop glaucoma because the aqueous drainage may be decreased or obstructed by the inflammation
- Conjunctival hyperemia (redness of the vessels in the conjunctiva)
- Scleral injection (scleral redness)
- Fluorescein uptake in cases of ulcerative keratitis (reflexive uveitis from the ulcer)

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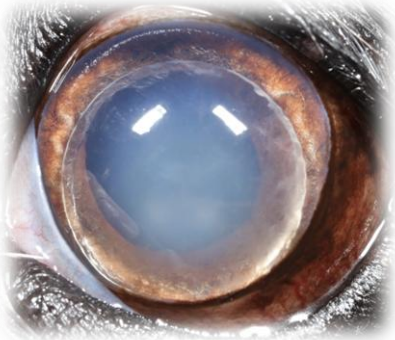
Chronic Uveitis can lead to

- Glaucoma
- Cataracts
- Lens luxation (anterior or posterior)
- Iris bombe (Adhesions of the iris and lens)
- Retinal detachment
- Permanent vision loss



Common Causes of Inflammation

- Pigmentary Uveitis (“Golden Retriever Uveitis”)
  - Cataracts and Diabetic Cataracts
  - Ocular Manifestation of Systemic Disease
  - Idiopathic Uveitis

Uveitis and Commonly-Seen Diseases

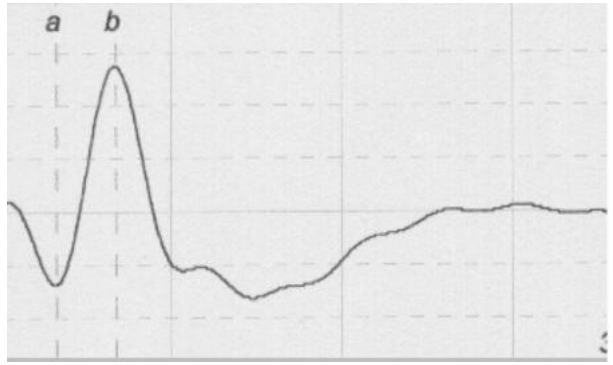
Pigmentary Uveitis ("Golden Retriever Uveitis")

- Goldrush lineage
- Middle Aged Onset
- Low IOP can be noted & other signs of Uveitis
- Pigmented cells get disrupted in the anterior chamber of the eye
  - Darker or thicker iris
  - Pigment deposits on the corneal endothelium
  - Pigment on the anterior lens capsule
- Initial symptoms can be redness and tearing making it difficult to diagnose early
- Secondary Cataracts and Secondary Glaucoma can occur
- Vision and globe threatening – usually a bilateral process
- Treatment with topical and/or oral medications
  - Steroids or NSAIDs
  - Surgical intervention for secondary glaucoma

Uveitis and Commonly-Seen Diseases

Cataracts

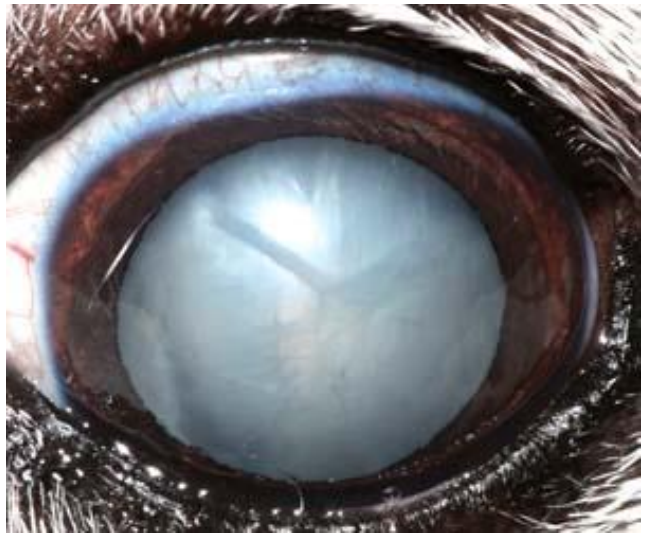
- Any opacity of the lens and/or lens capsule
- Classified according to cause, location, age of onset, or stage of maturation
  - Cause: Inheritance, diabetes, nutritional deficiencies, toxins, trauma, developmental
  - Location: Nuclear, cortical, equatorial, polar, anterior, posterior
  - Age of onset: Juvenile, Senile
  - Stage of maturation: Incipient, Immature, Mature, Hypermature
- Lens-induced uveitis (LIU)- an inflammatory reaction when the lens proteins leak out of the lens capsule
  - Mostly seen with Mature, Hypermature, Diabetic, and Traumatic Cataracts
    - Diabetic cataracts – mature in just days or weeks
  - <u>LIU needs to be treated long-term</u> to prevent secondary glaucoma with or without surgery to remove the cataracts
  - <u>Not every cataract or patient is a candidate for surgery</u>
    - Type of cataract, presence of LIU and other ocular disease (retinal health: ERG/Ocular ultrasound, diffuse corneal pigmentation), and systemic disease



Uveitis and Commonly-Seen Diseases

Diabetic Cataracts

- Diabetic Cataracts
  - 50% of dogs develop cataracts within 5 months of diagnosis
    - 75% of diabetic dogs will get cataracts within one year, 80% at 16 months, 87% at two years [9]
  - They can develop rapidly and cause Lens-induced Uveitis (LIU)
    - Lens swells (intumescent lens) and proteins leak out of the lens capsule
  - Control of diabetes is important and systemic health workup is needed
    - Fructosamine and Complete Urinalysis
    - Fasted Triglycerides
    - +/- Dental
    - +/- Cardio Exam
  - Starting medical treatment early aims to control the LIU in the eyes, not stop the cataracts from forming.



Fun Fact: Cats have a very low incidence of developing diabetic cataracts due to them having lower aldose reductase activity

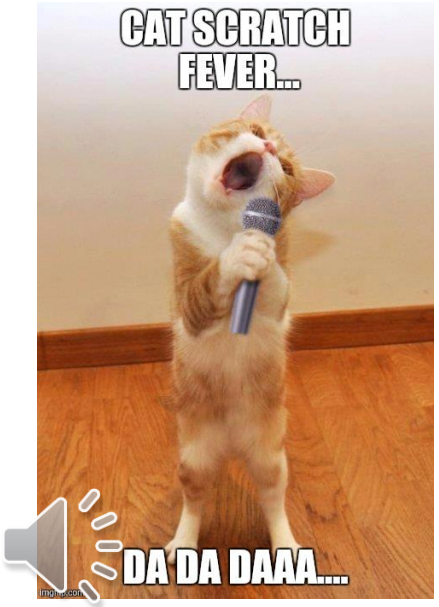
- Aldose reductase is an enzyme that converts glucose to sorbitol. Excess glucose converts to excess sorbitol causing the lens to swell and a cataract is formed

Uveitis and Commonly-Seen Diseases

Ocular Manifestation of Systemic Disease(OMSD)

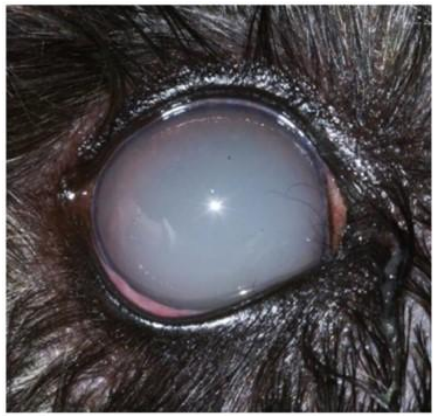
Systemic Diseases that affect the eye(s), often present with ocular early warning signs

- Neoplasia (Oral or Nasal tumors, Lymphoma)
- Infectious Diseases (Tick-Borne Diseases, Leptospirosis, Bartonella (cat scratch fever)
- Viral Disease (Herpesvirus-Canine & Feline, Feline Immunodeficiency Virus (FIV), Feline Leukemia (FeLV), Feline Coronavirus (FCoV), Feline Infectious Peritonitis (FIP)
- Protozoal Disease (Toxoplasmosis, Histoplasmosis)
- Metabolic Disease (Diabetes mellitus, Cushing disease, Hyperlipidemia)
- Other Systemic Diseases (Systemic Hypertension—older cats esp!)
- Autoimmune Disease (Uveodermatologic syndrome “VKH”)

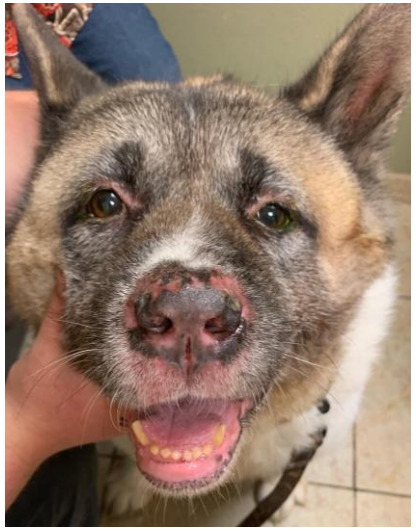


Uveitis and Commonly-Seen Diseases

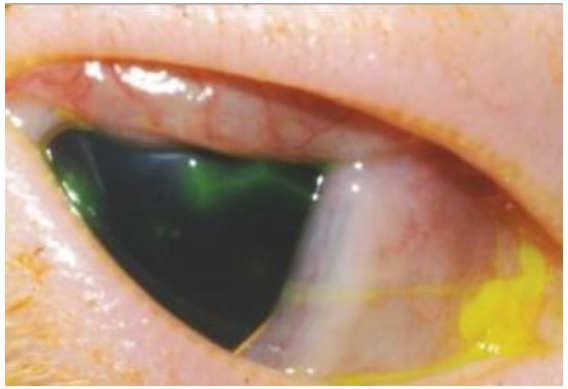
Ocular Manifestation of Systemic Disease (OMSD)



Hyperlipidemia Clinical Medicine of the Dog and Cat

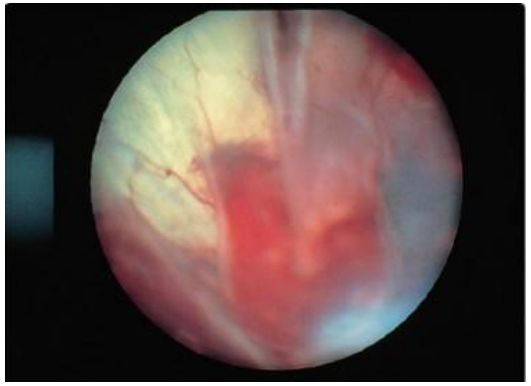


UDS Akita – ECFA San Diego

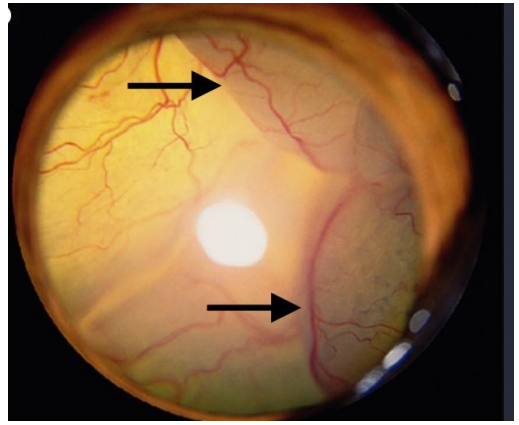


FHV– "Runny Eyes"-Brad Holmberg

Feline Lymphoma – Ocular Manifestation of Lymphoma V.Nerschbach



Toxo- retinal hemorrhage and detachment
Clinical Medicine of the Dog and Cat



Clinicians Brief- Top 5 Ocular Consequences of Systemic Hypertension. Michael Brown DACVO

Uveitis and Commonly-Seen Diseases

Idiopathic or Immune-Mediated Uveitis

- Unfortunately, in some cases of uveitis an underlying condition cannot be identified. These cases are presumed to be idiopathic (unknown) or immune-mediated after a thorough process of elimination.

- Why it happens is unknown, but the eye(s) still need to be treated to combat the uveitis and other symptoms.

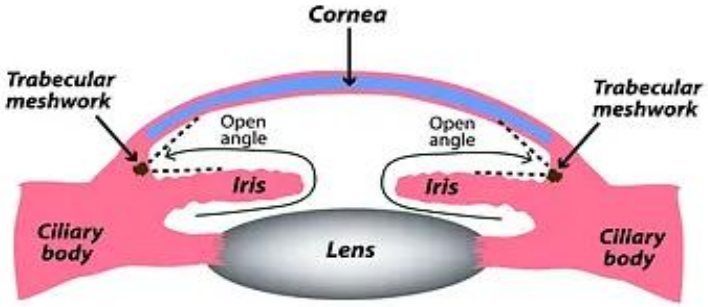
High IOP and Glaucoma

- Glaucoma is characterized by increased intraocular pressure with resulting damage to the optic nerve.[1]
  - Normal IOP ranges from 12 mmHg-20 mm Hg (depending on species, and breed)
  - IOP that is above 25-30 mmHg – should be suspicious of glaucoma
  - Two main categories:
    1. Primary Glaucoma (inherited)
    2. Secondary Glaucoma (caused by another disease process)
  - Vision threatening
  - Progressive disease

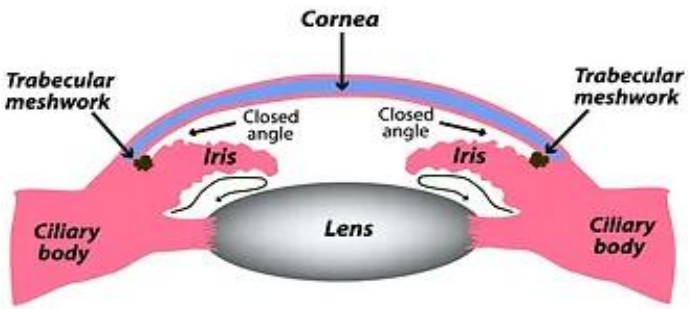
Primary Glaucoma

- Primary Open Angle (Common in Humans, Beagles and Norwegian Elkhounds)
  - Slower process
  - Younger to middle aged animals
  - Iridocorneal angle closes over time
- Primary Closed Angle (Any breed, but very common in Cocker Spaniel, Basset Hound, and Shiba Inu)
  - Iridocorneal Angle not developed correctly
  - Gonioscopy can be used to visualize the iridocorneal angle
  - More rapid onset, happens between 6-8 yrs of age
  - Eventual collapse of the angle and then fluid build-up, causing the globe to become buphthalmic

*****Primary glaucoma is a bilateral disease. If a patient has been diagnosed in one eye it is recommended to start prophylactic treatment in the opposite eye and monitor IOP.*****



OPEN-ANGLE GLAUCOMA

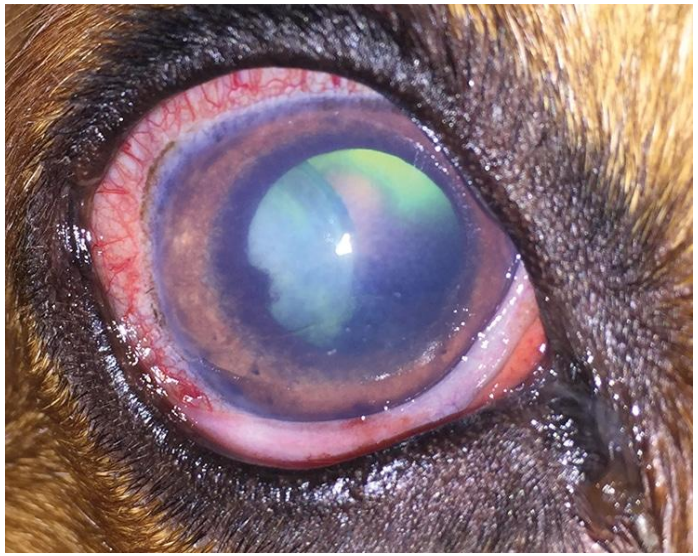


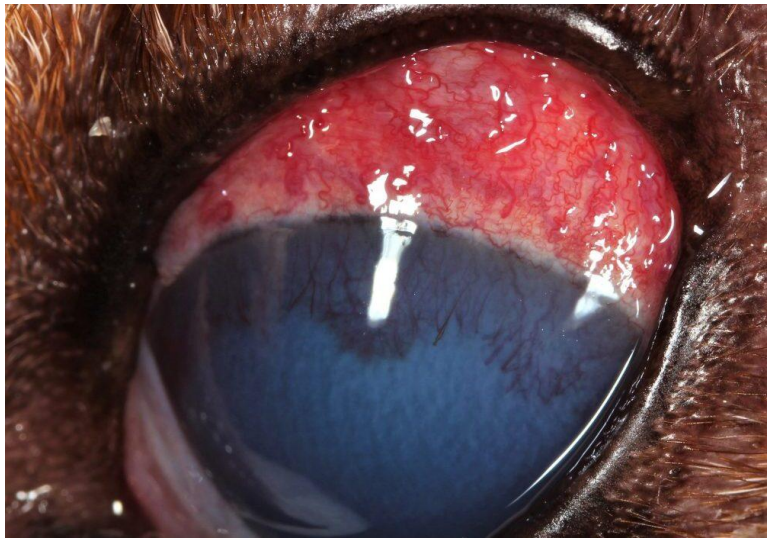
ANGLE-CLOSURE GLAUCOMA

https://www.andysvetclinic.net/post/what-is-glaucoma-in-dogs-cats

Secondary Glaucoma

- Occurs in many different species and breeds
- It is either directly related to primary ocular disease or systemic health that affect the flow of aqueous humor
- Can be unilateral or bilateral
- Usually occurs when the iridocorneal angle or pupil gets filled with abnormal substances/cells that impair outflow[1]
  - Uveal cysts, inflammatory cells, neoplastic cells, lens luxation, scar tissue that can form from long-term uveitis





Signs of Glaucoma

Symptoms can depend on the severity of the glaucoma

Animals are not able to vocalize the initial signs such as flashes of light and occasional visual impairment

Early signs:

- Recurrent scleral redness (“the white part”)
- Ocular irritation, squinting, tearing, discharge
- Increase of IOP noted from the patient’s normal IOP (good to know the patient’s normal values) – Can be a gradual increase
- Decrease in vision

Chronic/End Stage:

- Complete Vision loss
- Buphthalmic globe (stretched globe)
- Ocular pain and tenderness around the globe
- Lethargy
- Loss of appetite – It can hurt to eat
- Chronic migraine feeling
- Elevated IOP (40s, 50s, 60s++!)

https://vet360.vetlink.co.za/guide-can-cant-eye-saved/

Conclusions

- Know how to properly restrain for an Ophtho exam and medication application.
- How to take an IOP and include it in yearly checkups and other exams
- High IOP is not the only concern when checking IOP
- Uveitis can lead to many vision and globe-threatening changes
- Glaucoma is progressive and results in permanent vision loss
- Know what you are treating –Why is there uveitis? What type of Glaucoma is this?
- Many forms of cataracts should be treated medically; surgery is not the only option.
- Ocular conditions can be an indicator of systemic disease
- Look at the entire picture when examining a patient- if IOP is high, no other ocular changes are noted, could it be a false reading?
- Educating the doctors, staff, and clients is crucial to helping our pets stay healthy and visual for as long as possible.

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Thank you for attending!
Any Questions?

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