Glaucoma

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Glaucoma

- Physiology of Aqueous Humor
  - Produced in the ciliary body
  - Flows out the iridocorneal angle and ciliary cleft
  - High intraocular pressures are caused by a decreased amount of fluid leaving the eye
  - Pressures over 25mmHg can rapidly damage the retina—minutes can count

Glaucoma

- Primary: Inherited
  - Due to an abnormal iridocorneal angle and/or ciliary cleft (Goniodysgenesis)
  - Cocker Spaniel, Basset Hound, Toy Poodle and more

- Secondary: Due to some other disease process that damages the drainage angle
  - Severe or chronic uveitis
  - Lens-induced uveitis
  - Lymphoplasmacytic uveitis in cats
  - Lens luxation
  - Intraocular Neoplasia
  - etc
Glaucoma

- Primary Glaucoma will eventually develop in both eyes
  - One eye typically develops elevated IOPs first
  - Treatment of the contralateral eye is essential

- Secondary Glaucoma only causes glaucoma in the eye with the problem
  - Some causes of secondary glaucoma will be present in both eyes
    - Lens-induced uveitis in patients with cataracts (especially diabetics)
    - Inherited lens luxation

How does Glaucoma damage vision?

- Pressure leads to decreased retinal blood flow
- Pressure on the optic nerve causes disruption of axoplasmal flow in the neurons
- Glaucoma patients seem to have a high production of free radicals in the retina which leads to oxidative damage

- It is probably a combination of the above

Glaucoma Diagnosis

- Schiottz: Indentation

- Tonopen: Applanation

- Tonomat: Rebound
Intraocular Pressure (IOP)

- Normal: 8mmHg-25mmHg
- No more than 3-5mmHg discrepancy between eyes.
- Elevated in Glaucoma
- Decreased in uveitis and old age
- Technique is everything…any pressure on the neck or eyelids may alter the results.

- IOP is a number…not a diagnosis

To make a diagnosis you need...

LIGHT SOURCE AND MAGNIFICATION!!!

What does glaucoma look like?

- Lethargy, Inappetence
- Red Eye
- Dilated pupil
  - Absent or reduced direct and indirect PLR
- Absent or reduced menace
- Corneal edema
- Buphthalmos
- +/- squinting
What does glaucoma look like?

- Sudden pressure spikes are more painful than gradual changes
- Cats seem to tolerate higher pressures while still maintaining vision (they may still be painful though)

Additional Testing

- IOP Curves
  - Same concept as a glucose curve.
  - First pressure performed prior to meds in the morning. Measure q.6 hrs to find a nadir.
  - Goal is to keep IOP below 17mmHg in glaucoma patients.
  - Note: Repeated proparacaine and tonometry can lead to ulcers.
- Gonioscopy
- Ultrasound Biomicroscopy (UBM)
  - High frequency probe 35 or 50mHz: can evaluate the iridocorneal angle and ciliary cleft.
  - Evaluate before and after latanoprost to monitor the dynamic action of the ciliary cleft.
Glaucoma Management

- Medically decrease IOP
  - Reduce aqueous production
  - Increase aqueous outflow

- Surgical management: for visual eyes
  - Laser destruction of the ciliary body
  - Trans-scleral or endolaser cyclophotocoagulation
  - Intraocular shunt

- If it is a secondary glaucoma you must try to get the underlying problem solved
  - Lens luxations and Uveitis cases are the only real situations where this is possible
  - Lens couching
    - Sedate, dilate and reclinate
  - Uveitis – Systemic steroids over NSAIDs when possible
Glaucoma Medical Management

- Glaucoma is an emergency!!
- Prostaglandin Analogues (PGF2a)
  - Increases aqueous outflow
  - Cats do not have these receptors
- Latanoprost 0.005% (Xalatan)
  - Excellent emergency drug to use - works well and fast
  - Use BID
  - Cautions: Causes miosis and can be pro-inflammatory
  - Don’t use if the lens is anteriorly luxated
  - Consider any underlying uveitis
  - Bimatoprost 0.03% (Lumigan) - $$$

Glaucoma Medical Management

- Carbonic anhydrase inhibitors
  - Reduces aqueous production
- Dorzolamide 2% (Trusopt)
  - Use BID-TID
  - Almost all glaucoma eyes should be receiving dorzolamide
  - My go to drug to prophylactically treat the contralateral eye in a primary glaucoma
- Brinzolamide 1% (Azopt)
  - Expensive, but less irritating, I primarily use this in patients (especially cats) that do not tolerate dorzolamide

Glaucoma Medical Management

- Mannitol 0.5-1g/kg IV slowly
  - Dehydrates the vitreous through osmosis
  - Cautions: Dehydration, Heart failure, Uveitis
  - Can try once, if it doesn’t work it’s unlikely a second dose will help

- Methazolamide 2.5mg/kg PO BID
  - Systemic Carbonic Anhydrase inhibitor
  - May have minimal effect if the patient is already receiving topical dorzolamide

- Timolol 0.25% -0.5% BID
  - Beta-blocker – can slow the heart rate
  - Does not work well in dogs (much more effective in humans)
  - Cosopt (combination of Dorzolamide and Timolol… $$$)
Primary Glaucoma: The Reality

- At presentation it is often too late for the first eye
- When medications do help in the first eye, they typically don’t work for long
- Focus should be on prophylactic therapy of the second eye
- Medical management eventually fails in all cases

Prophylactic Therapy Success

- Time until the second eye develops Elevated IOP in primary glaucoma

When to consider glaucoma surgery

- Cyclophotocoagulation and/or shunt surgery is typically offered as medical management is failing, but the patient is still visual
Glaucoma: The reality

- Enucleation
- Intravitreal Gentocin Injection
  - 20-25mg Intravitreal injection

Gentocin Injection

- We use 100U Insulin syringes
- Remove an equal volume of fluid from the anterior chamber
- Measure 8mm from the Limbus
- Direct the needle towards the optic nerve
  - DO NOT touch the lens capsule
  - Inject 20-25mg Gentocin

Case selection

- Canine Primary Glaucoma
- High anesthetic risks (without renal disease)
- Clients with financial constraints

Possible Outcomes:

- Long term IOP control without medications
- Phthisis bulbi
- Failure
  - Can try a second time, but it is unlikely to work a third time
Gentocin Injection Failure

- In my hands Gentocin injection has a 70-80% success rate.
- Recent study found over 90% success with 2.5 mg

<table>
<thead>
<tr>
<th>% of Population that fail</th>
<th>2-3 Weeks</th>
<th>5 Months</th>
<th>6 Months</th>
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Enucleation

- Lateral Canthotomy
- Dissect peri-ocular tissue as close to the globe as possible
- No traction on the globe
- Get a pair of Enucleation scissors…and use them
- Remove the conjunctiva, nictitans gland and eyelid margins
- I place a meshwork of suture across the dorsal and ventral orbital rim to improve cosmetics
- Close subcutaneous tissue (start at the nasal canthus to facilitate burying the knot
- Skin closure with nylon (typically cruciate)

Questions?