Ouch….Now what?
Ocular Emergencies
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Common Ocular Emergencies - dealing with the unexpected
- Proptosis of the globe
- Glaucoma
- Corneal lacerations
- Lid lacerations
- Ocular and/or adnexal contusions and concussion
- Severe corneal ulceration
- Corneal perforation and/or iris prolapse
- Hyphema
- Acute anterior uveitis
- Sudden blindness

The making of disaster……

General Considerations
A. Ophthalmic Emergencies - Require immediate professional attention to maintain vision, the integrity of the globe, or to relieve ocular pain.
- Any animal exhibiting acute ocular pain, deformity of the globe or orbit, acute loss of vision or a sudden change in appearance of the eye should be treated as an emergency until proven otherwise.
- Accurate history and complete physical exam are essential.
B. Other Systems - The maintenance of pulmonary, cardiovascular, hemodynamic and neurologic functions takes precedence over vision in emergency situations. These systems must be stable before definitive ocular therapy can be carried out.

Proptosis Of The Globe
- It is important to keep the cornea moist to prevent additional damage
- Owners can use saline, water, petroleum jelly, or antibiotic ointments
- Carefully exam the patient for systemic injuries (remember not to focus on the most “scary” clinical sign – assess the patient)

- Prognosis: 10% chance of maintaining vision
- Negative prognostic indicators
- Hyphema
- Usually associated with severe uveal tract damage
- Often results in ocular hypotension and phthisis bulbi
- Pupil size
- Best prognosis given to a visual globe with direct and consensual PLR
- Miosis: may be associated with iridocyclitis or loss of sympathetic innervation
- Mydriasis: damage to the afferent limb of the PLR reflex (retina or optic nerve) or the efferent limb (oculomotor nerve or iris sphincter muscle)
- Cats have a poor prognosis; brachycephalic dogs have the best prognosis
When deemed stable, induce anesthesia
- I generally pre-med with butorphanol/acepromazine and place an IV catheter for intubation with propofol/isoflurane; alternatively, butorphanol/dexmedetomidine is often sufficient
- Remember, the problem is not that the globe has "popped out of the socket" – it is that the eyelids are restricting the globe from returning to a normal position
- GOAL: lift the eyelid margins over the globe will pushing the globe back into the orbit
- Clean/flush the globe and conjunctiva with LRS or saline eye wash and dilute betadine

Replacement of the globe
- Roll the eyelid margins out and place #2 horizontal mattress sutures of 5-0 silk or nylon
- Horizontal mattress sutures: enter 5mm from the lateral canthus in the superior eyelid, 5 mm from the eyelid margin and exit at the grey line (meibomian gland openings) – enter the inferior eyelid margin and perform a mirror image – space the bite by 5mm and repeat (both inferior and superior) – leave the suture loose over the globe and do not tie; repeat this suture medially; sutures should involve 60-70% of the lateral eyelid margin
- Slip a scalpel blade handle between the sutures and the globe; gently apply pressure to the globe while pulling on the sutures; the globe should reduce and the sutures can be tied
- Stents or no stents ???
- May require lateral canthotomy

Other drugs during the procedure
- Cefazolin 10mg/kg IV
- Dex-sp 0.1-0.5mg/kg IV
- Discharge medications
  - Broad spectrum topical antibiotics TID (solution probably easier)
  - Topical NSAID (flurbiprofen TID) or atropine SID
  - Systemic broad spectrum antibiotic (clavamox or cephalosporin)
  - Systemic anti-inflammatory (prednisone or NSAID)
  - Systemic pain medication (tramadol, torbutrol, or buprenorphine)
  - E-collar

Follow-up
- Recheck in 1 week
  - Remove the most medial suture
  - Fluorescein stain the globe to assess corneal disease
  - Evaluate vision
- Recheck in 2-3 weeks
  - Remove remaining sutures
  - Most likely discontinue medications
  - Consider enucleation or medial canthoplasty

Complications
- Blindness
- Strabismus
- Corneal ulceration +/- perforation
- Neurogenic KCS
- Insepsitive cornea (CN 5)
- Facial Palsy (CN 7)
- Chronic exophthalmos and corneal exposure
Orbital Abscess / Cellulitis

- Orbital swelling - exophthalmia - pain on opening mouth.
- Look for an orbital foreign body.
- Treat with systemic antibiotics and anti-inflammatories.
  - Generally clavamox or marbofloxacin
  - Generally prednisone unless contraindicated
- Surgical drainage per os just caudal to last molar.
- If exposure keratitis is present, may need topical lubricants or temporary tarsorrhaphy.

Glaucoma

- Glaucoma is a clinical sign...not a specific disease entity
- Primary vs. Secondary glaucoma require different treatments and a treatment for one can cause significant problems for the other
- Generally, if the underlying condition is treated in cases of secondary glaucoma, the intraocular pressures will respond positively.

Glaucoma - acute primary glaucoma with potential for vision

- Latanoprost 0.005% every 15 minutes for 4 doses (1 hour)
- If available, topical and systemic carbonic anhydrase inhibitors (trusopt, azopt, methazolamide) and topical beta-blockers (timolol) can be added as well (these will take several hours however to take maximal affect)
- Dex-sp 0.1-0.5mg/kg IV
  - Recheck intraocular pressure 1 hour after starting latanoprost therapy; if IOP>25mmHg, than more aggressive therapy is indicated

Glaucoma - acute primary glaucoma with potential for vision

- If the globe fails to respond to latanoprost therapy.....
  - Mannitol 2ml/lb IV over 20 minutes…..wait 20 minutes and recheck IOP….if >30mmHg, repeat mannitol dose
  - If mannitol fails, aqueous centesis is the last option and/or immediate referral to an ophthalmologist

Anterior Lens Luxation

- Common in Terrier breeds and cats with chronic uveitis
- Anterior lens luxations can disrupt the normal outflow of aqueous and cause papillary block – surgical intervention should be considered ASAP
- Surgery: lensectomy vs. “couching” the lens into the posterior segment
Glaucoma Therapy

Initial Emergency Treatment

- Decrease Intraocular Volume
  - hypotonic drops (oral or IV mannitol or glycerin)
  - Medical therapy: Lasix, mannitol

- Decrease Unconventional Outflow
  - Xalatan (bimatoprost) 0.005% 1 or 2 drops 2x/day for 10 days
  - Rx for 1-2 drops/day (must use topical steroid or 1 or 2 drops of lubricant)
  - May be problematic with uveitis
  - Anti-glaucoma therapy

Carefully examine; if laceration is suspected, sedate/anesthetize immediately and place an e-collar to prevent further damage and refer to an ophthalmologist.

- Avoid pressure on the globe
- Perform a seidel test to confirm leakage; apply a concentrated amount of fluorescein to the cornea (orange) and watch for flowing swirls (green)
- If the laceration is not full thickness and appears sealed, it may not require surgical intervention

Corneal Lacerations

- Medical therapy
  - Systemic antibiotics (cefazolin, cephalexin, clavamox)
  - Systemic anti-inflammatories (NSAID)
  - Systemic pain medication (tramadol, torbutrol, buprenorphine)
  - Topical broad spectrum antibiotics (such as triple antibiotic)
  - Topical cycloplegic (atropine)

- Time since injury
  - 0-4 hours – repair immediately
  - 4-24 hours – estimate and repair; immediate or delayed
  - >24 hours – consider treating as an open wound until gross infection is controlled, then repair electively
- If margin is affected: appose margin first, then close (4-0-6-0)
- If margin is not affected: close like any dermal skin lesion
- If extensive: Elizabethan collar, antibiotics, bandage, etc. and referral

Corneal Foreign Body

Eyelid Lacerations

- Evaluating and planning eyelid repair
  - When did the trauma occur?
  - How contaminated is the lesion?
  - Is the lid margin affected? Lacrimal puncta? Canaliculi?
  - How extensive is the lesion? Does it require grafting?
  - Is the globe affected? Nictitans?

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Eyelid Lacerations

- Minimal debridement – preserve as much tissue as possible
- Eyelids are extremely vascular – even lacerations with significant contamination will heal nicely
- Remember to protect your work: e-collars, sedation, analgesics

Contusions and Concussions

- Contusion – damage from direct contact of the globe with an object
- Concussion – damage due to trauma around the eye with forces transmitted to the globe
- Can cause severe intracranial injury
  - Hyphema, chemosis, subconjunctival hemorrhage, corneal desiccation, proptosis of the globe, blepharoptosis, lid paralysis, absent PLR, ostitis, lens luxation, retinal detachment, blindness

Contusions and Concussions

- First, assess the patient; generalized physical exam and treatment of other life-threatening disorders
- Evaluate the eye and adnexa; PLRs, menace, corneal stain, IOP
  - Is the lens in place?
  - Is the retina normal? Hemorrhages?
  - Are orbital and facial bones intact? Radiographs?
- Treatment
  - Systemic anti-inflammatories (generally corticosteroids)
  - Systemic antibiotics (cefazolin, cephalexin, clavamox)
  - Topical lubricants +/- antibiotics & NSAIDS
  - Close monitoring; cage rest
- If condition is severe or worsens over 12 hours, patient should be referred

Severe Corneal Ulceration

- Infected with significant stromal loss
  - Examination – Schirmer tear test and fluorescein stain
  - Diagnostics – aerobic culture and sensitivity and potentially a sample for cytology and gram stain
  - E-collar, harness, and sedatives very important
  - If more than 50% of the stromal thickness is lost, surgical intervention should be considered

Severe Corneal Ulceration

- Therapy is aggressive and based on cytology, gram stain, and/or culture results
  - Topical antibiotics: combination of neomycin and ofloxacin or the single use of a late generation fluoroquinolone (such as moxifloxacin) targeting both gram + & - organisms – q2hrs for 24-48 hours
  - Topical anti-collagenase: serine q2hrs for 24-48 hours
  - Topical pain medication: atropine q12-24 hours
  - Systemic anti-inflammatories (generally NSAIDS or corticosteroids)
  - Systemic pain medication (same as listed earlier)
  - Systemic antibiotics (doxycycline +/- fluoroquinolones)

Descemetocles

- The last cell layer before perforation
  - An opportunity to consult a veterinary ophthalmologist should be immediately offered
  - Surgical intervention is most likely ideal
  - Conjunctival flap
  - Corneal/lenticular transposition
  - Corneal transplant
  - If this is not an option, treatment is...
Corneal Perforation

- Like a descemetocele, referral to an ophthalmologist should occur immediately.
- If this is not an option, treatment is similar to an infected corneal ulcer, with the addition of:
  - Systemic antibiotics (generally fluoroquinolone, such as marbofloxacin)
  - Avoid ointments – the carrier can get inside the globe causing more uveitis; drops are also easier for clients and require less manipulation around the globe.
  - More aggressive pain medications
  - More aggressive sedatives
  - If comfort cannot be achieved in 48-72 hours, enucleation is most likely warranted.

Hyphema - blood in the anterior chamber

- Hemorrhage occurs from:
  - Iris and ciliary body
  - Uveitis
  - Trauma
  - Neoplasia
  - Posterior uvea and retina
  - Uveitis
  - Trauma
  - Neoplasia
  - Systemic hypertension
  - Also consider coagulopathies

Hyphema - blood in the anterior chamber

- Look for the cause
  - Rule out trauma
  - Then consider:
    - Systemic hypertension – systolic blood pressure
    - Immune-mediated thrombocytopenia - CBC
    - Coagulopathies – ACT, PT, PTT
    - Intravascular neoplasia – ultrasound
    - Hyperviscosity syndrome (MYD)
    - Developmental abnormalities
      - Persistent hyaloid artery
      - Collie eye anomaly
      - Vimentinal dysplasia
    - Treatment
      - Topical NSAIDS (such as flurbiprofen) & corticosteroids (such as prednisolone acetate) – assuming a healthy cornea
      - If minor, drugs like atropine or tropicamide may be used to dilate the pupil – this will help to prevent synchiae formation and help control the uveitis;
        BUT BEWARE… glaucoma is also common secondary to hyphema and these drugs MAY expedite this process
      - Systemic corticosteroids (anti-inflammatory dose)
      - If glaucoma is present or pending
        - Topical (azopt or trusopt) and/or systemic (methazolamide) carbonic anhydrase inhibitors
      - Large blood clots may require intracameral tissue plasminogen activator (TPA)
Acute Uveitis

- Anterior uveitis – inflammation of the iris and ciliary body
- Posterior uveitis – inflammation of the choroid
- Panuveitis – inflammation of the entire globe

Presentation
- Painful; conjunctival and episcleral injection; corneal edema
- Elevated nictitans; photophobia; epiphthalmitis
- Intracocular flare or fibrin; often miosis; hypotony
- Often associated with systemic disease – some of which are life threatening
- May result in secondary glaucoma, cataracts, synechia

Acute Uveitis

- Tyndall Effect
  - Use a bright light source and move from 15-45 degree angles
  - Use different areas in the globe as focal points (iris, pupil)

Acute Uveitis

- Dogs
  - Tick borne: E. canis, Lyme, RMSF
  - Fungal: blastomycosis, coccidioidomycosis, cryptoplasmosis, histoplasmosis
  - Parasitic: toxoplasmosis, neospora, heartworm, toxocara
  - Neoplastic: lymphoma
  - Immune mediated disease
  - Lens induced uveitis
  - Immune mediated thrombocytopenia
  - Immune mediated vasculitis
  - Uveodermatologic syndrome
  - Breed specific
  - Pigmentary uveitis of the Golden Retriever
  - Cairn Terrier

Acute Uveitis

- Cats
  - Immune mediated (lymphocytic plasmacytic inflammation)
  - Viral: FIV, FIP, FeLV
  - Bacterial: bartonella
  - Protozoal: toxoplasma gondii
  - Fungal: cryptoplasmosis, histoplasmosis, blastomycosis
  - Neoplastic: lymphoma
  - Tick borne
  - Herpes ?

Initial work-up
- CBC/CHEM/UA
- Appropriate serology based on species and presentation
  - Tick PCR
  - Fungal PCR; prefer urine blasto antigen test for blasto
  - Viral titers
  - Enzo titers
  - Bartonella western blot or PCR
  - +/- Thorax radiographs
  - +/- Abdominal ultrasound
Acute Uveitis

- Treatment:
  - Topical NSAIDS (flurbiprofen) and corticosteroids (prednisolone acetate 1%) – q 6hrs
  - Topical atropine – q12-24 hrs – again, use with caution (glaucoma)
  - Systemic NSAIDS are generally safe
  - Systemic corticosteroids may be more valuable, but should rule out or be treating systemic diseases concurrently

Acute Blindness

- Acute glaucoma
  - Often uncomfortable; episcleral injection; corneal edema; reactive or fixed mydriasis
  - Check intraocular pressure
  - Retinal detachment
    - Generally comfortable; reactive or fixed mydriasis; vitreous/subretinal hemorrhage or serous detachment
    - Check systolic blood pressure
    - Some breeds predisposed
      - Bichon Frise
      - Shih tzu
  - Acute uveitis with retinal detachment, glaucoma, or neuritis
    - Common with lymphoma or fungal diseases

- Hypertensive retinopathy in a cat

- Sudden Acquired Retinal Degeneration (SARD)
  - Acute blindness over 24 hrs; fairly normal appearing globe; possible short-term history of PU/PD; often middle to older aged spayed females
  - Various toxicities
    - Ivermectin overdose
    - Enrofloxacin in cats
    - Marijuana intoxication
  - Post-seizure
  - Cerebral hyponxia following anesthesia or CPR

- End-stage retinal degeneration
  - Acute onset of cataract
  - Diabetes
  - Juvenile/ genetic
  - Optic neuritis
  - Primary CNS disease

Questions