Reasons for Presentation

- Known trauma
- Holding eye shut (pain)
- Sudden change in ocular appearance
- Red appearance to the eye
- Sudden loss of vision

Triage is Tough

Orbit

- Proptosis
- Orbital abscess and cellulitis
- Orbital foreign bodies

Proptosis

- Globe is forced beyond the orbital rim, eyelids
- Trauma
- Brachycephalics predisposed
  - Shallow orbit
  - Prominent globe
  - Large eyelid opening
  - Periorbital swelling, ON damage

Proptosis - Prognostic Indicators

- Medial rectus first to tear
- Poorer prognosis if:
  - > 2-3 extraocular muscles severed
  - Corneal or scleral rupture
  - Hyphema
- Not reliable
  - PLR (for 7-10 days)
  - Pupil size
  - Facial conformation
  - Cats, dolichocephalic
Surgical Replacement
- Lateral canthotomy if needed
- Pre-place sutures
  - Simple interrupted, horizontal mattress
  - 5-0 non-absorbable suture ideal
  - Stents (fluid line tubing)
- Gentle traction to pull lids over globe

Proptosis Treatment
- Keep eye lubricated
- Pull eyelids over
- Suture shut, minimum of 2 weeks
- Antibiotics
  - Topical
  - +/- systemic
- Systemic Anti-inflammatories
  - Steroids vs. NSAIDS
- Warn owner guarded prognosis
  - Enucleation

Complications
- Strabismus (medial, ventral rectus)
- Lagophthalmos
- Decreased corneal sensitivity
  - Corneal degeneration, ulceration
  - Keratoconjunctivitis sicca
  - Corneal ulcer (due to above, suture)
  - Uveitis, glaucoma, cataract
  - Retinal detachment, retinal degeneration
  - Optic nerve degeneration, avulsion
  - Phthisis bulbi

Orbital Abscess and Cellulitis
- Exophthalmos
- TE protrusion and hyperemia
- Strabismus
- Pain on opening the mouth
- Pain on retropulsion
- Possible fever
- Check the dental arcade
- Check the zygomatic papilla
- Evidence of foreign bodies?

Orbital Abscess and Cellulitis
- Ancilliary diagnostics
  - US, CT, MRI
- Surgical Drainage
  - Last molar
  - Blunt and slow
  - Find a pocket
  - Often unrewarding
- Antibiotics
  - Culture and sensitivity
  - Avoid mouth bugs
- Anti-inflammatories
  - NSAIDS
  - Steroids
Orbital Abscess Patterns in Dogs and Cats

- 2009 study, 34 dogs and 7 cats
- Dogs: Staphylococcus, Escherichia, Bacteroides, Clostridium, and Pasteurella
- Cats: Pasteurella and Bacteroides
- Antimicrobial resistance was uncommon in cats

Orbital Abscess Patterns in Dogs and Cats

- Most common idiopathic
- Most common identified routes of orbital bacteria introduction: extension from adjacent structures, penetrating exogenous trauma, and foreign bodies
- Basis of in vitro susceptibility: cephalosporins, extended-spectrum penicillins potentiated-penicillins, and carbapenems
- Clavamox and Metronidazole (TOC)

Eyelid Lacerations

- Primary closure soon
- Flush, cold compress
- Apposition important
- Minimal debridement
- Antibiotics
- Anti-inflammatories
- Topical lubricants
- Monitor for nerve injury

Questions??

Corneal Emergencies

- Lacerations
- Penetrating Wounds
- Descemetocoeles
- Foreign Bodies

Figure 2. Sympathetic ophthalmia. T2-weighted color MRI scan. Note the low intensity signal linear foreign body in the intrascleral space surrounded by high intensity signal material, consistent to be protein material.
Corneal Lacerations
- Lacerations that are leaking are best treated surgically ASAP
- Degree of intraocular damage and integrity of cornea will determine type of surgical treatment
- If surgery must be delayed due to other injuries, long traveling distance, etc. treat medically

Medical Treatment
- Topical antibiotic drops preferably q.2-4 hours if not leaking, if leaking q.6 hours
- Topical mydriatic?
- Oral anti-inflammatory to treat intraocular inflammation (we like steroids!)
- Oral antibiotics to prevent intraocular infection (we like Clavamox)
- E-collar, pain management

Corneal Laceration
- Primary closure
  - 8-0 Vicryl or smaller
  - Deeper injuries?
  - Lens
  - Uvea
  - Retina
  - Treat uveitis
  - Systemic and topical abx
  - Systemic anti-inflammatories
  - May need Tissue Plasminogen Activator
  - May need surgery

Treatment of Lacerations with Associated Lens Capsule Tear
- Surgical repair of laceration by direct suture or graft
- Phacoemulsification of cataract or lens material through lens capsule tear or through capsulorrhexis
- Intraocular lens (+/-)
- Post-op treatment same except topical steroids and anti-glaucoma meds may be indicated

Complications of Lacerations
- Anterior/posterior synechia
- Chronic uveitis
- Phthisis bulbi
- Secondary glaucoma
- Cataract
- Blindness

Penetrating Wounds
- Gunshot, plant, fence
- Deeper injuries?
- Small, collapsed globe
- Handle with care
- Refer for repair
  - Don’t remove object
  - Avoid ointments
- Additional diagnostics
  - Ocular ultrasound
  - CT or MRI
Corneal Foreign Bodies

- Usually plant material
- How deep does it go?
- Topical anesthetic
- Sedation?
- Remove with 25/27 gauge needle and fine forceps
- Hydropulsion
- Medical treatment
  - Topical abx +/- systemic
  - Single Dose of Atropine
  - Oral NSAID/steroid

Remove with 25/27 gauge needle and fine forceps

Hydropulsion

Medical treatment

Topical abx +/- systemic

Single Dose of Atropine

Oral NSAID/steroid

Descemetocele/perforation

- Descemetocele is a pending perforation so don’t wait to refer
- Perforation esp. if leaking is a definite emergency if globe is to be saved
- These cases can rupture in the exam room so be careful!

Descemetoceles

- Ulcer extending to descemet’s (thin!)
- Impending rupture
- Avoid pressure on jugulars
- Open Eyelids over orbital bones
- Surgical ER- refer
- Never bad to start meds before transport
  - Abx: big gun
  - Serum?
  - E-collar

They don’t all look the same

- Descemetocele= ulcer to the depth of endothelial basement membrane
- Fluorescein uptake with clear center
- Rarely see bulging of membrane usually deep crater
- Perforation=fibrin plug, blood, iris, collapsed anterior chamber, aqueous humor leakage
- Acute perforations usually very painful

Prompt, careful, thorough exam

- Avoid excessive restraint
- Look for underlying cause
  - Dry eye
  - Distichiasis, trichiasis, ectopic cilia, entropion
  - Foreign body (esp behind third eyelid)
  - Mineral degeneration
  - Facial nerve, trigeminal nerve disease
  - Corneal sequestrum (cat)
Examination and diagnostics

- Numbing the surface of the eye with topical anesthetic can be very helpful
- Examine non-painful eye first may give clues to inciting cause of painful eye (i.e. Dry eye, extra hairs, etc)
- Slow, careful examination of affected eye if possible
- Proper diagnostics to rule out underlying dry eye, assess depth of ulcer, etc

Prognostic clues

- Presence of direct or consensual PLR
- Clear view into eye
- Size of ulcer
- Integrity of cornea
- Presence of other ocular disease
  - Cataracts, retinal disease

Patient/ client preparation

- Majority of these cases will need surgery
- Depending on clinical findings same day surgery is ideal and warranted
- Older/ and patients with concurrent health problems need further work-up
- Prompt referral if client willing (don’t hesitate to call us)

Surgical repair

- Conjunctival pedicle flap
- Conjunctival island graft
- Conjunctival hood flap
- Corneocconjunctival transposition flap
- Corneal graft
- Other tectonic grafts (scleral, small intestinal submucosa (BIOSiS))

Corneal Graft                Conjunctival Graft

Feline Conjunctival Pedicle Flap
Corneoconjunctival Transposition

Post-op medications and follow up
- Topical and systemic same as for laceration
- Restricted activity
- Elizabethan collar
- After care plays as important a role as surgery in determining success
- Follow up visits (usually 3-4 during first 8 weeks)

Melting Corneal Ulcer
- Corneal perforation within 12-24 hours if not tx aggressively
- Causes usually bacterial
  - Pseudomonas aeruginosa
  - Beta hemolytic streptococcus
- Fungal uncommon in dog; common in horse
- Melting due to collagenase either from organism or self

Examination and Diagnostics
- Look for underlying causes
- Schirmer tear test (before drops)
- Cytology
- Culture and sensitivity (before drops)
- Fluorescein stain
  - Dry eye, lid abnormalities, hairs, ear skin infection etc
Treatment and Follow up

- Topical antibiotics every 2 hr
- Topical anti-collagenase every 2-4 hr
- Topical mydriatics ?
- Oral antibiotic
- NSAID

Treatment Protocol

- Ofloxacin q.2 hours
- Tobramycin q.2 hours
- Anticollagenase q.2 hours: Serum (Autologous or Heterologous), N-acetyl-cysteine, EDTA, tetryacyclines
- Atropine 1% or tropicamide 1% to prevent synechia, ciliary spasm, stabilize blood aqueous barrier

Treatment Protocol

- Fresh autologous serum aseptically prepared topically q 2-4 hours (refrigerate and discard after 48 hours)
- Clavamox PO q 12 hours
- E-collar
- May need hospitalization if client unable to treat round the clock
- Follow up within 24-48 hours

Anterior Chamber

- Uveitis
- Hyphema
- Anterior lens luxations
  - Primary
  - Secondary

Uveitis

- Many causes, many infectious
- Look for other systemic signs

- Check for ulcer
- Topical steroids
- Systemic NSAIDs or steroids
- Atropine
- Systemic abx?

Uveitis- Differential Diagnosis

Infectious
- Fungal
  - Blastomycosis
  - Histoplasmosis
- Cryptococcus
- Coccioidomycosis
- Candidiasis
- Viral
  - FeLV / FIV
- FIP
- Canine Distemper
- Rabies
- Adenovirus
- Algal (prototheca)

- Bacterial
- Brucellosis
- Bartonella
- Babesia
- Protozoal
- Toxoplasmosis
- Neospora
- Leishmaniasis
- Rickettsial
- Ehrlichia
- RMSF
- Parasitic
- Dirofilaria
- Toxocara
Uveitis - Differential Diagnosis

- Immune Mediated
  - Uveodermatologic syndrome
  - Lens -induced (phacolytic)

- Traumatic
  - Lens capsule rupture
  - Blunt trauma
  - Penetrating trauma

- Toxic
- Neoplastic
  - Lymphoma
  - Melanoma

- Metabolic
  - Systemic hypertension
  - Hyperlipidemia
  - Idiopathic - #1

Hyphema

- Trauma? Able to clot? Other systemic signs?
- PT/PTT, platelets
- CBC, serum chemistry, **blood pressure**
- Ehrlichia, RMSF, Bartonella
- Ocular US to see if retinal detachment or mass

Acute Anterior Lens Luxation

- Acute blepharospastic, painful eye
- Acutely red eye
- Acute corneal edema
- Presentation similar to glaucoma but careful examination reveals the lens in the anterior chamber and usually miosis
- Usually associated glaucoma due to pupillary block or drainage angle

Anterior Lens Luxation

- ALWAYS an ER
- Impending pupillary block glaucoma
- Damage to corneal endothelium
- Possible retinal detachment
- Concurrent uveitis
- Surgical removal early
- Terriers - check other eye
- No miotics

History and Presenting Signs

- Treatment of associated glaucoma with Mannitol IV
- Miotics **CONTRAINDICATED**
- Topical steroids if no ulcer
- Systemic anti-inflammatory
- Prompt referral for surgical lensectomy
Surgical Management of Luxated Lens

- General anesthesia
- Operating microscope
- +/- non-depolarizing muscle blocker
- Clear corneal or corneolimbal incision
- Lens extraction via lens loops
- Cryoprobe for posterior, sublux lens
- Anterior vitrectomy
- Close corneal incision

Post-op treatment and follow up

- Topical anti-inflammatory QID
- Topical antibiotic QID
- Oral anti-inflammatory BID
- Oral anti-glaucoma BID
- Oral antibiotic BID
- 3-4 recheck visits over 8-12 wks
- Client communication re: contralateral eye

CLINICAL DIAGNOSIS?

Primary Glaucoma

- Intraocular pressure >25mmHg with no evidence of intraocular disease that could result in secondary glaucoma
- IOP spike can permanently damage optic nerve within hours
- Remember the breeds
- Remember the classic signs BLIND, RED, PAINFUL, DILATED, CORNEAL EDEMA
- When in doubt treat

Primary glaucoma breeds

*classic breeds seen at VRC-NOVA

- Arctic breeds *
- Bassett hound *
- Beagle
- Boston terrier
- Bullmastiff
- Cairn terrier
- Cocker spaniel *
- Chow Chow *
- Flat-coated
- Golden retriever
- Great dane
- Norwegian Elkhound
- Poodle
- Fox/Welsh terrier
- Springer spaniel
- Shar Pei
- Shiba inu

HYPEREMIA, EDEMA, MYDRIASIS
Chronic versus Acute
- History
- Buphthalmos
- Lens subluxation
- Damaged optic nerve

Acute history
- Normal size globe
- Normal lens
- Pink or hyperemic optic nerve

Examination and Diagnostics
- Menace response? Dazzle reflex?
- Pupil size
- Direct PLR?
- Indirect PLR?
- Direct/indirect ophthalmoscopy
- Gonioscopy (contralateral eye)
- Tonometry
- Prompt referral

Initial Medical Treatment
- Mannitol IV slow over 20-30 minutes
- Oral carbonic anhydrase inhibitors
- Topical carbonic anhydrase inhibitors
- Topical parasympathomimetic
- Direct acting, indirect acting
- Topical prostaglandin analogue
- Topical miotic
- Topical +/- oral anti-inflammatory

Emergency Glaucoma Treatment
- Mannitol 1g/kg IV over 20 min or Glycerin 0.75ml/lb PO over 20 min
- Methazolamide 1mg/lb PO BID-TID?
- Dorzolamide (Trusopt) QID
- Latanoprost (Xalatan) BID
- Demecarium bromide BID
- Timolol maleate 0.5% (Timoptic) QID

Surgical Treatment for Glaucoma
- Diode laser cyclophotocoagulation
- Cyclocryotherapy
- Gonioimplant
- Intrasceral prosthesis *
- Enucleation *
- Ciliary body ablation *

*Permanently blind, painful eye

Primary Glaucoma is a BILATERAL Disease
- Blind painful eyes with no chance of vision return best treated surgically
- Prophylactic medical treatment of contralateral eye is beneficial
- Long term prognosis poor
- Early intervention best chance of slowing progression of disease
- Client education important
Acute Glaucoma

- Acute for real?
- Every second of pressure increase equals more damage
- Mydriasis
- Corneal edema (>40)
- Episcleral injection
- Buphthalmia/Habb’s striae
- Lower fast!
- Primary or secondary?
- Gonioscopy

Acute Primary Glaucoma

- No antecedent cause
- IOP > 30 mmHg
- Inherited in
  - Cocker spaniel
  - Bassett Hound
  - Siberian Husky
  - Chow-Chow
  - Shar Pei
- Other eye often effected in 8 months
- Prophylactic treatment

Acute Glaucoma - Treatment

- Primary - no lens lux
  - Latanoprost
  - Cosopt
  - +/- Mannitol
- Lens Lux
  - NO prostaglandins, NO miotics
- Secondary
  - Treat underlying cause
  - Steroids
  - Cosopt OK
  - Mannitol not effective if uveitis, can try giving steroid injection 5-20 minutes prior

Sudden Onset of Blindness

- Uveitis
- Intraocular hemorrhage
- Glaucoma
- Chorioretinitis
- Retinal detachment
- SARDS
- Optic Neuritis
- CNS disease

Retinal Detachment

- Look for underlying cause
- Hypertension, may reattach
- Spontaneous in some breeds
- Bullous
- Rheumatogenous
- Some surgical solutions

Optic Neuritis

- Dilated pupils
- Optic disc swelling
- Look for chorioretinitis
- Many causes
  - Infectious
  - Inflammatory
  - Neoplastic
  - Traumatic
- Look for other CNS signs
Ocular Emergency Checklist

- What is the eye position?
- What is the eye size?
- Any obvious corneal defects?
- How painful is the patient?
- Is the eye visual?
- Is there generalized depression or signs of systemic illness?
- Does the problem require immediate surgical repair?

Questions??

Helpful Hints

- Ointment vs. solution
- Serum
- E-collar
- Antibiotic selection
- Steroids vs. NSAIDS

Ointment vs. solution

- Client preference
- NEVER an ointment if the eye has or might rupture

Serum

- Only needed if soft/stromal invasion
- Bleed a big friend
Antibiotic selection

- Antibiotic resistance
- Big guns: use usually indicated by culture, stromal loss, infected or melting ulcers
  - Gentamicin
  - Tobramycin
  - Cefazolin
  - Chloramphenicol
  - Moxifloxacin
- Little guns: general, broad spectrum — prophylactic, erosions, conjunctivitis
  - Neomycin
  - Polymyxin B
  - Bacitracin
  - Gramicidin
  - Oxytetracycline (Terramycin)

Steroids vs. NSAIDs

- Topical
- Oral
- Facial conformation
- Long-term use

Contact

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