Enucleation (Outline)

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Definitions:
**Enucleation**: removal of the globe, conjunctiva, nictitating membrane, and lacrimal gland after the eye muscles and optic nerve have been severed (subconjunctival)

**Exenteration Exirpation**: removal of the entire contents of the orbit. (transpalpebral ablation).

**Exophthalmos** involves a normal-sized globe that is pushed forward by a space-occupying lesion in the orbit, most commonly a retrobulbar abscess, cellulitis, or neoplasm. Resistance to retropulsion.

**Buphthalmos** involves a normally positioned globe that is enlarged because of glaucoma. No resistance to retropulsion. Corneal edema. Linear streaks in cornea due to breaks in Descemet’s membrane

**Possible indications for enucleation**
Squamous cell carcinoma
Lymphosarcoma
Chronic glaucoma
Prolapsed retrobulbar fat (Phthisis bulbi)
Severe trauma or proptosis.
Rupture
Chronic endopthalmitis or panophthalmitis
Retrobulbar abscessation; periorbital cellulitis
Perforating ulcers
Lacerations, orbital fractures, foreign bodies

**Squamous cell carcinoma** (SCC)
75% of lesions involve bulbar conjunctiva and cornea (90% limbus, 10% cornea)
25% involve palpebral conjunctiva, nictitating membrane, eyelid skin

Options for treatment:
Cryotherapy; Excision/cryotherapy; Hyperthermia; Enucleation/Exenteration; Bradiation with strontium applicator; Immunotherapy

Cryotherapy or hyperthermia Small lesions, < 2.5 cm treated with or without prior surgical debulking resulted in 97% success rate after 1-2 treatments.

Exenteration of 17/21 cattle with SCC
Mean survival time after surgery was 15 months. Recurrence evident in 6 of 17 cases within 2 to 14 months after surgery.

**Lymphosarcoma**
Most frequent cause of exophthalmos

**Diagnosis**
Clinical signs
BLV Serology
US/ Aspirate with cytology

Enucleation not permanent cure
Check regional lymphnodes – cull if lymphadenopathy

**Proptosed/ ruptured eye** – usually traumatic

**Phthisis bulbi** – prolapse fat. Differentiate from lymphosarcoma

**Cataract.** May be congenital or associated with BVD, toxic plants

**Anesthesia.** Rarely done under general anesthesia

**Sedation**
Temperament of animal
Sedation used in 19/53 – 36% cases presented for enucleation
Xylazine: 0.02-0.05 mg/kg IM/IV
Ketamine Stun: 20:40:60  Butorphanol, xylazine, ketamine
Acepromazine/xylazine: 10/5mg or 10/10mg

**Auriculopalpebral Nerve Block**
Prevents eyelid closure during examination of eyeball
Blocks the motor to the eye. Paralyzes orbicularis oculi muscle
Does not produce analgesia of the eye or the lids.

**Procedure**
Insert needle in front of base of ear at the end of the zygomatic arch
Introduce needle until its point lies at the dorsal border of the arch
Inject 10-15 ml of 2% lidocaine

**Retrobulbar block**

**Procedure**
10 ml lidocaine injected through the dorsal, ventral, medial and lateral canthi
Infiltration of the eyelid margins.

**Problems:**
Intraneural injection with acute collapse or death, rupture of the globe, hemorrhage.

Lidocaine can diffuse through optic foramen into the brain

**Peterson block**

**Procedure**

10 cm slightly curved 18 gauge needle is inserted in a space bounded by the supraorbital process, zygomatic arch and the coronoid process to reach the pterygopalatine fossa

After aspiration to prevent injection into the internal maxillary artery, 20 - 30 ml of lidocaine is infused retrobulbar

**Problems:**

Injection into turbinates; variable response

**Enucleation/ exenteration procedure**

**Procedure:**

Suture/clamp lids

Incision follows 2-3cm from lid margins

Blunt/sharp dissection of SQ/deep fascia along orbital rim

Medial and lateral orbital ligaments are cut.

Continue dissecting transpalpebral cutting through the orbicularis oculi and around the conjunctival fornices.

Dissection follows bony part of orbit to apex to optic nerve/muscle cone

Curved hemostat on optic nerve and blood vessels

Optic nerve, retrobulbar muscles severed

Blood vessels clamped if required

Debridement of orbital tissue

Packing – sterile gauze. Remove in 48 hours

Suture incision – horizontal mattress non-absorbable.

**Postoperative care:**

Antibiotic Flunixin/meloxicam

Anti-inflammatory

Monitor for infection
Postop complications
Para-orbital infection (10/53 cases 19%)
  More common in field conditions
  Less common with exenteration
  No significant association (P > 0.05) found between ocular diagnosis, age, anesthetic technique or the suture pattern and occurrence of postsurgical complications.
  Suture tract infection (6/15: 40%)
  Recurrence of disease (5/15: 33%)

Other surgical procedures
Laceration
  Entropion possible complication
Procedure:
  Tacking eyelid. Simple interrupted; horizontal/vertical mattress non-absorbable
  Hotz-Celcus. Incision 3mm parallel to lid margin. Elliptical removal of skin and orbicularis oculi. Check for entropion correction. Remove more skin if necessary. Start suture from center of wound.

Infectious bovine keratoconjunctivitis (IBK)
M bovis – Gram negative organism
  Severity influenced by: environment; season; strain; host immune response; concurrent pathogens
  Persistent – relapses occur
  Susceptible to wide range of antibiotics

Treatment failure: Antibiotic delivery; MIC
Antibiotic routes:
  Palpebral & subconjunctival
  Above MIC tear levels obtained with following:
    1ml of oxytet 100 for 24 hours
    1ml procaine pen (subpalpebral) 35 hours
  Procaine pen study: Once a day x 3 subpalpebral injection (Pen/steroid)
    Not better than no treatment in naturally occurring IBK.

  Bulbar subconjunctival penicillin vs oxytet:
Similar reduction in corneal ulcer healing times
Greater recurrence and shedding in penicillin calves
Bulbar subconjunctival procaine penicillin 300,000IU/ml recommendations:
  1-2ml at 36 hour intervals for 2-3 treatments
  Treat both eyes even if one is unaffected
Overall LA200 at 20mg/kg IM lower recurrence and shedding

Topical route:
  Topical cloxacillin: 2 treatments 72 hours apart as effective as 2 LA200 IM shots at 20mg/kg
  No meat or milk with drawal
Systemic route:
  Oxytet
  Conjunctival concentrations for 20 hours following 20mg/kg IM
  Localize/concentrate in lacrimal gland, conjunctiva and cornea
  Herd outbreak: treat all with single shot then oral chlortetra 2g/250kg. Significant reduction in incidence
  Florfenicol One study showed better effect than oxytetracycline.
  Related to oxytet resistance.

References
