AVIAN
RESTRAINT &
ANESTHESIA

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OBJECTIVE

- Learn to safely restrain, anesthetize, and provide appropriate analgesia for a bird
Physical Restraint

- Manual (bare-handed)
- Gloves
- Towel
- Net
Hoods

- Common in falconry
  - Diurnal raptors
- Other species
  - Ostriches
    - (not emus or rheas)
  - Waterfowl
  - Cranes
Passerines & Small Psittacines
Raptors

- Cover with towel, then control feet
- Can use gloves
- In falconry, birds are trained to the glove
Pre-anesthetic Preparation

- Dedicated Anesthetist
- Fasting
  - ≤ 2-4 hours
- Draw up ER drugs, reversals
- Analgesic plan
- Be prepared to cancel or abort
Anesthetic morbidity & mortality is directly related to anesthetic duration

TIME = LIFE
Analgesia

- **Poor analgesics:**
  - Isoflurane
  - Sevoflurane
  - Propofol
  - Benzodiazepines
Analgesic plan

- Dissociative anesthetics
- Local anesthetics
  - Toxicity – overdosage
- Nitrous oxide
  - Underutilized
  - DECREASED FiO2
  - Expands gas filled spaces
    - Not air sacs
Opioids

- **Kappa agonists**
  - Butorphanol (0.5-2.0 mg/kg) reduced MAC

- **Mu receptor agonists**
  - Poor to no response
ANALGESIA

NSAIDS

- Nephrotoxicity
  - Species sensitivity
  - Long-term use

- Flunixin meglumine (0.1-1.0 mg/kg)

- Ketoprofen (1-2 mg/kg bid)

- Meloxicam (0.3 mg/kg sid)
  - Preferred by many
Induction

- Injectables
  - Propofol
  - Ketamine combinations

- Inhalants
  - Isoflurane
  - Sevoflurane
Propofol

- Requires vascular access
  - Large birds
- Respiratory depression
- Hypotension
- Short duration
- Poor analgesic
- 4-10 mg/kg IV
Ketamine Combinations

- IV or IM
- Analgesia?
- Prolonged recovery
- Poor muscle relaxation
Inhalants

- Rapid control of airway
  - Mask at high %
  - No chamber induction
  - Intubate ASAP

- Turn down gas once induced
  - Efficient respiration
  - Overdosage

- Minimize dead space
Isoflurane

- Low tissue/blood solubility
- Cardiopulmonary depression
  - Dose-dependent
  - Arrhythmogenicity
- Poor analgesia
  - Premed for painful procedures
Sevoflurane

- Lower solubilities
- Lower potency
  - Higher MAC
- Expensive
- Shorter inductions and recoveries
  - Not always an advantage
Ventilatory Support

- Endotracheal tube
- Air sac cannula
- Ventilator
Endotracheal intubation

- Endotracheal tube
  - Uncuffed tube
  - Catheter for tiny birds
  - Remember ↑↑ in resistance
- Trachea relatively larger than mammals
- Complete tracheal rings
Endotracheal Intubation
Intubated bird

- **Always** disconnect before moving or repositioning bird
- Cause of tracheal strictures not completely understood
- Use extreme care when handling
VENTILATORY SUPPORT

Airsac Cannulation
VENTILATORY SUPPORT

Non-rebreathing systems

- Lower resistance
- Easy to adjust depth
- High-flow
  - Rapid heat loss
  - Wasteful
Ventilation

- IPPV is critical
  - Spontaneous breathing does NOT ensure adequate ventilation
  - Every 6-10 seconds
  - Manual or mechanical

- Watch chest excursions
Thermoregulatory support

- Water blankets
- Heat lamps
- Bair hugger
  - Forced air warmer
  - Most effective
Fluid Support

- **Crystalloids**
  - ½ strength LRS or saline (0.045%) + ½ strength dextrose (2.5%)
  - ~ 25% remains in vascular space in 30 min
  - 10 ml/kg/hour during surgery

- **Colloids**
  - Hetastarch
  - 10-15 ml/kg IV or IO over 15 minutes

- Do not use hypertonic solutions
Vascular access

- Emergency drugs
- Fluid support
- Pros and cons
  - Delicate veins
    - IO may be preferable
  - Difficult to secure
  - May take time to get in
    - TIME=LIFE
FLUID SUPPORT

**Intraosseous catheter**

- Ulna (not pelicans) or tibiotarsus
- Spinal needle, 22 to 18 ga
- Half length of bone
- Lidocaine and/or general anesthesia

**Placement assessment**
- Basilic vein clearance
- Radiograph
- No evidence of SQ accumulation
Intraosseous catheter
Syringe pumps

- Accurate
- Small volume infusion
  - Fluids
  - Drugs
- Use regular syringes
- Can pre-program infusions
Blood transfusion

- Available blood donors
  - Same species
  - Same genus
  - Same order?
FLUID SUPPORT

Oxyglobin

- Expensive
- Hypertonic
- Hypertension
- Easy to fluid-overload patients
Subcutaneous fluids

- **Advantages**
  - Convenient
  - Easy

- **Disadvantages**
  - Slow absorption
  - What would you want in an emergency?

- Do not use hypertonic solutions
Monitoring

- Clear drapes
- Esophageal stethoscope
- Temperature probe
- ETCO₂ — underutilized
- Doppler-ulnar, tibiotarsal a.
- Pulse ox less useful in birds
Anesthetic Depth

- Muscle relaxation
- Response to pain
  - Feather plucking very painful
- Palpebral & corneal response
- Heart & respiration rate
  - Careful-HR may ↓ just before arousal
Doppler flow detection

Ulnar a.

Tibiotarsal a.
ECG

- Monitor HR
- Dx arrhythmias
- Challenging
  - Fast rates
  - Low amplitude
- Use small clips or needles
Respiration

- Watch chest excursions
- Assume hypoventilation
  - Anesthetic depression
  - Positional
  - Disease
- CO2 stimulates respiratory drive
  - Use lower RR when recovering birds
Blood gas analysis

- $P_aO_2$: Oxygenation
- $P_aCO_2$: Ventilation
- pH & $P_aCO_2$: Acid-base status
- Ulnar or metatarsal arteries
Pulse oximetry

- Not valid in birds
- Trends may be useful
  - Pulse rate
  - Pulse wave \( \neq \) perfusion

MONITORING
End-tidal CO\textsubscript{2} (capnography)

- Very useful tool
- Not perfect
  - Dead-space
  - Sampling rate
  - Volume
- Awaits validation
Temperature

- Esophageal = core
- Cloacal /= core
- Continuous
- Normal bird ≥ 104°F
Recovery

- Wrap bird in towel until able to stand
- Remove perches from cage until bird can perch steadily
- **Birds often arrest at or just after extubation**
  - Be prepared
Prolonged recovery?

- Anesthetic overdose
- Hypothermia
- Hypoglycemia
- Hypercapnia
- Hypovolemia