AVIAN RESTRAINT & ANESTHESIA

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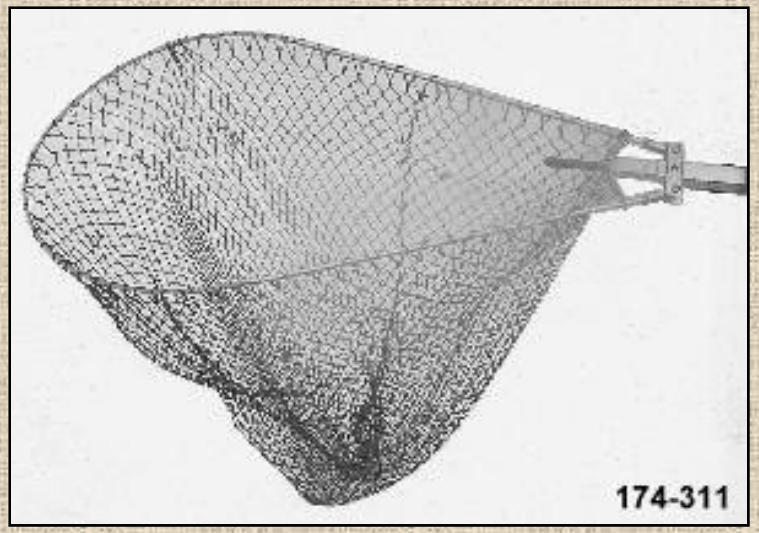
OBJECTIVE

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

Physical Restraint

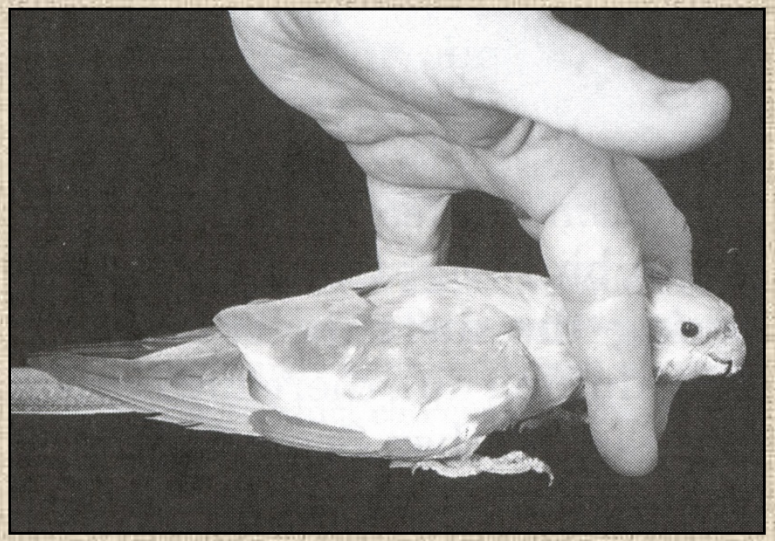
- Manual (bare-handed)
- Gloves
- Towel
- Net

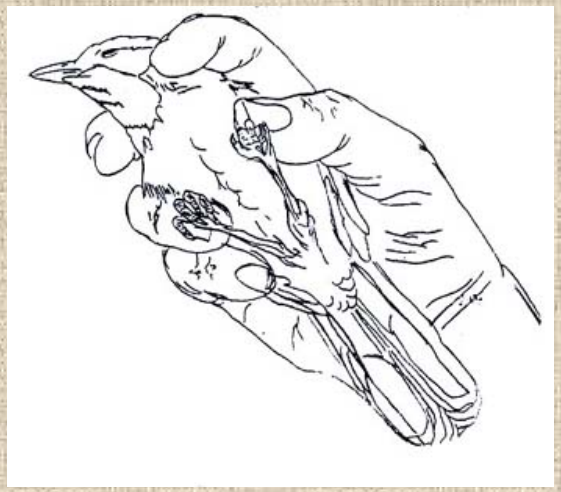


Hoods

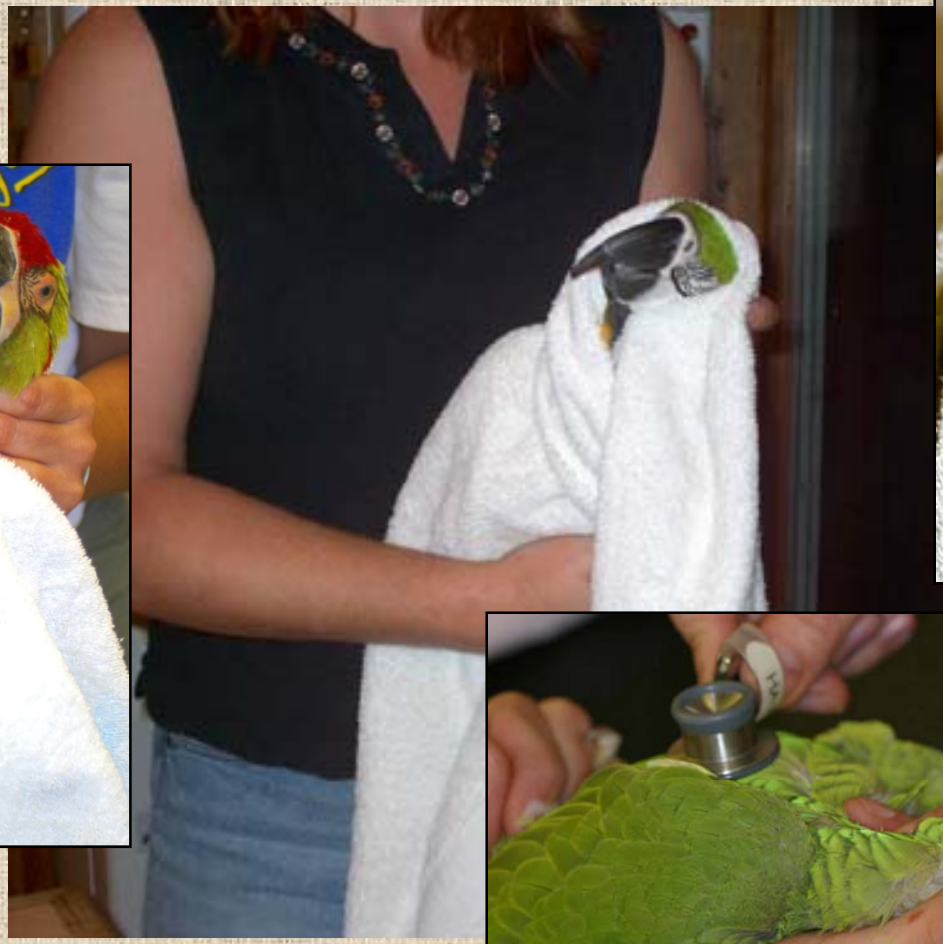
- Common in falconry
  - Diurnal raptors
- Other species
  - Ostriches
    - (not emus or rheas)
  - Waterfowl
  - Cranes

Passerines & Small Psittacines





Large Psittacines



Raptors

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

Pre-anesthetic Preparation

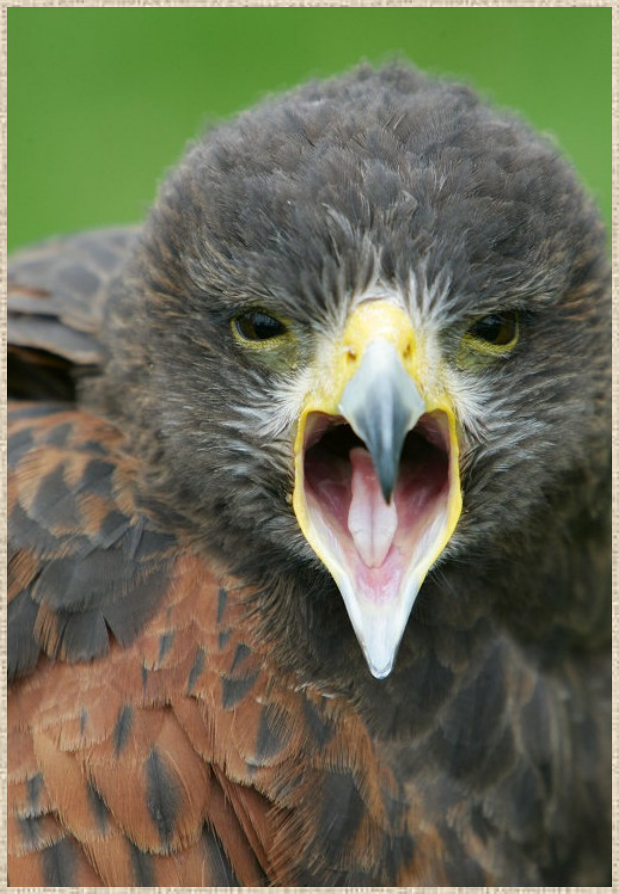
- Dedicated Anesthetist
- Fasting
  - ≤ 2-4 hours
- Draw up ER drugs, reversals
- Analgesic plan
- Be prepared to cancel or abort

Anesthetic morbidity & mortality is directly related to anesthetic duration

TIME=LIFE

Analgesia

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



10 mL 5 Fliptop Vials Multiple-Dose NDC 0074-3213-02
DIAZEPAM Injection, USP
5 mg/mL
FOR I.V. OR I.M. USE.
Protect from light.
Store at controlled room temperature 15° to 30°C (59° to 86°F).
ABBOTT LABORATORIES, NORTH CHICAGO, IL 60064, USA

NDC 55390-126-10 10 x 10 mL vials
MIDAZOLAM HCl INJECTION
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*Midazolam 5 mg/mL (as the hydrochloride)
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BEDFORD LABORATORIES

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250 mL
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INHALATION ANESTHETIC
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IsoFlo®
isoflurane, USP
Nonflammable, Nonexplosive Inhalation Anesthetic
250 mL
For Use in Horses and Dogs
Caution: Federal law restricts this drug to use by or on the order of a licensed veterinarian
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20 ML Single Dose Flip Top Vials
PropoFlo™
propofol
Anesthetic Injection
CARTON CONTAINS 5 VIALS
Emulsion for Intravenous Use in Dogs.

Analgesic plan

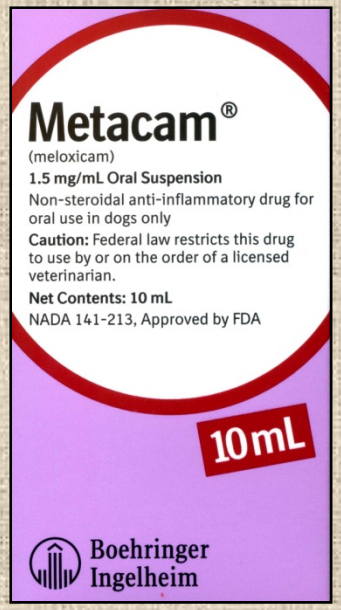
- Dissociative anesthetics
- Local anesthetics
  - Toxicity – overdosage
- Nitrous oxide
  - Underutilized
  - DECREASED FiO2
  - Expands gas filled spaces
    - Not air sacs

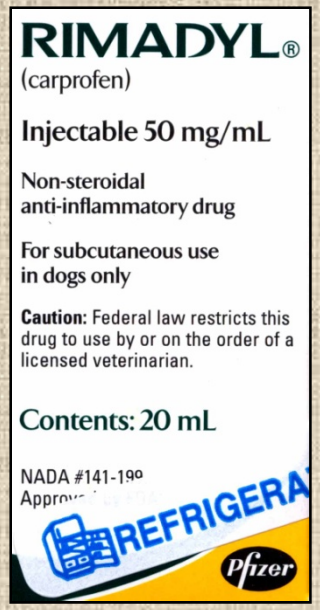
Opioids

- 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

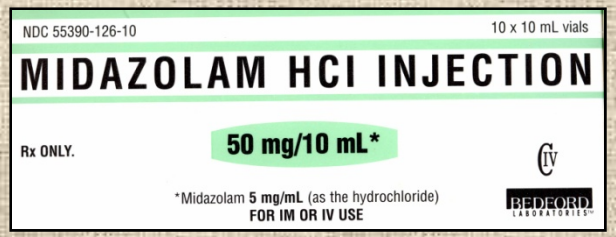
- Injectables
  - Propofol
  - Ketamine combinations
- Inhalants
  - Isoflurane
  - Sevoflurane

Propofol

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

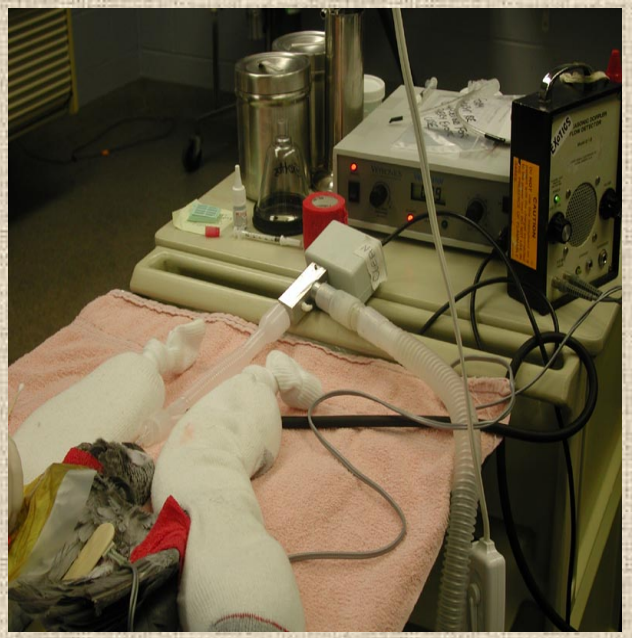
Ketamine Combinations

- 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

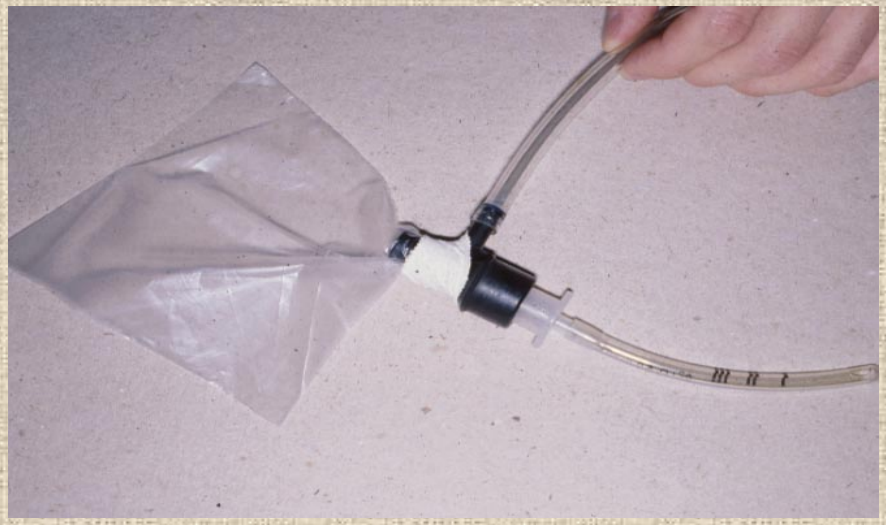
- Low tissue/blood solubility
- Cardiopulmonary depression
  - Dose-dependent
  - Arrhythmogenicity
- Poor analgesia
  - Premed for painful procedures

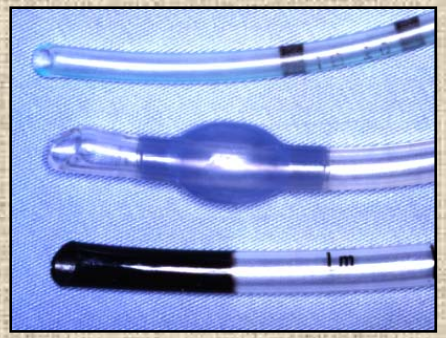
Sevoflurane

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

Ventilatory Support

- Endotracheal tube
- Air sac cannula
- Ventilator

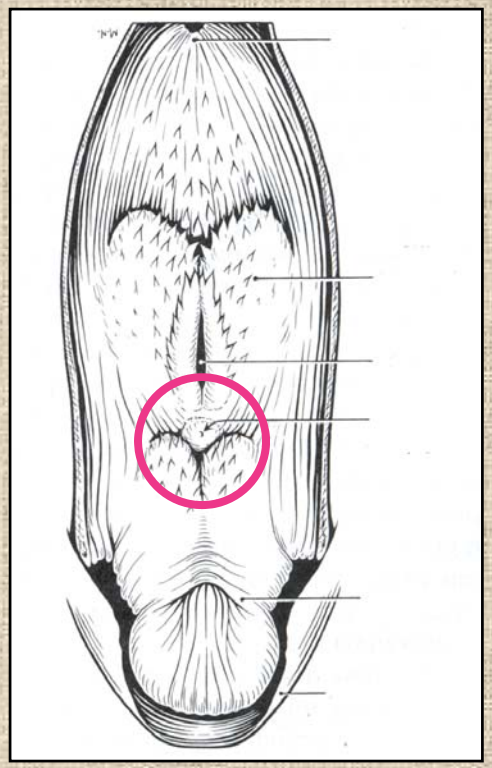


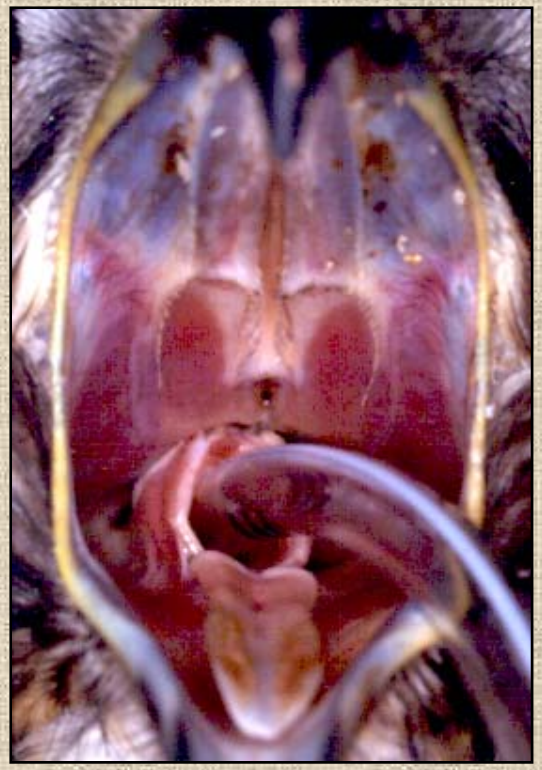


Endotracheal intubation

- Endotracheal tube
  - Uncuffed tube
  - Catheter for tiny birds
  - Remember ⇑⇑ in resistance
- Trachea relatively larger than mammals
- Complete tracheal rings

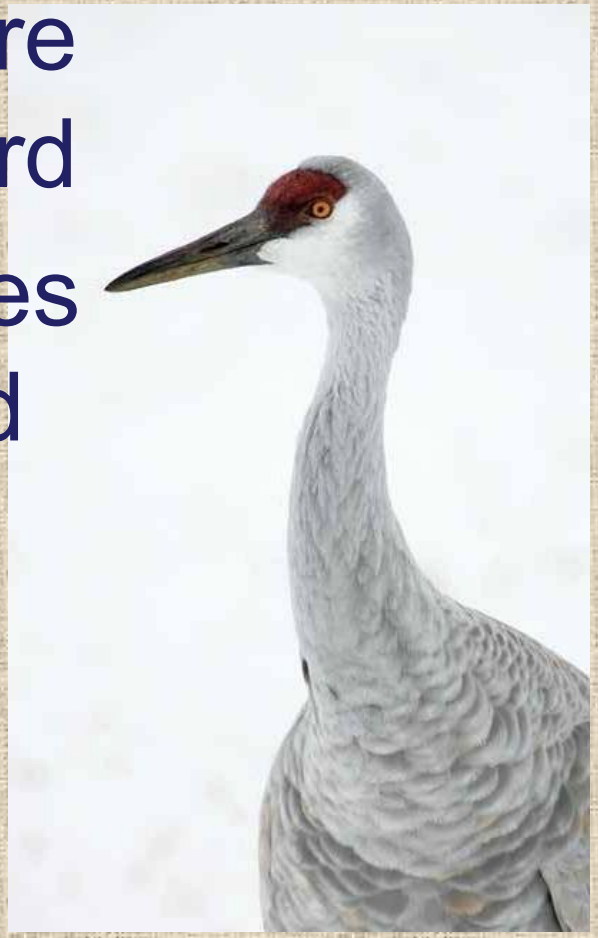
Endotracheal Intubation

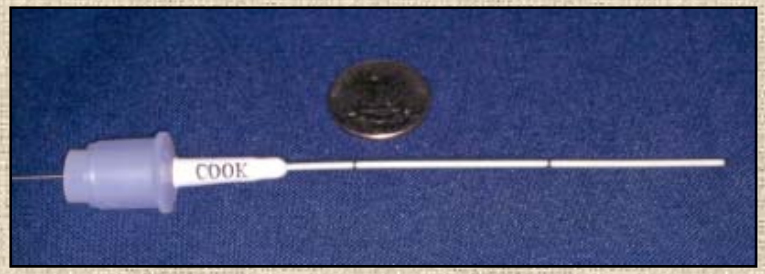




Intubated bird

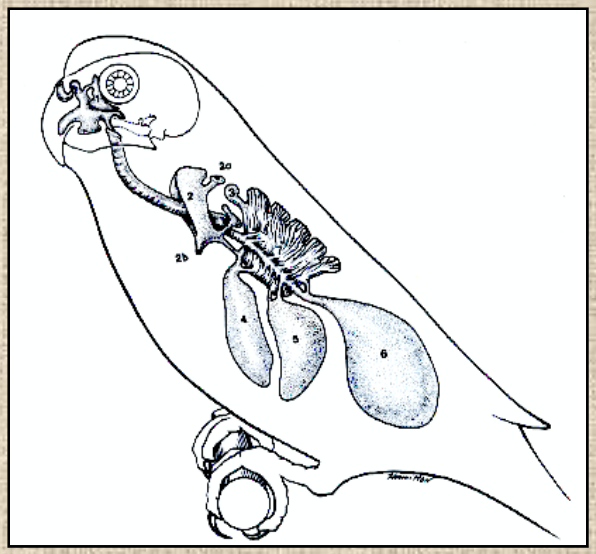
- **Always** disconnect before moving or repositioning bird
- Cause of tracheal strictures not completely understood
- Use extreme care when handling

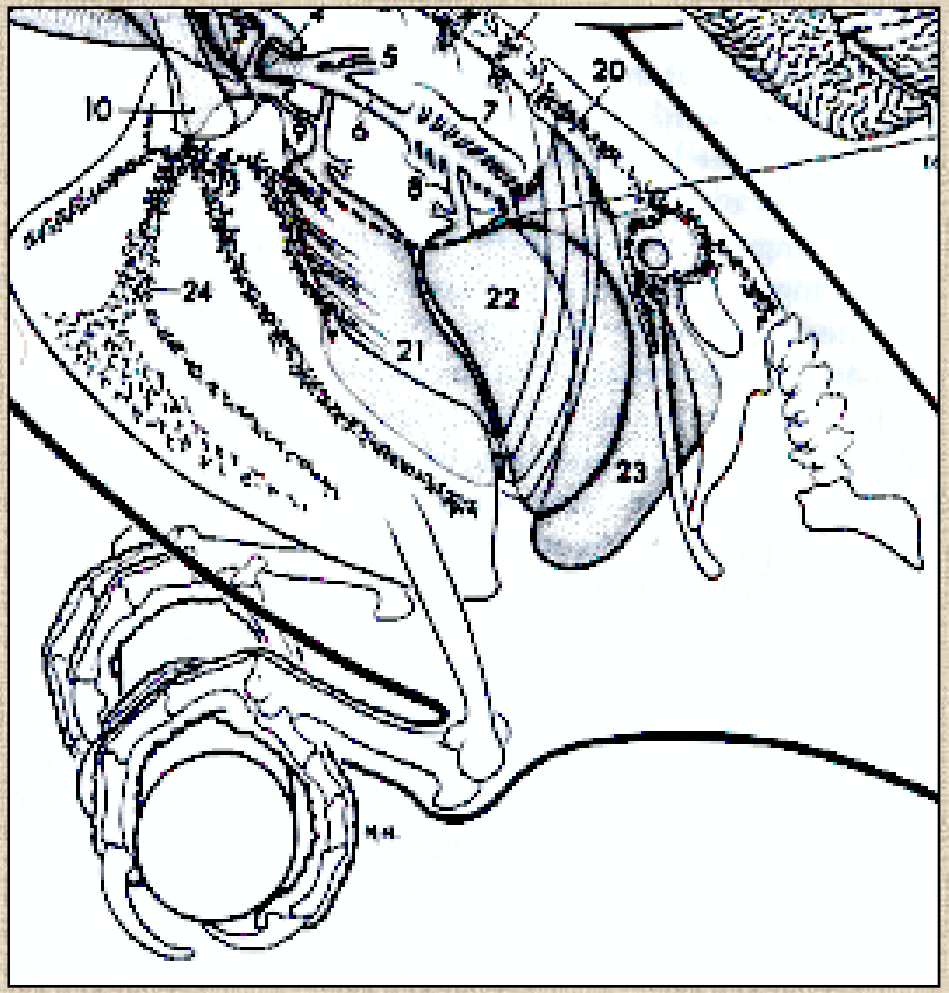




VENTILATORY SUPPORT

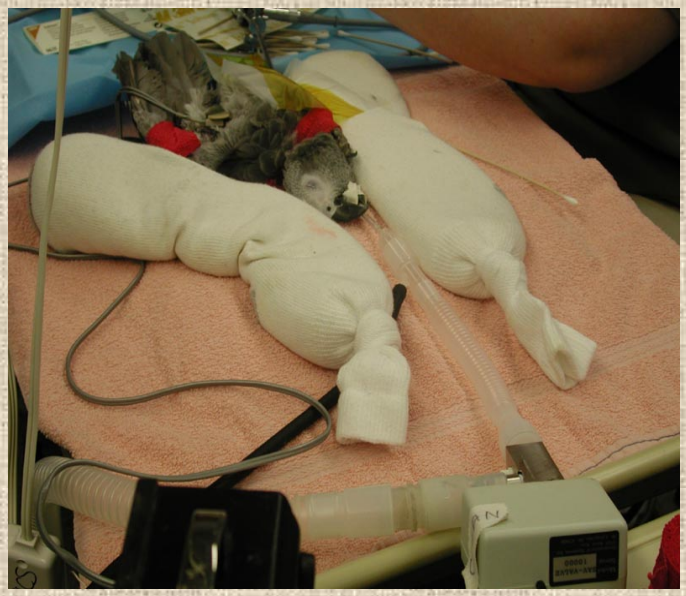
Airsac Cannulation



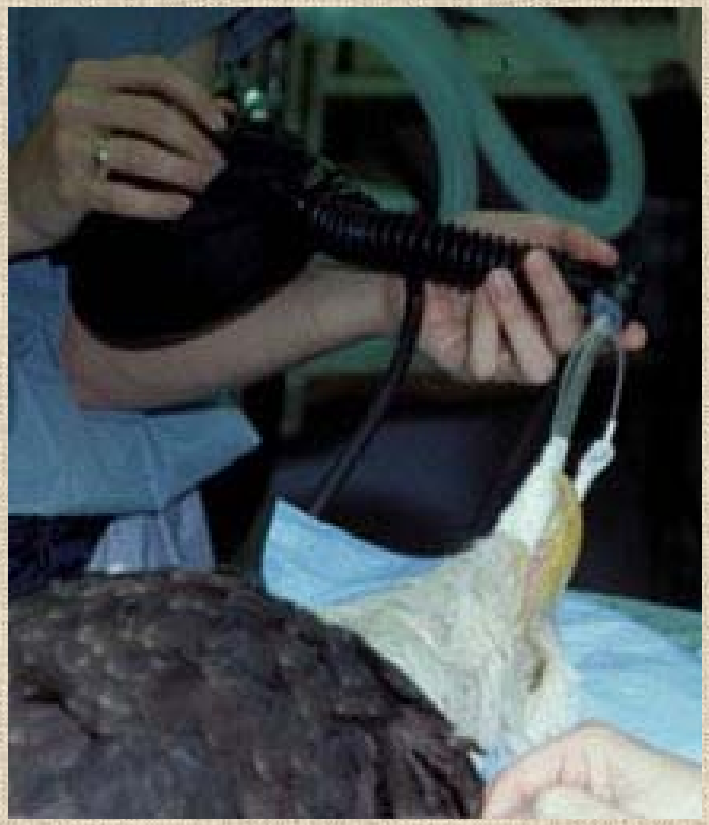


Non-rebreathing systems

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



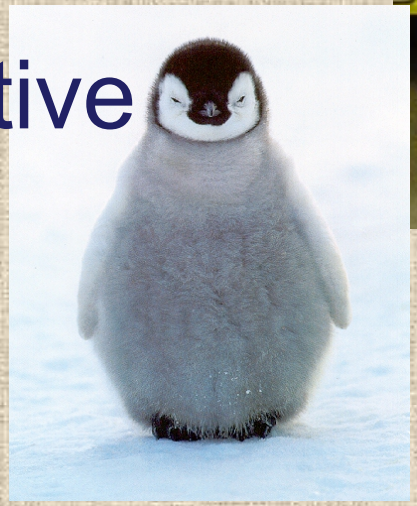
Ventilation



- 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

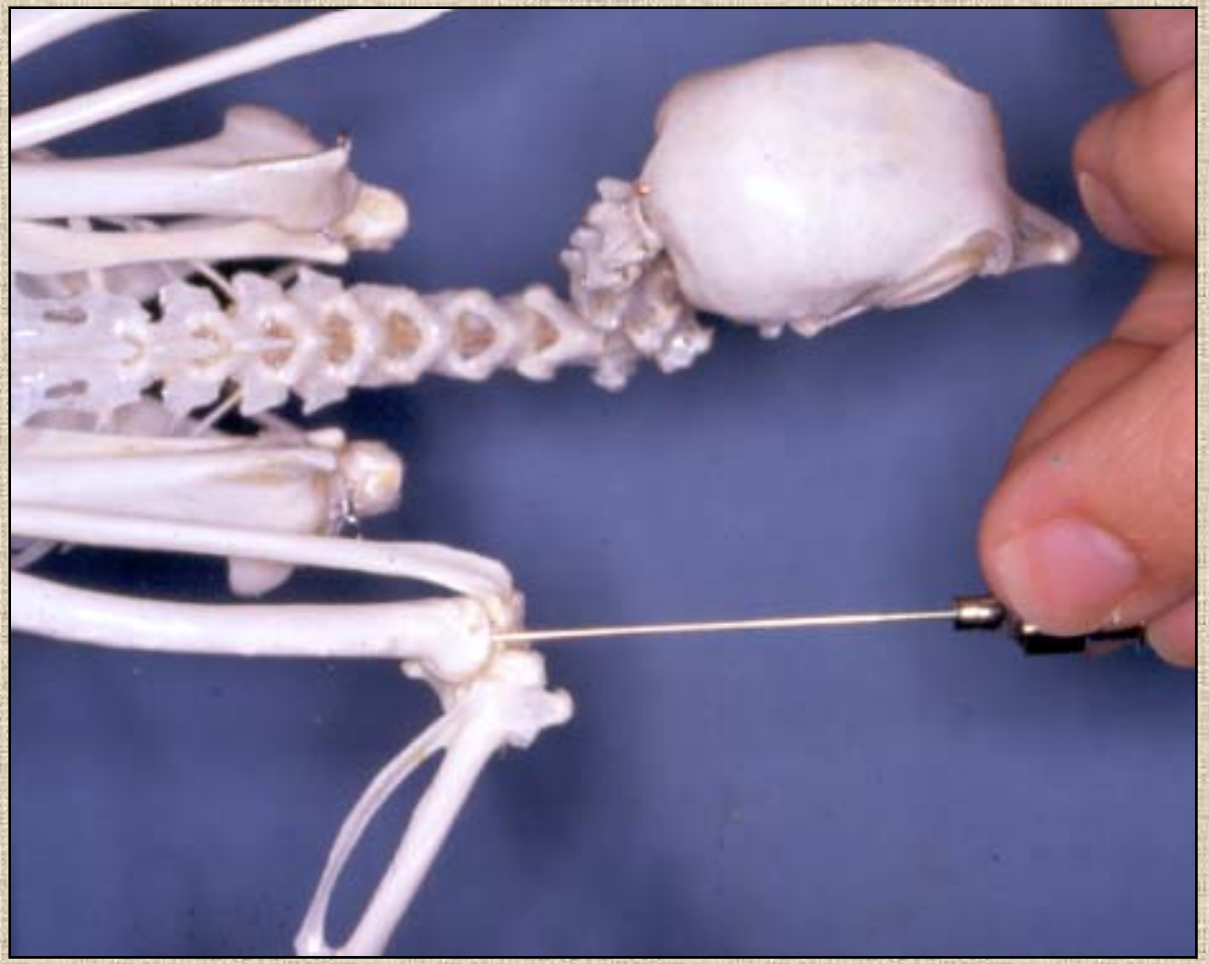
- Emergency drugs
- Fluid support
- Pros and cons
  - Delicate veins
    - IO may be preferable
  - Difficult to secure
  - May take time to get in
    - TIME=LIFE

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

FLUID SUPPORT

Intraosseous catheter



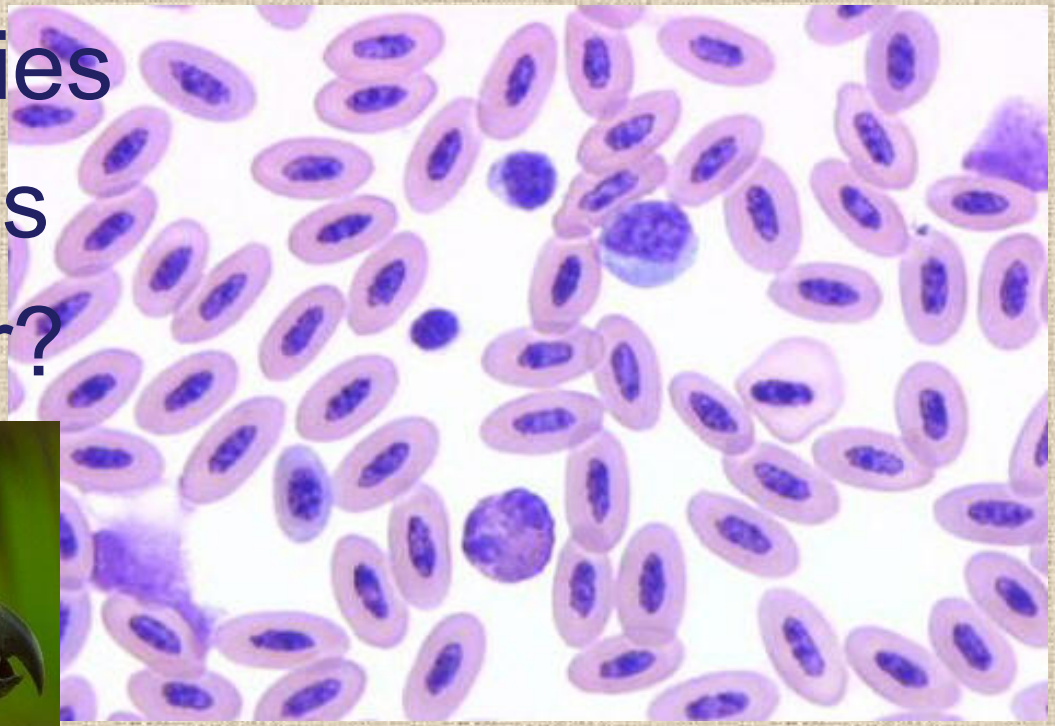
Syringe pumps

MEDFUSION 2010i

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

Blood transfusion

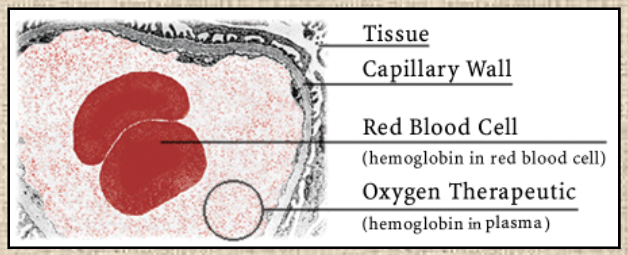
- Available blood donors
  - Same species
  - Same genus
  - Same order?



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 stethescope
- Temperature probe
- $ETCO_2$ — 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

MONITORING

Doppler flow detection

Ulnar a.

Tibiotarsal a.

ECG

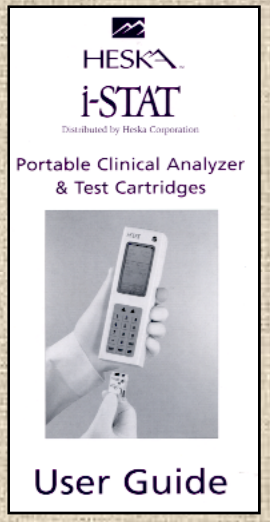
- Monitor HR
- Dx arrhythmias
- Challenging
  - Fast rates
  - Low amplitude
- Use small clips or needles

MONITORING

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 -/= perfusion

End-tidal CO_2 (capnography)

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

MONITORING

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