CATS ARE HARD!!!

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OBJECTIVES

- Understand the most common options for sedation and analgesia in cats
- Understand chemical restraint options and pros/cons in cats
- Understand common anesthetic complications in cats
- Understand how to manage standard recovery in cats

THE CAT AS AN ANESTHETIC CHALLENGE

- many sharp weapons!
- lack hepatic glucuronidation system
- small(er) body size
- unique(?) response to anesthetic/analgesic drugs

THE CAT AS AN ANESTHETIC CHALLENGE

- pain behavior may be difficult to assess
- drug administration may be challenging (e.g. oral)
- higher % of anesthetic complications *vs.* dogs

COMMON ANESTHETIC "COMPLICATIONS" IN CATS

- 1.3% incidence (Canadian study)
- 28% incidence in sick/geriatric cats
- 8.5% incidence of significant hypotension (VMTH study)
  - higher % in geriatrics

WHAT ARE "COMMON" ANESTHETIC COMPLICATIONS IN CATS?

- laryngospasm or difficult intubation
- tracheal trauma/tear

- endo-bronchial intubation

- severe hypotension
- "excitement" after opioids

- intra-operative *hypo*thermia

- post-operative *hyper*thermia

- inadequate analgesia or pain assessment

GOALS IN ANESTHETIC PLANNING

- good analgesia
- surgical plane of anesthetic depth
- smooth recovery

- happy cat/happy owner at discharge

GOALS IN ANESTHETIC PLANNING

- good blood pressure
- non-traumatic intubation
- good respiratory drive
- normothermia
- normal heart rate/rhythm

HOW ARE GERIATRIC CATS DIFFERENT?

- less organ “reserve”
- more profound organ “depression” from anesthetics
- stress = bad

PREMEDICATION OF THE CAT……WHY?

- reduces stress!
- makes catheter placement easier
- smooth anesthetic induction and intubation

“HEALTHY” CAT PREMEDICATION FOR MINOR PROCEDURE

SEDATIVES AND ANALGESICS

- dexmedetomidine (3 – 10 mcg/kg)
- acepromazine 0.01 – 0.05 mg/kg
- butorphanol (0.2-0.5 mg/kg) or buprenorphine (0.01 – 0.04 mg/kg)

“IMMOBILIZATION”

- ketamine (5-10 mg/kg) IM
- alfaxalone (1-2 mg/kg) IM
  - Total volume?

CASE EXAMPLE
MINOR DENTAL

- 5 y/o female spayed Calico
- 5 kg
- Friendly temperament but has short fuse when handled
- PE and bloodwork is normal

PREMEDICATION CHOICE

- Buprenorphine 0.01-0.04 mg/kg = 0.667 mL
- Butorphanol 0.1-0.5 mg/kg = 0.25 mL
- Dexmedetomidine 5-10 mcg/kg = 0.1 mL
  (assuming 500 mcg/mL)
- Alfaxalone 2 mg/kg = 1 mL
- Ketamine 10 mg/kg = 0.5 mL

WHAT ABOUT SIMBADOL?

- Long-acting buprenorphine (24 hours)
- Reserve for “minor” analgesia
- SQ administration (0.24 mg/kg)
  - [1.8 mg/ml]

"HEALTHY" CAT PREMEDICATION FOR MAJOR PROCEDURE

- dexmedetomidine (3 – 10 mcg/kg)
- hydromorphone (0.05 – 0.1 mg/kg) or methadone (0.1-0.5 mg/kg) or fentanyl (2-5 mcg/kg).....if IV is an option
- +/- ketamine (5 – 10 mg/kg) or alfaxalone (1-2 mg/kg) IM
- Similar volume concern

OPIOIDS, CATS, AND HYPERTHERMIA?

- seen in the recovery period
- temperatures up to 107°F!
- The key? Keep them normo-thermic during surgery
- naloxone will reverse hyperthermia
  - and analgesia!

PREMEDICATION WITH ATROPINE OR GLYCOPYROLATE IN CATS?

- these drugs will increase heart rate (a lot!)
- saliva → sticky, harder to clear, and more likely to occlude ETT

- my preference….omit them from the premed and treat bradycardia if/when it occurs

IV INDUCTIONS IN CATS

- less stressful than mask/box induction
- preanesthetic medication provides good restraint for IV catheter placement
- more “hands on” than mask/box induction i.e. better monitoring


Anes

IV INDUCTION TECHNIQUES

- propofol (2-6 mg/kg) to effect
- ketamine-diazepam/midazolam (1 ml/10 kg of 50:50 mix)
  - 5 kg cat = 0.25 mL ketamine and 0.25 mL midazolam
- alfaxalone (0.5-2 mg/kg IV)
  - looks a lot like propofol
  - possibly less cardiovascular depression

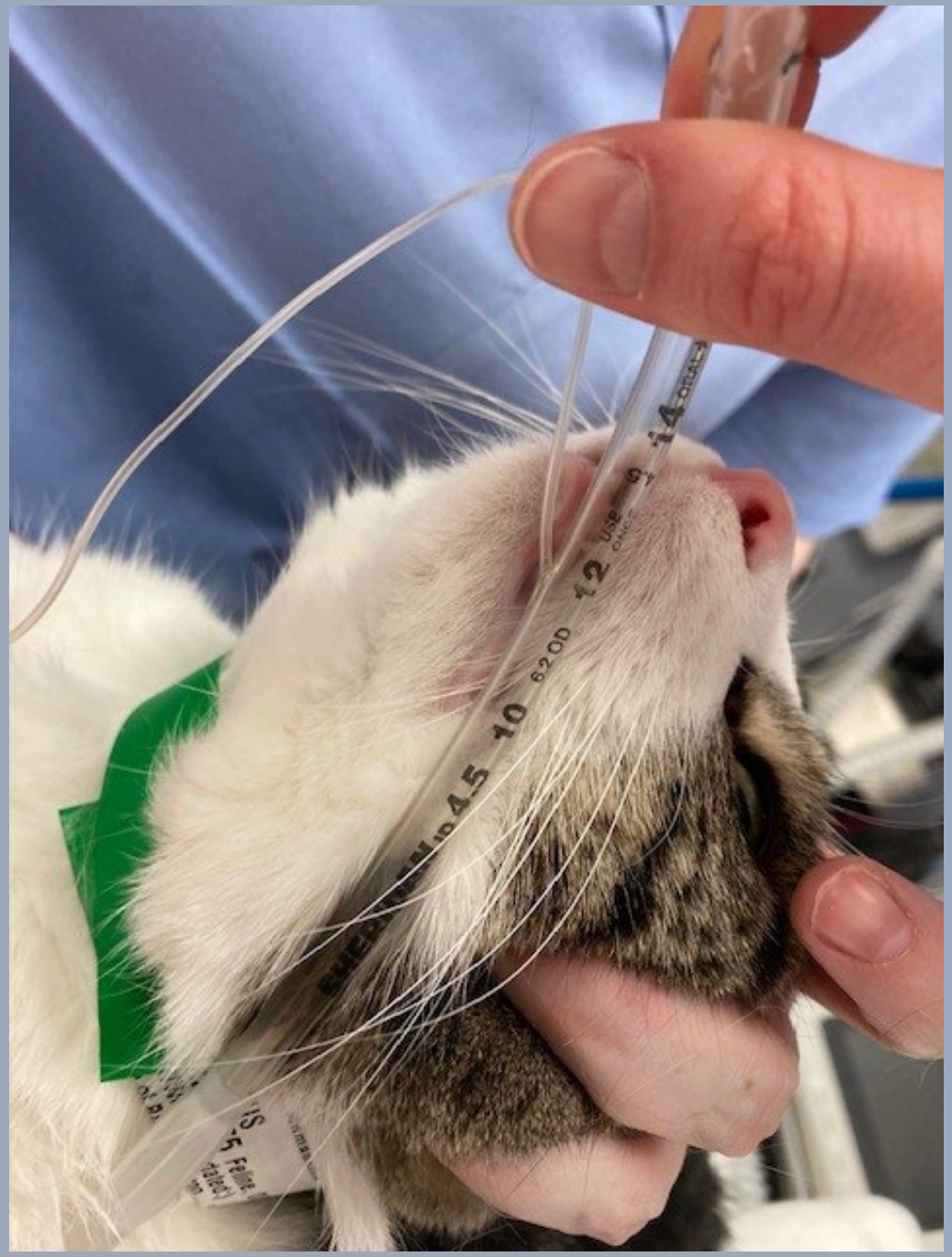
TROUBLESHOOTING ANESTHETIC INDUCTION

- laryngospasm & intubation
  - spray 2% lidocaine on larynx
  - wait! assure sufficient depth with injectable

- apnea
  - intubate with 3-5 mm ID tube
  - ventilate by hand with 02
  - give IV anesthetics slowly

TROUBLESHOOTING ANESTHETIC INDUCTION

- Endo-bronchial intubation
  - pre-measure tube to thoracic inlet
  - monitor SPO2
    - immediate drop in SPO2 or cyanotic membranes after intubation with 100% O2


4.5
10
12
14

ANESTHETIC CIRCUITS TO USE IN CATS

- rebreathing vs. non-rebreathing (e.g. Bain)

- use NRB if < 5 kg
- 02 flow rates:
  - 1 L/min if NRB
  - > 10 ml/kg/min if RB

ANESTHETIC MAINTENANCE

- isoflurane
  - MAC = ~1.7%
  - minimal hepatic metabolism
  - low solubility so fast onset and fast recovery
- sevoflurane
  - MAC = ~ 2.6%
  - minimal (some) hepatic metabolism
  - lower solubility so faster onset and faster recovery
  - Compound A??

SUPPLEMENTING THE INHALANT

- haven't I given enough drugs already??!!
- Adding CRI's will decrease inhalant requirement significantly!!
  - This is good!
- fentanyl CRI
  - →2 – 20 mcg/kg/**hour** IV
  - →taper down for recovery
- other analgesic techniques
  - regional, e.g. dental blocks
  - ketamine CRI

WHY I LOVE KETAMINE !

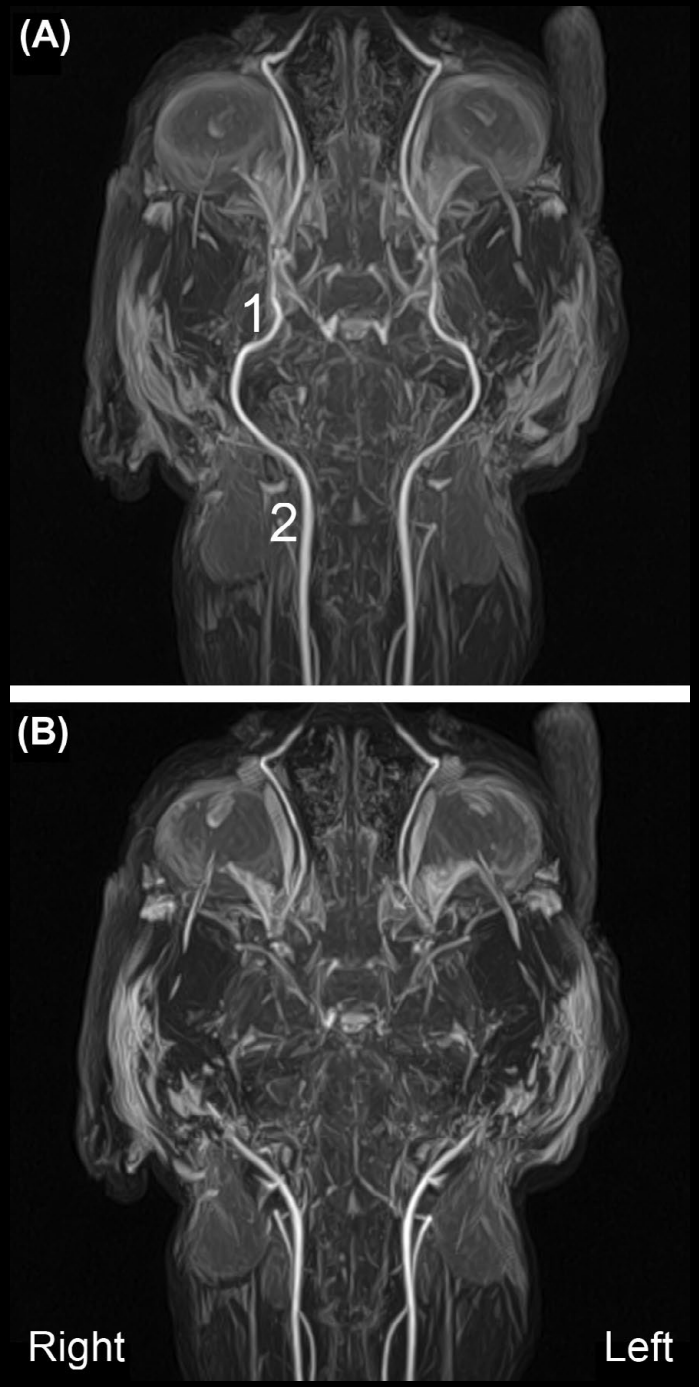
- Great somatic analgesic
- Safe for most patients
- CRI rates of 2-25 mcg/kg/min after a loading dose of 0.5-1 mg/kg

SYRINGE PUMPS

- a great tool for a ‘cats only’ practice

- anesthetic drugs, fluids, antibiotics, vasoactive drugs, diuretics, etc

MORE ABOUT CAT DENTALS!


(A)
1
2
(B)
Right
Left

WHAT ABOUT IV FLUIDS FOR CATS?

- yes - for any procedure > 20 minutes
- optimizes tissue perfusion, renal excretion of drugs, venous return to heart
- LRS or Plasmalyte
- start @ 5 mL/kg/hour
- monitor BP, lung sounds
- turn down for long procedures?

ANESTHETIC MONITORING FOR CATS….ARE THEY DIFFERENT?

- more at risk for hypotension & hypothermia
- respiratory arrest quickly leads to cardiac arrest
- closed pop-off will → cardiac arrest/pneumothorax in *seconds*

MINIMAL ANESTHETIC MONITORING FOR "STANDARD OF CARE" IN CATS

- blood pressure!
  - Doppler method measures mean (?) arterial pressure
  - Cardell® is automated oscillometric method….good accuracy in cats
  - Place cuff above carpus/hock

MINIMAL ANESTHETIC MONITORING FOR "STANDARD OF CARE" IN CATS

- Pulse oximetry
  - Only gives you %sat of Hb!
- Capnography
  - Adequacy of ventilation, cardiac output, problems with the circuit

MINIMAL ANESTHETIC MONITORING FOR "STANDARD OF CARE" IN CATS

- respiration
  - by visual assessment or with capnograph
- temperature

- respiratory arrest often portends cardiac arrest
- hypothermia will increase anesthetic depth and slow recovery

MANAGING ANESTHETIC RECOVERY

- assure adequate analgesia
- quiet, warm, non-dog environment!

- monitor temperature!
  - some cats become hyperthermic after ketamine or opioids

  - many cats are cold at extubation→slow recovery

TEMPERATURE MANAGEMENT

- Hot?
  - fans, tepid water on pads
  - stop cooling when T° hits 99°F
- Cold?
  - Blankets
  - BairHugger®
  - Warm water bottles

GLASGOW PAIN SCORE SYSTEM FOR CATS

- Validated
- Easy and quick
- DIVAS system
- Repeatable inter-person

NSAID'S IN CATS

- most studies in cats are acute use….very little information on chronic use in cats
- only meloxicam FDA approved (injectable, 1x dose only!)

- longer half-lives than in dogs
- more potential for renal toxicity

MOST COMMONLY USED NSAID'S IN CATS

- meloxicam
  - 0.1-0.2 mg/kg PO, IV, or SC
  - FDA approved (1 dose only)
- ketoprofen
  - 2.0 mg/kg SC or 1.0 mg/kg PO
  - Associated with platelet inhibition
- carprofen
  - 4.0 mg/kg PO

CHRONIC USE OF MELOXICAM

- considered “off label”
- Lascelles study
  - initial dose = 0.2 mg/kg PO
  - second dose = 0.1 mg/kg PO SID for *no more than* 3 days
  - subsequent doses = 0.025 mg/kg PO either twice weekly or every other day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QUESTIONS?