Recent Advances in Veterinary Anesthesia and Analgesia

What’s New?

- At-home and premedications
- Induction
- Local anesthetics
- Maintenance
  - Fluid therapy
  - Blood pressure management
- TGH medications

Cats

- Fractious cats are often FEARFUL cats
- Cats may be fearful of handling because of pain
- Goals PRIOR to reaching the hospital:
  - Reduce travel stress
  - Decrease fear wind up on arrival
Cats: Prehospital Gabapentin

- Gabapentin PO
  - 100 mg/cat
  - 50 mg/petite or geriatric cat
  - 150 mg/big cat
  - Sprinkled on 1 tablespoon wet food 2-3 hours prior to arrival

“Prehospital gabapentin has been the single most effective tool for reducing fear and anxiety in healthy cats that I and many clinicians have used.” - Dr. Heidi Shafford, DACVAA

Cats: Prehospital Gabapentin

- Facilitates exam and blood draws
  - Cat may be ataxic and slow but not overly sedate
- Smoother transition to traditional PA and anesthesia
  - Does NOT replace preanesthesia sedation or analgesia

Cats and Gabapentin

- Sedative effect can linger – 12 hours
  - Clear communication with client!
  - No stairs, no jumping at home
- Avoid pre-hospital sedation if:
  - Patient’s health status is unknown
  - Cat is sick
  - Respiratory compromise
Dogs

Common situational anxiety disorders:
- Separation
- Noise phobia
- Veterinary visits
- Hospitalization
- Travel

Trazodone
- Atypical antidepressant
- Serotonin antagonist/reuptake inhibitor (SARI)
- Often prescribed as augmenting agent to SSRIs and TCAs
- Inhibits glutamate release
- Stimulates dopamine and norepinephrine release in the prefrontal cortex

Dogs: Prehospital Trazodone
- 3-7 mg/kg PO 1-2 hours before anticipated event
- May also be administered by veterinary staff
  - Early hospital admission but later procedure
- Can be dosed PRN, daily, or up to q8 hours
- Individual variability in response and duration of effect
Cats: Prehospital Trazodone

- Studied more extensively in dogs
- Recent study in cats
  - Dosing at 50, 75, and 100 mg
  - Peak sedation 2-2.5 hr post-administration
  - Well-tolerated
  - Effective at all doses
- Recommended starting dose: 25 mg/cat


© PEAK Veterinary Anesthesia Services

Trazodone: Potential Adverse Effects

- Sedation
- Ataxia
- Vomiting, diarrhea
- Appetite changes
- Risk of serotonin syndrome

© PEAK Veterinary Anesthesia Services

Alfaxan® IM Sedation/Anesthesia

- IM use approved in other countries; off-label in US
- Outstanding sedation
- Alfaxalone 1-2 mg/kg
- Hydromorphone 0.05-0.1 mg/kg OR methadone 0.5 mg/kg
- +/- Dexametason 0.005-0.01 mg/kg OR acepromazine 0.01-0.03 mg/kg

© PEAK Veterinary Anesthesia Services
Cat Neuter Anesthetic Protocol*

- Mixed in syringe and given IM:
  - Alfaxan® 2 mg/kg
  - Hydromorphone 0.1 mg/kg OR methadone 0.5 mg/kg
  - Dexdomitor® 0.005-0.01 mg/kg
- Intratesticular block
  - Bupivacaine 1.5 mg/kg, split between testicles
- O₂ via mask
- Can repeat full or partial drug doses if necessary

*Courtesy Emily Hoard, DVM (Jurox)

Alfaxan®

- Approved by FDA in both dogs and cats
- Rapid acting, short duration
- Less cardiopulmonary depression than propofol
- Approved in US for use as IV induction with intermittent boluses
- www.alfaxan.com

Alfaxan®

- Neurosteroid
- Similar molecule to progesterone
- Binds to GABA receptor
Teaching Old Dogs New Tricks: Recent Advances in Veterinary Anesthesia & Analgesia

Alfaxan®

- Other potential uses:
  - IM anesthesia
  - TIVA

- Dosing (premedicated animals):
  - Dogs: 2 mg/kg
  - Cats: 5 mg/kg
  - Observed clinical dosing: 2-3 mg/kg

Alfaxan®: Advantages

“Safe” cardiopulmonary profile
Alfaxan®: Advantages

- Aqueous solution
- Does not harbor bacteria
- Iso-osmolar
  - No sting on injection
  - No problems if given perivascularly

Alfaxan®: Disadvantages

- Schedule IV controlled drug
- US labeling: discard after 6 hr
  - Same labeling as regular propofol
- AUS labeling: 7 days if refrigerated

Alfaxan® Refrigerated Storage
Alfaxan®: Disadvantages

Without adequate premedication and/or inhalant use:
• Rougher recovery than propofol
• Cats may be sensitive to stimulation during IM sedation

Fluid Therapy in Anesthetized Patients

- Adjust anesthetic depth
- Account for ongoing losses
- Lower recommended maintenance rates than traditionally used
- Use fluid boluses to address hypotension caused by hypovolemia
- Gradual reduction of maintenance rate at least every hour

Fluid Therapy in Cats

“Factors associated with increased odds of anaesthetic-related death were poor health status (ASA physical status classification), increasing age, extremes of weight, increasing procedural urgency and complexity, endotracheal intubation, and fluid therapy.”
Fluid Therapy: Colloids

- Suspensions of large molecular weight particles
  - Do not readily pass through capillary endothelium
- Attract and hold water in the intravascular space

Fluid Therapy: Colloids

- Routine use now questionable
- Increased AKI, morbidity/mortality in humans
  - Human studies predominantly centered around very sick patients
  - Pulled off the market completely in Europe, Canada

Colloids: Veterinary Medicine Impact?


Conclusions - HES therapy is associated with increased risk of adverse outcome including death or AKI in dogs. A randomized controlled trial investigating the safety of HES therapy in canine patients is warranted.
Colloids: Veterinary Medicine Impact?

- Some anesthesiologists avoiding colloid use as much as possible
- More studies needed

Treatment of Hypotension

- Due to hypovolemia or vasodilation
  - Common with general anesthesia
    - Propofol
    - Inhalants
  - May be indicated by low DAP and/or low SAP
- Preload is the problem; treat with fluids
  \( \uparrow \text{CO} = \text{HR} \times \uparrow \text{SV} \)
  \( \uparrow \text{MAP} \)

Treatment of Hypotension

- If fluids not effective...
- Dexdomitor® ?!

© PEAK Veterinary Anesthesia Services
Treatment of Hypotension

• If fluids not effective or contraindicated...

• Dexdomitor®
  
  • MICRODOSE IV: 0.1-0.5 mcg/kg (0.0001-0.0005 mg/kg)
  
  • Goal: tiny amount of vasoconstriction to improve vascular filling

• NOT ROUTINE

Dental Nerve Blocks

• Infraorbital
• Maxillary
• Mental
• Mandibular

Addition of Buprenorphine to Dental Nerve Blocks

• Effect of bupivacaine alone may exceed 24 hr
• Addition of buprenorphine may extend the effect to 48-96 hr
• 50% of dogs receiving combo and 25% receiving buprenorphine alone had reduced anesthesia requirements 48 hours later
Dental Nerve Blocks

- Up to 1.5 mg/kg bupivacaine +/- epinephrine
- ADD buprenorphine 0.05 ml/patient
- 25- or 27 gauge, 0.75-1.5 inch needle

Nocita®

- Liposome-encapsulated bupivacaine
- Up to 72 hours pain control!
- FDA approval for tissue infiltration in dogs undergoing cranial cruciate ligament surgery

Nocita®

- Maximum dose 5.3 mg/kg (2 ml/5 kg)
- Can dilute with sterile saline for additional volume
- Use “moving needle technique” to administer throughout tissue layers
Tramadol

- Enhances the endogenous inhibitory analgesic system
- Serotonin reuptake inhibitor
- Humans and cats: metabolite has opioid-like effects
  - NOT DOGS

Tramadol and Dogs

- Low plasma levels of both parent compound and metabolite after oral administration
- Dogs produce very little O-desmethyltramadol (M1 metabolite)
  - Humans produce in abundance
  - What is produced has extremely short 1/2 life
- Parenteral formulation (not available in US) demonstrates clinical evidence of pain-modifying effect

Tramadol: Time to Let It Go?

Research Paper
Influence of tramadol on acute thermal and mechanical cutaneous noceception in dogs

Citation: Veterinary Anaesthesia and Analgesia 2016, 43, 172-180.

Conclusion and clinical relevance: Tramadol was metabolized marginally to O-desmethyltramadol and failed to produce clinically relevant acute antinociception. Therefore, the use of tramadol for acute nociceptive pain is questionable in dogs.
Tramadol: Time to Let It Go?

“Different breeds of dogs might not or only poorly respond to treatment with tramadol due to low metabolism of the drug... The non-opioid mechanisms of tramadol do not provide antinociception in this experimental setting...”

© PEAK Veterinary Anesthesia Services

Tramadol and Dogs

No evidence for effective analgesic support in acute pain settings in dogs

© PEAK Veterinary Anesthesia Services

Arachidonic Acid

- LOX
  - Leukotrienes
    - Inflammation
    - GI ulceration

- COX-1
  - Prostaglandins
    - GI protection
    - Renal blood flow

- COX-2
  - Prostaglandins
    - Vasodilation
    - Platelet autonomy
    - Inflammation & Pain
    - Renal blood flow
    - GI protection
Galliprant®

- Non-COX-inhibiting prostaglandin receptor antagonist (PRA)
- Blocks the EP4 receptor
  - Identified as the primary mediator of canine osteoarthritis pain and inflammation
  - Impact on GI, renal, and hepatic homeostasis is reduced

Galliprant®

- FDA approval for the treatment of OA pain in dogs
- No injectable form
- Not for cats
- Perioperative use studies?
- Comparative efficacy studies?