ALFAXALONE (ALFAXAN®): A NEW ANESTHESIA INDUCTION DRUG

Alfaxalone (Alfaxan®, Jurox Pty Limited; Rutherford NSW, AU) is a newly FDA approved anesthetic induction drug approved for use in dogs and cats. It is classified as a neuroactive steroid and exerts its mechanism of action by modulating neuronal cell membrane chloride ion transport by binding to GABA\textsubscript{A} cell surface receptors. Alfaxalone is administered slow and steady to effect over about 60 seconds. Induction doses are between 1 and 2 mg/kg IV in dogs and between 3 and 4 mg/kg IV in cats. Alfaxalone can be administered as intermittent boluses or a CRI for maintenance of anesthesia. Alfaxalone can depress cardiorespiratory function in a dose dependent manner. It has also been administered IM in combination with other sedatives and analgesics to successfully sedate fractious patients. Alfaxan® is supplied in 10 ml vials containing alfaxalone 10 mg/ml. Alfaxan is currently being assigned by the FDA to a Controlled Substance Classification Schedule. Alfaxan should become available in the USA sometime in 2014.

MAROPITANT (CERENIA®): NK1 (SUBSTANCE P) ANTAGONISM

Recently, the substance-P modulating effects of the anti-nausea drug maropitant (Cerenia®; Phizer Animal Health) have been described and some patients exhibiting severe pain syndromes (facial and lick granuloma) have responded favorably to 1 mg/kg SQ daily. Maropitant is a neurokinin (NK1) receptor antagonist that blocks the action of substance P in the central nervous system. Cerenia® was shown to decrease sevoflurane MAC in dogs undergoing ovariohysterectomy by 24% after IV injection of 1 mg/kg IV followed by 0.03 mg/kg/hr CRI. Sevoflurane MAC was further reduced (by 30% total) in dogs after 5 mg/kg IV followed by 0.15 mg/kg/hr CRI. In cats undergoing ovariohysterectomy, a dose of 1 mg/kg IV reduced sevoflurane MAC by 16% and 5 mg/kg IV gave no further reduction in MAC. Maropitant has also been shown to reduce the intense pruritis and self mutilation of Murine Ulcerative Dermatitis (J Am Assoc Lab An Sci 50(2):221-226, March, 2011).

FENTANYL TRANSDERMAL LIQUID (RECUVYRA®): POST-OPERATIVE ANALGESIA
A new formulation of transdermal fentanyl for dogs (Recuvyra®, Elanco Animal Health; Greenfield, IN) eliminates the complexity of setting up and monitoring a CRI or the unpredictability / abuse concerns of patches while still providing predictable, steady state blood levels of fentanyl. The onset of action is only four hours, compared to 12 hours for fentanyl patches, and Recuvyra® provides 96 hours of analgesia after a single application. Care must be taken when applying this product because the fentanyl is highly concentrated in the application solution. The dose of other anesthetic drugs, including tranquilizers and the inhalant anesthetic, can be markedly reduced when using this product.

MOUSE GRIMACE SCALE: FACIAL ANALOG PAIN SCALING IN ANIMALS

Pain is an unpleasant sensation originating from a specific body region because of actual (or potential) tissue damage. It is a complex experience that involves both physiologic and psychologic pathways. Each free nerve ending (nociceptor) has a threshold potential. When that threshold potential is exceeded, a nerve impulse travels to the CNS and is perceived as a painful stimulus. Individual pain thresholds vary dramatically, so do outward responses to pain. Some patients are simply more reluctant to move or become restless and cannot sleep well. Other patients will avoid owners or may cling more than usual. Vocalization is a very insensitive indicator of pain and is usually one of the last signs to appear. Dogs may only vocalize when pain is excruciating and cats may never vocalize. Because the pain signaling pathways in people and animals are almost identical, it must be assumed that when a condition exists that causes pain in people an animal patient is experiencing pain in the same way, and to the same degree, as a person. Animal patients simply have a different way of showing the outward signs of pain in ways we are just beginning to understand. Slight changes in facial expression may be the only clue that something is causing pain in a pet. One new, and very exciting, tool available to help assess pain in mice using facial expression is the Mouse Grimace Scale published in 2010. Facial analog scaling of pain is a widely used, in highly validated, method of pain assessment in non-verbal human infants (and verbal adults). More recently, rat and rabbit grimace scales have been published. Matthew Leach’s group, who published the Rabbit Grimace Scale (Newcastle University, UK), is currently working on scales for rhesus macaques and is collaborating on scales for lambs, horses and pigs.
REFERENCES


V-Gel Supraglottic Airway Device

The V-gel airway device does not enter the trachea. It is very easy to place in rabbits and cats. The device does create a seal strong enough to enable positive pressure ventilation.

Robenacoxib (Onsior®)
- NSAID specifically labeled for cats!
- US label is three days post operatively
- Yeast flavored tablet and injectable forms
- 22 hours of analgesia in cats
- 80% post-op did not need rescue analgesia: wound palpation, manipulation
- UK and Australia have a canine product

Simbadol®
- Buprenorphine 24 hour injectable
- Approved in Cats
- Dose 0.24 mg/kg
- Strength 1.8 mg/ml
- Up to three doses, 24 hours apart

Oral Tramadol: Ineffective
  - Tramadol uptake and plasma concentrations were highly variable
- Comparison of Carprofen and Tramadol for Postoperative Analgesia in Dogs Undergoing Enucleation JAVMA 245(12): 1375-1381, 2014
  - Carprofen more effective than tramadol
  - Firocoxib and Firocoxib-Tramadol equal; both superior to Tramadol
- Several studies show no evidence of meaningful analgesia in dogs
- Highly variable and unpredictable pharmacokinetics in dogs
• Doses of > 5 mg/kg Q 4 to 6 hours may provide very mild analgesia
• Patients requiring more than the mildest of analgesia should be given something other than tramadol.

**Injectable Tramadol: Mild Analgesia**
- Injectable tramadol may provide some analgesia
  - Sevoflurane MAC reduced 25% with morphine CRI (loading dose 0.5 mg/kg IM; CRI 0.2 mg/kg/hr IV)
  - MAC reduced an additional 14% with morphine-tramadol CRI (loading dose tramadol 1.5 mg/kg; CRI 2.6 mg/kg/hr IV)
- Analgesia likely due to SSNRI rather than opioid mechanism (M1 metabolite)
  - Dogs very poor at metabolizing tramadol to M1 (active) metabolite
  - M1 is 1000 times less potent than morphine

**Sevoflurane vs Isoflurane**
- Anesthetic Index
  - Unitless value
  - Index of relative safety of inhalant anesthetics
  - Means to compare inhalants between species
  - Higher number = higher degree of safety
  - Apneic concentration ÷ MAC
  - Sevoflurane 3.45
  - Isoflurane 2.61

**Bupivicaine Liposomal Foam**
- Aratana Therapeutics
  - Expected to be available 2016
- Duration of Effect 72 hours after single injection
- Dogs tolerate well
- Does not delay healing after orthopedic surgery
- Exparel® launched in 2012 for use in people
  - DepoFoam® proprietary delivery technology

**Grapiprant®**
- Aratana Therapeutics, available 2016
- Prostaglandin EP4 receptor antagonist
  - Non COX inhibitor
  - Non-opioid
- Osteoarthritis pain in dogs
  - Indicated to control pain and inflammation
- Once daily oral dose
  - Clinical trial of 280 client owned dogs

**Reassessment Campaign on Veterinary Resuscitation (RECOVER)**
- 2012 meeting of ACVAA and ACVECC diplomates
- Literature review of 75 topics related to small animal CPR
- Outcome was evidence based CPR guidelines for small animal patients
- Be prepared
- Train staff members in advance
• Training every 6 months to keep skills current
• Maintain a well stocked, centrally located crash cart
• Supplies for IV access, airway management, drugs for initial pharmacologic therapy
• Anesthetic related arrest
  – Turn OFF the inhalant gas, flush the system, deliver 100% oxygen
  – Reverse all drugs given prior to or during anesthesia
  – Anesthetic arrests usually start with respiratory arrest, so prioritize intubation (if not already) and oxygen delivery then assess ECG
• Respiratory arrest – regardless of cause
  – Quick intervention may mean avoiding cardiac arrest
• Cardiac arrest
  – Bradycardia can respond to simple ventilation and atropine
  – V-fib may be impossible to reverse without countershock
  – Asystole may turn into V-fib then the above applies
• Provide asynchronous ventilation with a rate of 10 breaths per minute
  – Full breath in 1 second
  – Tidal volume of 10 ml/kg
• Ventricular fibrillation or pulseless ventricular tachycardia
  – Promptly defibrillate with biphasic defibrillator
• Chest Compression
  – At a minimum of 100 per minute
  – Compress the chest by 1/3 to ½ its width
• Maintain continuous chest compression with complete chest recoil
• Perform 2 minute CPR cycles with minimum time between
  – Follow with chest compressions