Anesthesia Update: What's New

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Introduction

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Introduction

- Jane Quandt DVM, MS, DACVAA, DACVECC (Anesthesia & ECC)
- Associate Professor of Anesthesiology UGA
Learning objectives

- To introduce some of the newer anesthetic/analgesic agents available in veterinary medicine
- Discuss the species differences that may be relevant for each agent
- Discuss the application of the new agents in an anesthetic plan
- Discuss potential side effects that may occur

PropFlo 28™

- New formulation of propofol that has a shelf life of 28 days
- Has the preservative benzyl alcohol added
- Has the same anesthetic effects as the regular propofol-
  - Not analgesic
  - Cardiovascular depression leading to hypotension
  - Respiratory depression
  - Short duration of action, 5 to 10 minutes

Propofol 28

- Dose is 2 to 4 mg/kg IV titrated to effect
- Comes in multi-use vial
- Concentration is 10 mg/ml and is an emulsion
- Labeled for IV use in dogs
- Shake vial before using
- Once opened can be used for 28 days and then discarded
- Refrigeration is not recommended
- Used for induction

Propofol 28

- Not labeled for use in cats due to the benzyl alcohol
- Benzyl alcohol can have toxic effects in cats
- Cats lack glucuronic acid conjugation which results in a decreased rate of metabolism and cumulative toxic effects
  - Such as:
    - Ataxia
    - Hyperesthesia
    - Fasciculations
    - Blindness
    - Aggression
    - Convulsions
    - Respiratory failure
    - Death

Propofol 28

- Has been used in equine inductions
- Used in place of diazepam prior to the administration of ketamine
- Used after sedation of the horse
- Given as a rapid IV bolus
- Provides muscle relaxation and anesthesia
- Has a short duration, used with ketamine

A study using PropoFlo in normal healthy cats, “Evaluation of propofol containing 2% benzyl alcohol preservative in cats” by Taylor PM et al showed that it was safe to use for induction

- It does not address the potential effects in debilitated cats or when doing a CRI
- For ill cats and for those needing a CRI the preservative free propofol is still recommended
Remifentanil (Ultiva™)
- A synthetic opioid that acts at mu receptors
- Ultrashort duration of action
- Elimination independent of hepatic or renal function
- It metabolized by nonspecific esterases in the blood and tissue
- Metabolite excreted in the kidney
- Half-life is approximately 6 minutes
- Schedule II

Remifentanil
- Analgesia is achieved by a CRI
- Remifentanil has been combined with a propofol CRI to provide total intravenous anesthesia
- Recovery is smooth and fast
- Bradycardia may occur and can be treated with an anticholinergic
- It is a potent respiratory depressant and may require ventilation

Remifentanil
- Recovery can begin in 5 to 10 minutes
- The drug does not accumulate in the body
- There is no residual analgesia so an analgesic with a longer duration will need to be given to those patients that had a painful procedure done
- Give the longer duration analgesic prior to complete recovery from the remifentanil
- There is no residual respiratory depression following recovery for remifentanil

Buprenorphine- partial mu agonist
- Buprenex™
- Slow onset IM or IV, up to 30 minutes
- Long duration of action from 3 to 6 hours
- Moderate to good analgesia, not as profound as mu agonists
- Binds avidly to mu receptor, so more difficult to reverse
- Schedule III

Choose buprenorphine for Once-daily, 24-hour surgical pain control
- The first and only buprenorphine FDA approved for cats
- Demonstrated safety and efficacy in >200 treated cats
- Up to 3 once-daily subcutaneous doses for 72 hours of pain control
**Features**

- One dose of buprenorphine injection works for 24 hours
- Proven efficacy and safety with over 200 cats treated
- Supplied in a 10 mL multidose vial that can be used for 28 days after the first puncture

**Benefits**

- Postoperative pain control day and night for the patient
- FDA approved formulation based on extensive clinical efficacy and safety data in cats
- Convenience of multidose vial for the clinic

**Product Details**

- Controlled Substance: Schedule III
  - See human safety warning, including complete Boxed Warning. Buprenorphine injection has an abuse potential similar to other Schedule III opioids.
- Concentration = 1.8 mg/mL buprenorphine
- 30 vials (10 mL per vial) in each case
- 21 month expiration dating
- 28 day shelf life after first puncture
- Approximately 15 doses per vial
- Product now has a new label of lasts for 56 days once the bottle is broached

**Buprenorphine Injection**

**Indication and Dosing**

**INDICATION:**

- Is indicated for the control of postoperative pain associated with surgical procedures in cats.

**DOSEAGE & ADMINISTRATION**

- The dosage is 0.24 mg/kg (0.11 mg/lb) administered subcutaneously once daily, for up to 3 days. Administer the first dose approximately 1 hour prior to surgery.
- Do not dispense this product for administration at home by the pet owner.

*See human safety warning, including the complete Boxed Warning. Hospital staff should be trained in the handling of potent opioids and should avoid accidental exposure.

**What is Alfaxan™?**

- A clear, aqueous solution for intravenous injection
- Registered for the INDUCTION and MAINTENANCE of anaesthesia in DOGS and CATS
- 10 mL vial of 10 mg/mL alfaxalone solubilised in 2-HPβCD
- Iso-osmolar, sterile solution with a pH 6.5 – 7

**Alfaxalone**

- Is a neurosteroid injectable anesthetic
- Causes CNS depression by binding to GABA receptors
- It has rapid liver metabolism and elimination
- There is a wide margin of safety
- Is given IV for induction and CRI’s
- It is water soluble so may be given IM which is useful in cats and small dogs

**Alfaxalone**

- It labeled for IV use only in the dog and cat
- It does not contain a preservative and should be used within 6 hours after opening
- It is a schedule IV substance
- Not painful on injection
- Has been used in dogs, cats, exotics, small ruminants, and donkeys
Alfaxalone

- IM administration has also been done for exotic species
- Is non-irritant and therefore is not painful when given IM
- Has a rapid onset
- It does not have a preservative

Alfaxalone

- Can cause cardiovascular depression
- May cause hypoventilation and apnea
- Has a short half-life, duration is 14 to 50 minutes
- Can be used as a CRI with good muscle relaxation and rapid recovery
- There is no drug accumulation and the dose can be titrated to effect
- Induction doses are 1 to 2 mg/kg IV given over 60 seconds

Alfaxalone

- May have rough recoveries, can have myoclonus and excitement
- Need to have a sedative or analgesic added to protocol to avoid this rough recovery.
- Alfaxalone may be an alternative to propofol
- Alfaxalone combined with an opioid and given IM is an excellent premed in aged, frail, or fractious cats that would not tolerate dissociatives or alpha 2 agonists premeds well

Robenacoxib

- Is a selective cyclooxygenase-2-inhibitor for the treatment of postoperative pain and inflammation in cats, also anti-pyretic effects
- Comes in 2 forms, injectable or oral
- Dose for injectable is 2 mg/kg SC between the shoulder blades
- Dose for oral is 1 mg/kg
- Both are given once a day for a maximum of 3 days

Robenacoxib

- The oral form may be given with or without food
- Best effect when given 30 minutes prior to surgery
- Do not give in conjunction with other NSAIDs or corticosteroids
- Can be combined with opioids for enhanced analgesia
- Undergoes liver metabolism
- Cox-1 sparing

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Robenacoxib
- The oral form and the injectable can be used interchangeably but be aware of dose difference

Nocita™
- New extended-release bupivacaine from Arantana
- Has the potential to provide up to 72 hours of post-operative pain relief
- A local anesthetic that is injected directly into the surgical site, being developed post-surgical pain in dogs and cats

Extended Release Bupivacaine
- Product consists of multi-vesicular liposomes encapsulating aqueous bupivacaine
- Liposomes are microscopic structures made of nonconcentric lipid bilayers, bupivacaine is gradually released from vesicles over an extended time, and will distribute locally to the surrounding tissues
- FDA approved for use in the dog

EP2 antagonist
- Prostaglandin E2 (PGE2) is a prostanoid that serves important homeostatic functions, yet is also responsible for regulating pain and inflammation
- The EP4 receptor is primarily responsible for the pain and inflammation associated with osteoarthritis (OA)

Piprants
- Piprants are prostaglandin receptor antagonists (PRA), and are currently in development
- Grapiprant is a new analgesic
- Is an anti-inflammatory drug in the piprant class that functions as a selective EP4 PRA (prostaglandin receptor antagonist)

Grapiprant
- The EP4 receptor prominently involved in inflammation and pain, but importantly this receptor may mediate central sensitization and play a role in chronic pain
- Field trial has been completed in dogs
- FDA approval for control of pain and inflammation associated with OA in dogs, March 2016
- Comes as oral tablets, dose is 2 mg/kg once a day
- Trade name is Galliprant
Grapiprant

- Safety studies in laboratory dogs have demonstrated an excellent safety profile
- Wide safety margin, no significant changes seen in liver, kidney, or coagulation in 9 month dog study
- No GI ulceration was noted
- Do not use in dogs younger than 9 months of age or less than 3.6 kg
- Do not use concurrent with COX-inhibiting NSAID’s or corticosteroids
- Studies are underway investigating grapiprant’s use in cats

New Agents

- Be willing to consider newer agents
- Consider the cost benefit
- There may be improved patient care
- Evaluate the evidence and the literature

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