Derailing the Pain Train

Garret Pachtinger, VMD, DACVECC  
Co-Founder, VETgirl  
garret@vetgirlontherun.com

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Introduction

Garret Pachtinger, VMD, DACVECC  
COO, VETgirl

Introduction

Justine A. Lee, DVM, DACVECC, DABT  
CEO, VETgirl

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- Type in questions
- Emailed to you 48 hours after the webinar
- Active participation = no quiz
- Watching video later, must complete quiz
  - ELITE members only
- Email / contact with ANY questions
  - garret@vetgirlontherun.com
  - justine@vetgirlontherun.com

Recognition of Pain

- Animals Tolerate Pain Better Than People Do
- Tail Wagging and Purring = Comfort

Recognition of Pain

- Panting
- Vocalizing
- Lethargy
- Lameness
- Anorexia
- Anxiety
- Tachycardia
- Tachypnea
- Mydriasis
- Purring in some cats
- Rubbing face
- Scratching
- Pawing
- Guarding
- Head shaking
- Difficulty eating
- Squinting
- Red eye
- Drooling
- Lack of mobility
- Hunched gait
- Abnormal posture
- Reluctance to sit or stand
- Difficulty urinating
- Licking at distal limb
- Spasms

Recognition of Pain

Physiologic Effects of pain:

- Negatively impact
- Cardiopulmonary function
- Metabolism
- Endocrine status
- Immune function.
**Recognition of pain:**

- Pain is subjective
- Use common sense
- Was a painful procedure performed?
- Better to treat pain that isn’t there than to not treat pain that is...

**Pain Assessment Tools:**

**Numeric Rating Scales**

**Routes of Administration**

- Oral?
- Intravenous?
- SQ?
- IM?

**Multimodal Analgesia**

- Simultaneous administration of two or more analgesic drug classes or techniques
- Synergistic effects when given together
- Inhibition of nociception can be achieved along different points of the pain pathway

**What would you choose?**

- Buster - 6yo MC MIXB
- No PMH
- UTD on vaccines
- On seasonal HW and F/T prevention
- Outside playing, saw a squirrel, and ran into the street where he was HBC
- 30 minute transit time, immediately taken to your hospital
LOVE Opioids

- At least three opioid receptors
- Mu and Kappa receptors are most common / important.
- Mu receptors = more analgesia = most side effects
  - Bradycardia
  - Hypoventilation
  - Vomiting.

Hydromorphone
Pure Mu-Agonist

- Opioid agonist
- Dogs/Cats - 0.05–0.2mg/kg SQ, IM, N
- Side effects
  - Panting
  - Vomiting
  - Nausea
  - Hypersalivation
  - Excitement (cats)

25kg @ 0.1mg/kg
~$23

Efficacy of orally administered maropitant citrate in preventing vomiting associated with hydromorphone administration in dogs

Among the 40 study dogs, the incidence of vomiting associated with hydromorphone administration was 25%.

Oral administration of maropitant prevented vomiting but not signs of nausea associated with hydromorphone administration in dogs

Cerenia and Analgesia

- Neurokinin-1 and Substance-P NK-1 receptors
- Selectively expressed on nociceptors in the superficial laminae of the spinal cord dorsal horn
- Upregulated in neuropathic pain
- Substance-P binds to this receptor
- Activates a cascade of intracellular signaling mechanisms that can contribute to central sensitization.

Methadone
Pure Mu-Agonist

- Dogs: 0.1–1.0mg/kg IV, SQ, IM
- Cats: 0.05–0.5mg/kg IV, SQ, IM
- Antagonist at the NMDA receptor
- Characteristics similar to hydromorphone
- Personal experience
  - Less panting
  - Less nausea
  - Less vomiting

25kg @ 0.2mg/kg
~$33
Fentanyl

• One of the most potent analgesics known
  potency of 80–100x that of morphine
• IV CRI: 0.1–0.7μg/kg/min
• Rapid onset (2 minutes) and short duration of effect (20–30 minutes) when administered IV
• Administered by continuous IV drip, transdermal patch, IM, SC, or epidural injection
  • Used in combination with midazolam or diazepam drawn into separate syringes

Butorphanol
Agonist-Antagonist

• a μ antagonist and κ agonist
• A decent sedative, but will provide poor, short-acting analgesia
• 0.2–0.4mg/kg IV, IM, SQ
  • Stimulates kappa receptors and blocks mu receptors
  • Produces less sedation, dysphoria, and respiratory depression
• Can be used to reverse the effects of morphine and fentanyl

Buprenorphine
Partial Mu Agonist

• pKa (8.4) closely matches the pH of the feline oral mucosa (9.0), which allows for nearly complete absorption when given buccally in that species

Impact of the blood sampling site on time-concentration drug profiles following intravenous or buccal drug administration.

Buprenorphine (0.02 mg/kg, IM) given before surgery and during wound closure provided adequate analgesia for 6 hours following ovariohysterectomy in cats, whereas butorphanol did not.
LOVE but RESPECT NSAIDS

- The COX Pathway
- Most commonly used veterinary pain drug
- COX-1: Not really used in veterinary medicine
- COX-2: Rimadyl, Metacam, Previcox, and Deramaxx
- Stopping production of prostanoids from prostaglandins by inhibition of the cyclooxygenase pathway

Ketamine

- Non-competitive NMDA receptor antagonist
- Can modulate central sensitization
- Exert an antihyperalgesic effect.
- May also have activity at opioid and other analgesic receptors
- Not fully understood.

Alpha₂-Adrenoceptor Agonists

- Short duration of analgesic effect
- Profound sedative effect
- Adverse effects:
  - Respiratory depression, vomiting, bradycardia, heart block, hypotension
  - When used in low doses may potentiate opioid effects and increase quality of postoperative analgesia

Alpha₂-Adrenoceptor Agonists

- Bradycardia (heart rates <40 bpm)
- Freak out mode...anticholinergic? Atropine!
- Minimal increase in cardiac output...
- Increased myocardial workload
- Increase in cardiac arrhythmias
- Bradycardia associated with administration of alpha-2 agonists is essentially a physiologic safety mechanism to prevent increased workload on the heart...
Alpha₂-Adrenoceptor Agonists

- Dexmedetomidine
- 1-5 mcg/kg boluses
- CRI - 1-5 mcg/kg/hr

Corticosteroids

- Strong antiinflammatory properties
  - Decrease prostaglandin activity such as NSAIDs
  - Don’t use concurrently with NSAIDs
- Adverse effects
  - Ulcerogenic
  - Immunosuppression with long-term use
  - Hyperadrenocorticism

Corticosteroids

- Physiologic: 0.05 mg/kg IV q. 12
- Anti-inflammatory: 0.1 mg/kg IV q. 12
- Immunosuppressive: 0.2 mg/kg IV q. 12

Tramadol

- Tramadol is a centrally acting analgesic
- Low affinity for the mu opioid receptor
- Analgesic action that may be primarily related to inhibition of norepinephrine and serotonin reuptake
- Don’t use concurrently with other norepinephrine or serotonin reuptake inhibitors (e.g., amitriptyline)
- Dosing?

Multimodal Therapy

- Tramadol and NSAID
- 2-4-6mg/kg tramadol POq8-12h
- NSAID
  - Rimadyl 1-2mg/kg POq12

Local Analgesia and Anesthesia

- Can be injected into wound edges, onto tissue beds, regionally, intraarticularly, intrapleurally, or intercostally.
- Effective at controlling pain.
- Can be used intravenously at low dose constant rate infusions to provide additional analgesia.
Others

• Benzodiazepines
• Muscle relaxants
• Gabapentin
• Amantadine

Lucas – Case Example

• Lucas
• 4 year old
• Male Castrated
• Himalayan

Triage History

• History of constipation for the past few days.
• Owner is unsure (since there is another cat in the house) but she doesn’t think he has been eating for about 1 day.
• He vomited 1 time this morning.
• Since this morning he has been sitting on the couch and not really very active.

Initial Physical Examination

• ABCs!!
  • Airway/Breathing – OK
  • Circulation
    • Mucous membranes pink, capillary refill 2-3 sec.
    • HR 140, reg. rhythm, no murmurs, poor pulses
  • Mentation – depressed, quiet, but alert
  • Temp: 98.4 Wt: 4.9 kg, 7% dehydrated

Any other thoughts?

• Any other examination parameters you are interested in?
• Abdominal Palpation – Large, firm, non-expressible bladder, uncomfortable on palpation

Favorite Protocols

Feline Urethral Obstruction

• Ketamine 5mg/kg IV
• Butorphanol 0.4mg/kg or Buprenorphine 0.01-0.02mg/kg
• Diazepam 0.3mg/kg

(Substitute propofol for ketamine if cardiac concerns)
**Feline Urethral Obstruction**

- Buprenorphine 0.01-0.02mg/kg q6h
- Or
- Simbadol 0.24mg/kg SQ SID

**Rib Fractures**

- Blunt thoracic trauma
- Penetrating trauma (bite wounds)
- Treatment
- Rib fractures should be a warning that additional injury has occurred
- What would you treat with?

**Canine Trauma**

- 0.2-0.4mg/kg Methadone IV q4-6h
- 0.1-0.2mg/kg Hydromorphone IV q4-6
- Once stable, >8-12 hours, perfused
- Rimadyl 2mg/kg PO q12

**Tracheal Collapse / Brachcephalic Airway**

- 0.2-0.4mg/kg Butorphanol
- 0.2-0.4mg/kg Diazepam (IV) or Midazolam (IV/IM)
- 0.01mg/kg Acepromazine

**Dexmedetomidine**

For sedation/analgesia 1-2 mcg/kg (lasts ~30min)
- CRI 0.5-2.5 mcg/kg/hr

**Dexmedetomidine**

- Chart dose IM or IV
- Butorphanol
- 0.2mg/kg IM or IV
Favorite Protocols

- General + Fent CRI
- CRI bolus
- Propofol
- Ace
- Diazepam
- Dexmedetomidine

Target to the patient: Hospitalized

- PRN vs scheduled
- Medication dependent (i.e. Opioids vs NSAIDS)
- Avoid breakthrough in pain control
- Consider CRI if intermittent not effective
- Make sure we are using pain scales, nurses trained to recognize the signs of pain

Target to the patient: Surgical

- Pre-operative therapy to prevent windup
- Continued intraoperatively and postoperatively.
- Are they responding to surgical stimuli?
- Additional propofol does nothing for the pain except mask it — windup.

Target to the patient: Critical

- No patient is too critical to receive analgesia
- Dose reduce? 25 to 50% of the normal dose?
- Opioids should be given intravenously.

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