**Feeling Sleepy and Feeling No Pain:**
Sedatives, tranquilizers, opioids and NSAIDS in the horse.

Ashleigh Olds-Sánchez, DVM  
DABVP-Equine Practice  
Keystone Veterinary Conference  
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**Outline**
- Most commonly used equine medications
- Sedatives, tranquilizers and analgesics
- NSAIDS – Non-steroidal anti-inflammatories

**Sedatives/Analgesics**
- Alpha-two adrenergic agonists:  
  - Xylazine, Detomidine, Romifidine
- Butorphanol
- Acepromazine

**Alpha-2 Agonists**
- Xylazine, Detomidine, Romifidine, (medetomidine)
- Most commonly used sedatives for horses
- Safe, fast acting, reversible
- Induce profound analgesia as well as sedation
  - Analgesic effect evident within minutes but may not last as long as the sedative effects
- Work well alone and in combination with butorphanol for minor procedures, standing surgery

**Side effects:**
- Ataxia (romifidine least ataxia inducing)
- Sweating
- Piloerection
- Osmotic Diuretic

**Alpha-two agonists**
- May decrease GI motility for 30-60 minutes (Xylazine<Detomidine)
- Horses can still startle, kick out suddenly (false sense of security)
- Bradycardia (beware old horses, subclinical cardiac dz)
- Effects may be profound if horse is febrile!!!
- Ceiling effect of dosing – once receptors are fully engaged, more sedation prolongs duration but not depth of sedation
- Fatal reactions reported with alpha twos and IV sulfas
Alpha-2 Agonists: Xylazine

- (Anased, Rompun) – 100 mg/ml large animal (Small animal 20 mg/ml)
- Onset 1-5 minutes, Duration of action up to 2 hours depending on dose, but most commonly 30 minutes
- Typical dose for 1000# animal: 1.5-3.5 cc IV, 5 cc pre-anesthetic
- Reversal: yohimbine, tolazoline, atipamazole

Alpha-2 Agonists: Detomidine

- (Dormosedan) – 10 mg/ml.
- Onset 3-10 minutes, Duration of action 30-120 minutes (dose dependent) usually 45-60 minutes.
- Typical dose 0.4-1.0 cc IV
- Typically try to not use pre-operatively, especially in colic horses – prolonged bradycardia, hypotension
- New: Dormosedan oral gel
- Reversal: Tolazoline, atipamazole

Alpha-2 Agonists: Romifidine

- (Sedivet) - 10 mg/ml
- Onset of action 2-4 minutes, Duration of action 75 minute to 3 hours (dose dependent)
- Typical dose 1-4 cc IV
- Least ataxia induced
- May not be best for hind limb procedures – light on their feet!
- Reversal?
- Availability? (compounded)
- Abuse in performance horses for competition

Alpha-2 agonists: Reversal Agents

- Yohimbine:
  - Only Xylazine
  - Give slowly!!!
  - Reports of sudden death
  - Compounded? Risks, legal? Higher association with death?

- Tolazoline
  - Xylazine & Detomidine
  - Reportedly safer than yohimbine
  - Not currently available - compounded
  - Give slow IV!!!
  - Indications that still effective IM, but off label use, slower action
  - Recommended reversal agent for horses – should have on hand and near by when sedating horses.
  - Atipamazole (antisedan) – not often used in horses. Reverses medetomidine (dexdomitor) $$ Reports as a “universal alpha-two reversal” – off label use

Butorphanol

- Opioid – most commonly used in horses
- Kappa agonist, Mu antagonist (mixed)
- Profound analgesia, but may be short lived.
- 10 minutes to 2 hours from single injection
- IV or IM use (combine with sedative if giving IV)
**Butorphanol**
- Often used in combination with alpha-2 agonists – potentiates the analgesic and sedative effects.
- Can cause excitation/dysphoria when used alone – not recommended IV alone, can give IM alone
- Can cause sudden head jerking, shaking due to mixed effects – not a great choice for head or eye surgery
- Anti-tussive
- Much less GI, respiratory depression than mu-agonists (morphine etc.)
- Reversal: Naloxone

**Buprenorphine**
- More potent analgesic than Butorphanol, rarely used as a sedative
- Mu and kappa agonist, delta antagonist
- Very expensive for systemic use in horses
- Useful to prolong blocks for local anesthesia (maxillary and mandibular blocks for dental extractions, retrobulbar block for enucleation etc.)
- Long duration of action (6-8 hours)
- May be useful in managing severe pain (laminitis)
- 0.004-0.006 mg/kg IV, IM, SQ

**Butorphanol / Buprenorphine**
- Butorphanol = Mu antagonist
- Buprenex = Mu agonist
- Not recommended to use in conjunction as they may counteract each other.
- Recommend several hour washout between administration.

**Acepromazine**
- Tranquilizer
- No analgesic properties
- Decreases anxiety
- Can be used in combination with alpha-2 agonists – potentiates sedative effects
- Side effects:
  - Penile paralysis (rare)
  - Splenic enlargement and temporary decrease in PCV
  - Vasodilation -> hypotension in dehydrated or shocky horses

**Detomidine CRI**
- Advantages:
  - No need for redosing
  - Steady plane of sedation
- Considerations:
  - More supplies and cost (minimal)
  - More time to place and remove catheter
  - Need to have someone to monitor drip rate?
  - Need somewhere to hang fluid bag/bottle
- Reports of Detomidine/Methadone CRI being significantly more effective (analgesic) than detomidine alone

**Detomidine CRI for standing surgery**
- Place IV catheter in jugular vein (14-18 gauge)
- 10 mg (1 ml) detomidine in 250 ml of saline or LRS
- Start with IV bolus 5-10 mg detomidine IV
- Drip CRI to effect through a macrodrip set (60 drops/ml)
  - 1 drop per second = 2.4 mg detomidine per hour
  - 2 drop per second = 5 mg detomidine per hour
- Adjust as needed and can add IV bolus if needed
NSAIDS: Non steroidal anti-inflammatories

- Phenylbutazone (Bute)
- Flunixin meglumine (Banamine)
- Firocoxib (Equioxx)
- Ketoprofen (Ketofen)
- Aspirin
- Meloxicam?

NSAIDS: Toxicity

- Gastric ulcers
- Right dorsal colitis
- Renal failure – irreversible papillary necrosis
- Greater risk in dehydrated patients or concurrently on aminoglycoside antibiotics
- High end doses for long periods more likely
- "Stacking" NSAIDS increases risks

NSAIDS: Flunixin Meglumine

- "Banamine"
- IV or oral paste
- Do not recommend IM injections – risk of clostridial myositis, but much safer than bute
- Dosing: 0.25 mg/kg q8hrs (anti-endotoxic)
- 1.1 mg/kg q12-24 hrs (anti-inflammatory)
- Typically 500 mg q24hrs for 1000# horse, or q12hrs post-op colic surgery, etc.
  - Must maintain hydration, consider gastro-protection at this high dose.
- May slow GI healing post-op colic surgery
- Generally considered better for visceral and soft tissue pain such as colic

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NSAIDS: Firocoxib

- Equioxx
- Injectable IV (not good through IV catheters or with other medications – precipitates), oral paste, tablets
- Dosing 0.1 mg/kg q 24 hrs.
- COX 2 specific inhibitor – thought to be much "safer” than bute or banamine
- Don’t stack with other NSAIDS or all protective value lost

NSAIDS

- All inhibit the COX (Cyclo-oxygenase) pathways
- Anti-inflammatory, analgesic, anti-pyretic properties
- COX 1 thought to be "protective/good" pathways
  - Stimulate blood flow to kidneys and GI tract
  - PGE2 -> mucosal protection of GI tract
- COX 2 thought to be inducible inflammatory pathways
  - Response to trauma, pain, infection, sepsis, inflammation
- COX 2 specific inhibitors are thought to be "safer" but not entirely risk free

NSAIDS: Phenylbutazone

- "Bute"
- Oral paste or tabs, injectable IV only!
  - Perivascular reactions, muscle necrosis – clostridial myositis
- Dosing: 0.25 mg/kg q8hrs (anti-endotoxic)
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"Stacking" NSAIDS increases risks

In case of overdose: gastric lavage/detox, IV fluids
NSAIDS: Firocoxib

- Loading dose – 3x dose first day to reach steady state faster
- Analgesia seems less than comparable bute, banamine
- Good antipyretic
- Some clinicians using off label at much higher doses and more frequent dosing in foals
- Popular to show on – 12 hour withdrawal and 24 hour duration of action
- Continuous use – need a 2 day "wash out" every 10-14 days

NSAIDS: Firocoxib

- Dilemma of oral Previcoxx tablets for long term use
- ¼ tab PO per 1000# horse
- Much less expensive, easier to give
- Off label – against FDA regulations because there is an FDA approved version – just more expensive
- Technically illegal – practically use is widespread, but less than before pills became available

NSAIDS: Miscellaneous

- Ketoprofen – some use, mostly in foals
- Blocks COX1 & 2
- Aspirin – anti-clotting effects – irreversibly binds COX 1 sites, some Cox 2.
- Meloxicam – off label, but may be more COX 2 specific, less disruption of GI healing for colic surgery patients

Gabapentin

- Increasing usage in horses – anecdotally "effective"
- Anticonvulsant being used more for neuropathic pain
- Poor oral bioavailability
- Seems to be well tolerated with minimal side effects in horses, but questionable efficacy
- Dosing: 2.5-10 mg/kg PO BID - TID

Acetaminophen & Tramadol

- Neither showed analgesia alone, but in combination in an IV drip they seemed to convey significant analgesia. May have implications for use in laminitis horses.

Lidocaine CRI

- Commonly used in post-operative colic patients
- Pain relieving – analgesic properties
- Pro-kinetic – small intestinal ileus
- Anti-inflammatory – speed tissue healing?
- Can use for other cases of abdominal pain or ileus
- Ventricular tachycardia
- Toxicity – neurologic, hyperexcitability – reduce dose/rate
- Start with slow IV bolus, then CRI low dose.
References


