OPIOID ANALGESICS

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Opioids can act as **agonists** (bind and stimulate receptors), **antagonists** (bind and block or inhibit activity), **partial agonists** (bind and stimulate, but with less than full activity at certain receptor subtypes), and **mixed agonist/antagonists** (stimulating some receptors while blocking others). Opiates produces these effect (analgesia) by interacting with opiate receptors and produces inhibition of somatosensory afferents at supraspinal levels.

Opioids are useful in a variety of chronically painful conditions (though they may have limited effectiveness in some forms of neuropathic pain). For the purposes of chronic pain management, only the oral and transdermal versions of various opioids will be considered in the following discussion.

1) BUPRENORPHINE (Binorphin)

a) Classification

i) Opioid

(1) Partial mu agonist of extremely high affinity

b) General Information

i) Good all around analgesic for mild to moderate pain free of any expected undesirable effect

ii) Minimal, if any, sedative effect

iii) Buprenorphine has a delayed onset

(1) 30 minutes to peak effect when given IV

(2) 45 to 60 minutes to peak effect when given IM

iv) Duration of effect is influenced by dose

(1) 3 to 4 hours at 0.010 mg/kg (0.005 mg/lb) dose

(2) 6 to 8 hours at 0.020 mg/kg (0.010 mg/lb) dose

(3) 8 to 10 hours at 0.030 mg/kg (0.015 mg/lb) dose

(4) 10 to 12 hours at 0.040 mg/kg (0.020 mg/lb) dose

c) Advantages/Recommended use

i) General soft tissue surgery

ii) Light orthopedic surgery

iii) In cats, studies have shown that bioavailability is the same whether given IV, IM, or via buccal oral mucosa (bioavailability is poor from GI tract – give sublingually or in lateral cheek pouch)

(1) This transmucosal absorption is influenced by the alkaline pH of feline saliva

(a) There is, as yet, no support for effective oral absorption by the dog

(2) Excellent option for home analgesic management in cats

d) Cautionary Information

(1) Difficult to reverse ***if*** undesirable effects arise

(2) Would be expected to antagonize other pure mu agonists like morphine, hydromorphone, fentanyl, and oxymorphone

e) Dosage Information

(1) Dogs – 0.010 to 0.040 mg/kg (0.005 – 0.02 mg/lb) IM or IV

(2) Cats - 0.010 to 0.040 mg/kg (0.005 – 0.02 mg/lb) IM, IV, or Tramsmucosally

f) Cost

i) Moderate at low end of dose range - high at upper dose range

2) BUTORPHANOL (Butrum)

a) Classification

i) Opioid

(1) A mixed agonist/antagonist with primary agonistic activity at the kappa receptor

b) General Information

i) Good all around analgesic for mild pain free of any expected undesirable effect

ii) Little, or no respiratory depression at clinical doses

iii) Duration of effect is 30 minutes to 1 hour in dogs and 1 to 3 hours in cats

c) Advantages/Recommended use

i) General soft tissue surgery

ii) More effective for visceral (soft tissue) than somatic (orthopedic) analgesic

d) Cautionary Information

i) Short duration of effect

(1) Dogs - 30 minutes to 1 hour

(2) Cats - 1 to 3 hours

ii) Higher doses can produce excitement and dysphoria

e) Dosage Information

i) Dog & Cats

(1) 0.2 to 0.4 mg/kg (0.1 to 0.2 mg/lb) IV, IM, SC

(a) 0.2 mg/kg (0.1 mg/lb) is the most commonly selected dose

f) Cost

i) Moderate (to high if given every few hours)

3) FENTANYL (Fendrop)

a) Classification

i) A pure mu agonist

b) **General Information**

i) Duration of effect is 30 to 45 minutes

c) Advantages/Recommended use

i) Short-term analgesia

(1) Excellent as an intra-operative “top up” analgesic

ii) Induction agent when combined with a benzodiazepine

d) Cautionary Information

i) May see panting and muscle rigidity

e) Dosage Information

i) Induction

ii) Analgesia

(1) Bolus – 0.002 mg/kg (0.001 mg/lb)

(2) Duragesic patch – based upon weight

(a) Small dogs and cats, use the 25 mcg/hr patch but only expose ½ of the patch

(b) For even smaller cats consider exposing ¼ of the patch

(c) Never cut the patch

(d) Clip hair as closely as possible at planned patch site without irritating the skin. Gently wipe area once or twice with slightly dampened gauze to remove loose hair. Let area dry. Warm patch to body temperature. Remove backing and apply patch to skin. Hold firmly against skin with hand for 2 full minutes. White tape and Kling gauze are used to cover and support the patch when possible.

f) Cost

i) Low per IV use and High per patch

4) MORPHINE SULFATE

a) Classification

i) A pure mu opioid agonist

b) General Information

i) Duration of effect is 4 to 6 hours

c) Advantages/Recommended use

i) General premed suitable for healthy animals

ii) Most commonly used in combination with acepromazine, an alpha-2 agonist, or a benzodiazepine sedative/tranquilizer

iii) May provide greater sedation than can be achieved with hydromorphone or oxymorphone

d) Cautionary Information

i) Higher dosages can cause bradycardia and respiratory depression

ii) More likely to cause transient hypotension than hydromorphone, fentanyl, or oxymorphone

iii) Often causes vomiting and defecation when given IM or SC

iv) IV use is associated with histamine release

(1) This is generally considered to be a transient low level concern and is unlikely if administered slowly

v) There is significant sedative synergism between morphine and acepromazine in the dog

(1) Acepromazine doses must be reduced appropriately

vi) Should be used with caution in the cat if no sedative/tranquilizer is used

e) Dosage Information

i) Dog – 0.5 to 1.0 mg/kg (0.25 to 0.50 mg/lb) SC, IM, or slowly IV

(1) Acepromazine dose would be low end – 0.005 to 0.040 mg/kg (0.0025 to 0.020 mg/lb)

ii) Cats – 0.25 to 0.5 mg/kg (0.125 to 0.25 mg/lb) SC, IM, or slowly IV

(1) Acepromazine dose must be higher end – 0.06 to 0.1 mg/kg (0.03 to 0.05 mg/lb)

f) Cost

i) Low

5) PENTAZOCINE LACTATE (Fortwin)

1. Pentazocine has minimal effect on the cardiovascular system and is mild respiratory depressant.
2. Effective analgesic.

In horse – 0.5-3.0 mg/kg I/V, 0.5-6.0 mg/kg I/M and Dogs 2.0 mg/kg I/M

6) NALOXONE

a) Classification

i) An opioid antagonist

b) General Information

i) A short acting, pure antagonist

c) Advantages/Recommended use

i) To reverse unwanted effects of opioid medications

(1) Can use small doses to partially reverse opioid effects

ii) Duration of effect is 1 to 3 hours

d) Cautionary Information

i) Generally of shorter duration than most opioid agonists

(1) Reversal effect may wear off before agonist has been cleared from body

(2) Redosing may be necessary after 1 to 3 hours if undesirable agonist influence returns

ii) Buprenorphine effects may not be reversible due to the high binding affinity

iii) Butorphanol may not reverse as completely as pure Mu opioid agonists

e) Dosage Information

i) Dog & Cats -).02 to 0.1 mg/kg (0.01 to 0.05 mg/lb) IM or IV

(1) Give 1/4 of calculated dose every 3 - 4 minutes until desired effect is achieved

f) Cost

i) Moderately low

Other narcotic analgesics are

Meperidine, Oxymorphone, , Etorphine, Nalbupine.

- **ADVANTAGES OF OPIATES:**

1. Absence of myocardial depression
2. Analgesia (euphoria)
3. Reversibility (competitive antagonism)
4. Reduces the amount of other anesthetics.

- **DISADVANTAGES OF OPIATES:**

1. Depression of medullary respiratory center.
2. Nausea/vomition – (CRT Zone)
3. Slows gastric emptying
4. Orthostatic hypertension especially with hypoxemia
5. Dysphoria
6. Elimination via hepatic metabolism and renal excretion
7. Strong vagal tonic agents-cause bradycardia.

Narcotic antagonists are

Nalorphine Levallorphan

Nalorphine: Naloxane is a pure narcotic antagonist, which means that if given by itself no sedation and analgesia would be produced. The other antagonists have partial agonist effects.

Analeptics like, Alpha-aminopyridine, Doxapram are CNS stimulants used to stimulate the medullary respiratory center in order to arouse or awaken animals that are under anesthesia.