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SEDATION FOR STANDING PROCEDURES

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INTRODUCTION
Drugs with sedative/tranquilizer effects are necessary in horses for most standing surgical/diagnostic procedures. Ideal drugs or drug combinations for this purpose should provide reliable sedation, cause minimal or controlled ataxia, and provide pain relief. In addition, the duration of these effects should be in accordance to the surgical time.

Most drug combinations have included use of alpha 2-agonists (xylazine, detomidine, romifidine and detomidine) and the addition of an opioid or tranquilizer. Combining different pharmacological groups allows reducing the doses of individual drugs which may decrease their side effects while enhancing their desired properties (analgesia, sedation).

Alpha 2-agonists possess strong analgesic properties in addition to their sedative effects and can be administered by the IM, IV, and epidural route. Their effects also include cardiorespiratory changes, including decreased heart rate, atrioventricular block, biphasic hypertension followed by hypotension, and reduced cardiac output, decreased respiratory rate and decreased arterial oxygen tensions. The effects of detomidine are more prolonged than those of xylazine, romifidine or medetomidine.

Recommended doses for alpha 2-agonists that result in dose-dependent sedation include:

- **Detomidine**: 10-20 µg/kg (0.01-0.02 mg/kg)
- **Xylazine**: 0.3-1 mg/kg
- **Medetomidine**: 3.5-7 µg/kg (0.0035-0.007 mg/kg)
- **Romifidine**: 30-100 µg/kg (0.03-0.1 mg/kg)

Acepromazine (0.02-0.04 mg/kg, IV) can be added to alpha 2-agonists to increase the degree of unawareness of the horse, while decreasing the dose of the alpha-2 to the low end of the recommended range. This combination is useful for procedures where the analgesia provided by the alpha-2 drug is sufficient or where use of other techniques, like local anesthetic perineural blocks or epidural injections adds further analgesia. The use of acepromazine through its alpha antagonistic actions can blunt the adverse cardiovascular effects of the alpha-2 drugs. Caution is advised in the male horse with use of acepromazine due to its effects on penis relaxation, although the author has found that proper manual repositioning is often enough to prevent complications.

Opioids, including morphine and butorphanol, are used for their analgesic properties. The use of an alpha 2-agonist can prevent the excitatory effects of opioids if used alone in the horse. It is recommended that the opioid be administered after the sedation from the alpha-2 has taken effect. Butorphanol has a short duration of action, 30 to 90 min, and a constant rate infusion has been recommended over intermittent bolus injections to improve its analgesic effects and decrease the behavioral side effects. A loading dose of 17.8 µg/kg IV, followed by an infusion rate of 23.7 µg/kg/h resulted in plasma concentrations that correlate with analgesic effects, but did not cause behavioral changes (ataxia or increased locomotor activity), whereas a single dose of butorphanol (0.1 mg/kg, IV) resulted in ataxia and locomotor activity in 4/7 horses. A simple reference way of preparing the infusion rate in a 450 kg horse is to add 15 mg of butorphanol to a 0.5 liter bag of saline (30 µg/mL) and this volume is administered at a rate of 1 drop/sec (10 drops/mL infusion set drip rate) which provides approximately 80 min of infusion.

Morphine at 0.1-0.3 mg/kg IV produces analgesia of longer duration than butorphanol, however it may also cause more behavioral side effects if prior sedation with alpha 2-agonists is not adequate.

A constant rate infusion has also been recommended for medetomidine in the horse to provide a constant level of sedation. A loading dose of 5 µg/kg IV, followed by an infusion of 3.5 µg/kg/h was used for two hours with predictable sedative effects. Heart rate and electrocardiogram were monitored and a decrease in rate and atrioventricular blocks were noted. As it is common for other alpha 2-agonists, urination is common during medetomidine's sedation. The infusion rate for a 450 kg horse can be prepared by adding 2 mg of medetomidine to a 0.5 liter bag of saline (4 µg/mL) and this volume is administered at a rate of 1 drop/sec (10 drops/mL infusion set drip rate) which provides approximately 80 min of infusion.

Use of constant rate infusions may provide a more constant degree of sedation once the loading bolus has been administered. Supplementing sedatives/tranquilizers with regional techniques (local perineural blocks, epidural injections) also facilitate standing procedures.

REFERENCES