Sedation and Anesthesia for Field Management of Colic

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1. Introduction
Field management of colic consists primarily of pain management to allow time for medical treatment to work or transport to a surgical facility. In selected circumstances, anesthesia for surgical correction may be necessary outside of a surgical facility with the usual inhalant anesthetic and support equipment. Nonsteroidal anti-inflammatory drugs are a mainstay of pain management in colic cases. Other analgesic drugs are being increasingly used both in the medical and postoperative management of colic.

The $\alpha_2$-agonist drugs have been used in the initial sedation and pain management of colics since their development. They have excellent analgesic and sedative properties, which make them extraordinarily useful during the initial diagnostic and treatment phase. Although the available $\alpha_2$-agonist drugs all differ slightly in their potency and duration of action, they all have the undesirable effect of a considerable decrease in GI motility. In general, their effectiveness can be improved by concurrently using an opioid. Drug combinations commonly used include xylazine (0.25 to 1.0 mg/kg) or detomidine (0.005 to 0.02 mg/kg), given intravenously or by intramuscular injection. An opioid such as butorphanol (0.01 to 0.05 mg/kg) or buprenorphine (0.006 mg/kg) can be added for additional sedation and analgesia. If an opioid is used, the lower dose of the $\alpha_2$-agonist should be tried initially to prevent excessive sedation. If longer-term sedation is needed, xylazine can be administered as a constant rate infusion (CRI) at the rate of 0.55 mg/kg per hour or detomidine at the rate of 6 $\mu$g/kg per hour. Dexmedetomidine has also been given as a CRI at the rate of 2.5 $\mu$g/kg per hour after a loading dose of 2.5 $\mu$g/kg. Although $\alpha_2$-agonist CRIs have limited usefulness in long-term colic management, they can be of considerable use if there is a delay in transport or definitive treatment.

Opioids are used in both initial colic management and longer-term pain management. The most commonly used opioid is butorphanol, administered at the rate of 13 $\mu$g/kg per hour. Other opioids such as fentanyl or morphine have been used primarily as an adjunct to general anesthesia or standing sedation protocols. Dexmedetomidine and morphine have been used as a CRI for standing sedation and might be effective when other combinations have failed. Dexmedetomidine is administered as described above with morphine given at a rate of 30 $\mu$g/kg per hour after a loading dose of 50 $\mu$g/kg. One other opioid delivery system, the transdermal fentanyl patch, has been used as a chronic analgesic delivery system. However, the results are variable.
Typically, one 100-μg/hr patch is used for each 150 kg of body weight. The patches are applied to dry, clean, clipped, or shaved areas. It takes several hours for the patches to produce effective plasma levels, and they last for 48 to 72 hours.

Systemic lidocaine has significant analgesic properties through both local and central effects. Its use as a CRI for pain control is well known. In colic, it is used for its prokinetic effects as well. The usual dose is 1.3 mg/kg as a loading dose followed by 0.05 mg/kg per minute. Long-term use does not appear to cause significant toxicity.

Epidural administration of opioids works well to provide analgesia to the abdomen and typically provides 12 to 18 hours of analgesia. Morphine is the opioid most commonly used, at a dose of 0.1 to 0.2 mg/kg. The addition of 15 to 30 μg/kg of detomidine may increase the effectiveness and duration of analgesia provided by the morphine. If repeated doses are to be administered, an epidural catheter can be placed (Fig. 1). The introducer needle is placed in a manner similar to a conventional caudal epidural, and, when the tip of the Touhy needle is in the epidural space, the catheter is advanced cranially approximately 10 cm. The catheter is then secured to the patient. I prefer the non–coil-reinforced catheters because they can be shortened to ease maintenance.

In selected cases, field surgery can be attempted. Selected lesions might be accessible via a standing flank laparotomy. In this case, sedation with an α₂-agonist–opioid combination in conjunction with a local block would be appropriate. If general anesthesia is attempted for surgical correction, the most commonly used regimens include some combination of guaifenesin, ketamine, and an α₂-agonist. There are many combinations, but the most common is 5% guaifenesin, 1 mg/mL ketamine, and 0.5 mg/mL xylazine, commonly called triple drip. To make this, 10 mL of ketamine and 5 mL of xylazine are added to 1 L of 5% guaifenesin. This can be used as a maintenance general anesthetic after induction with xylazine and ketamine. Immediately after induction, a small bolus of triple drip is often needed, and it can then be administered at the maintenance rate of approximately 2.2 mL/kg per hour (1 mL/lb per hour). If a long anesthesia is anticipated (more than 1 hour) I prefer to double the ketamine and decrease the administration rate. If possible, an assistant should monitor the depth of anesthesia and maintain the patient at a light plane of anesthesia. Some supportive care is usually needed for the patient. Intravenous crystalloid fluids should be administered to maintain blood pressure, and supplemental oxygen should be administered. Intubation and use of a demand valve provides oxygen as well as maintaining an open airway. A standard E tank contains enough oxygen to provide assisted ventilation to an adult horse for 20 to 30 minutes or supplemental oxygen for approximately 1 hour when using a demand valve. High flow demand valves are available for equine use. Obviously, the demand valve must be compatible with the endotracheal tube (Fig. 2). Human resuscitation kits can be purchased that contain a small oxygen tank, demand valve (lower flow for human use), flowmeter, and a gas-operated suction unit.