

MEDICAL MANAGEMENT OF COLIC IN ADULT HORSES:

Most cases of equine colic will resolve with medical therapy. The three hallmarks of medical management include analgesia (NSAIDs, sedatives, opiates), fluid therapy (laxatives, oral fluids, IV fluids), and husbandry (fasting, preventing self-injury, etc.). While severe or persistent pain indicates the need for referral, a basic guide to medical therapy involves the following:

- Withholding feed but allowing free choice access to water (for new clients, one must often clarify that “no feed” includes grain, hay and grass);
- Oral laxatives (such as mineral oil);
- Analgesics (flunixin ± xylazine).

After monitoring the initial response to therapy, additional enteral therapy (fluids and/or laxatives) can be provided. Intravenous fluid therapy can be added in horses with clinical signs of dehydration. One of the keys is not to re-introduce feed until the horse has passed a significant quantity of faeces and/or mineral oil (often used as a marker of intestinal transit).

PAIN MANAGEMENT

Pain control is the single-most important therapeutic factor when treating colic in horses. Regardless of the initial cause of colic, pain itself can result in ileus, and providing pain relief can break the cycle of motility inhibition.

While many of the analgesic agents disrupt motility, the benefits of analgesia typically outweigh the negative consequences. Analgesic therapy alone often provides sufficient relief for horses with spasmodic colic. For with non-strangulating obstructions, analgesia provides important adjunctive therapy. Continuous pain despite analgesic therapy should always raise concern and prompt referral as this is an important indicator of the need for surgical intervention.

Non-steroidal anti-inflammatory drugs (NSAIDs):

NSAIDs are usually the initial therapy of choice for visceral pain. They work by either selectively or non-selectively inhibiting cyclooxygenase production therefore predominantly target inflammatory mediated visceral pain. Because inflammation can lead to a vicious circle of nociceptive up-regulation, these agents are extremely useful, regardless of the primary insult.

Selectivity between COX isoforms vary between agents and dosages, and species, and expression of the isoforms varies between species and tissue. Flunixin meglumine, ketoprofen, and phenylbutazone are non-selective inhibitors (or some such as flunixin are slightly COX-1 specific), whereas carprofen and etodolac are somewhat COX-2 selective. Firocoxib is extremely COX-2 selective in the horse. Etodolac has been shown to inhibit epithelial restitution following ischemia-reperfusion injury in in-vitro studies of equine intestinal mucosa to a lesser degree than does flunixin. But, flunixin and etodolac each inhibit recovery of intestinal barrier function in jejunal mucosa after ischemia and a longer (18 hours) period of reperfusion.

Flunixin meglumine (flunixin) has been the standard for treatment of pain and shock in horses affected with colic for three decades. Flunixin provided longer analgesia and protected horses from some of the deleterious effects of endotoxin and, equally important, was found to be a potent anti-inflammatory agent. However, more recent data suggest that flunixin also has potential deleterious effects, including decreases in wound strength of abdominal incisions, potentiation of gastric ulcers, and inhibition of mucosal barrier function after healing. NSAIDs tend to be associated with Spasmodic colic.

α -2 adrenergic agonists:

Alpha-2 adrenergic agonists, such as xylazine, romifidine and detomidine, can provide excellent sedation, analgesia, and muscle relaxation for horses with severe abdominal pain. These drugs have a relatively short duration of action (longer for detomidine). The major side effects include inhibition of motility throughout the gastrointestinal tract as well as systemic and gastrointestinal alterations in hemodynamics.

These agents are often combined with an opioid, such as butorphanol, in order to give more balanced analgesia; however, this combination can create a synergistic inhibition of motility. It is important to note that the sedative effects typically outlast the analgesic effects of these drugs.

Xylazine (0.2 to 0.4 mg/kg IV) is a potent analgesic and may be used to control moderate to severe abdominal discomfort, with a reasonably short duration of action. It is particularly useful during the evaluation period of the horse with colic to allow diagnostic procedures to be performed.

Horses that require exploratory celiotomy typically begin demonstrating signs of colic in 30 to 60 minutes after administration of xylazine. If additional analgesia or duration of sedation is necessary, butorphanol tartrate may be administered (0.011 to 0.022 mg/kg IV).

Opioids:

Opioids, typically butorphanol, are most commonly used in conjunction with another agent, such as an α -2 agonist. Bolus dosing is obviously more practical in the field, whereas CRI can be extremely useful in a hospital setting. As with the α -2 agonists, opioids have well-known disruptive effects on gastrointestinal motility. These effects appear to be reduced substantially when butorphanol is administered as a CRI.

Sedatives:

Other sedative agents, such as chloral hydrate, can be used as an alternative to the α -2 agonists in certain situations. Chloral hydrate is a very powerful sedative and should be used only with a clear diagnosis (ie. small colon impaction) or without a surgical option. Dosage is 10g (for a 450-500 kg horse) as a 12% solution slowly (over 5 min) IV, preferably with a catheter as the agent is very caustic peri-vascularly. The dosage can be titrated in 5 g increments and repeated in 6-8 hours, if necessary.

Anti-spasmodics:

N-butylscopolammonium bromide (Buscopan®) has both anticholinergic and antispasmodic properties and has been commercially available for the treatment of spasmodic colic in Europe for many years (in conjunction with dipyrene). This drug is also useful for facilitating rectal examination.

Two important facts - Buscopan causes tachycardia and it is very short-acting (20 minutes).

Decompression:

Because much of the pain associated with colic in horses is caused by gaseous distention, decompression can often serve as a viable method of analgesia. By far the most common application is gastric decompression via a nasogastric tube. For horses with severe large colon and/or cecal distention for which surgery is not an option, cecal enterocentesis is a viable option. This procedure can be performed in the right paralumbar fossa, with a specific location identified by simultaneous auscultation and percussion. After a surgical prep and local anesthesia, a 14 ga, 5.5" catheter is inserted into the cecum. Preferably, an extension set is attached to the catheter and inserted in a cup of water at a level below the insertion point. This allows for easy identification of gas expulsion and prevents inflow of air into the viscus. Once gas flow has ceased, inject a small amount of gentamicin (3-5 ml) prior to removal to prevent contamination of the abdominal wall with any aspirated gastrointestinal contents.

This procedure is certainly not without risk and can result in peritonitis. Thus, it should only be performed if surgical therapy is not an option. Also, it rarely helps as much as one would think.

Alternate analgesia:

Intravenous lidocaine has been used in horses both as an analgesic and as a treatment/preventative for post-operative ileus. Lidocaine has been used in this fashion for years to treat human patients with neuropathic pain, and will decrease the MAC for halothane in horses. Some data support its somatic, but not visceral analgesic properties in normal horses, and IV lidocaine has also been shown to attenuate the effect of ischemia-reperfusion injury in the equine jejunum. Side effects of lidocaine infusion include CNS excitement, ataxia, seizures, collapse, and muscle fasciculations. These side effects rarely occur at the dosage provided, but stress the importance of an accurate drug delivery as they are well-correlated with plasma lidocaine concentrations. These effects are transient, and horses typically recover within minutes after discontinuation of the drug due to its short half-life.

FLUID THERAPY

Fluid therapy is used to treat both medical and surgical diseases. Rapid assessment of the horse's metabolic condition allowed the clinician to immediately replace serum electrolytes and total fluid deficits. Measurement of lactate concentrations helped to determine prognosis, but, more importantly, it highlighted the dramatic perfusion deficit created by the shock syndrome that many horses experienced during episodes of colic due to intestinal strangulation and infarction. Concurrent with improvements in metabolic assessment was the advent of peritoneal fluid analysis as a diagnostic aid, and this analysis helped to standardize the assessment for surgery.

Regardless of the initial cause of gastrointestinal disease, dehydration frequently results. A thorough discussion of fluid therapy is provided elsewhere in these notes.

Oral fluids:

Oral (or enteral) fluid therapy provides an effective, practical and economical alternative to IV fluid therapy for horses with colonic impactions. Enteral fluids can be administered in either bolus or continuous fashion via nasogastric tube. Continuous administration mitigates the practicality of this route, but not necessarily the expense. Always check for reflux prior to administration, and never administer enteral fluids to a horse with more than 1-2 liters of reflux.

Normal horses will tolerate up to 6-8 liters of water every 30 minutes for several doses, but this rate should not be attempted in horses with colic. Large volumes of fluid should be administered via gravity flow (i.e. funnel). I have good luck with enteral fluids (either alone or in conjunction with IV fluids) and usually give 6-8 L every 4-6 hours, alternating balanced electrolyte solution and either plain water or water with MgSO₄ (with MgSO₄ given no more frequently than once a day). Solutions should have an osmolality less than 800 mOsm/L to avoid hypertonicity.

If a horse is drinking well, another option is to provide electrolyte paste, either a commercially available product or the slurry suggested in the fluid/electrolyte therapy. This option is best used once an impaction has passed and offers an effective means to increase water consumption in horses predisposed to impaction colic, especially if given at times of increased risk such as travel or changes in the weather.

Intravenous fluids:

For the severely dehydrated horse, IV fluids provide the most rapid method to restore circulating blood volume. With marked dehydration and shock, fluid therapy with either synthetic colloid (i.e. hetastarch; 10 ml/kg) or hypertonic saline (2-4 ml/kg) can provide rapid restoration of plasma oncotic pressure. Each should be followed with a crystalloid replacement solution.

For horses with moderate dehydration, a reasonable goal is to replace approximately half of the calculated fluid deficit within the first 1-2 hours, with replacement of the remaining deficit (plus maintenance and ongoing losses) over the next 12-24 hours. Any polyionic replacement solution (LRS, Plasmalye A, Normosol-R, etc) can serve this purpose.

LAXATIVES

Mineral oil is the most common laxative used in the treatment of equine colic. Mineral oil is commonly dosed at 0.5-1 gallon via NGT in an adult horse. Additional water can be administered to a total volume of 6-8 liters as long as no reflux is obtained. Mineral oil offers the additional bonus of providing an estimate of gastrointestinal transit time as it is usually easily visible on a horse's perineum and/or hind limbs. Oil should typically appear within 12-24 hours following administration. One word of caution is that oil can pass around an incomplete obstruction, or "over the top" of an impacted cecum.

Other laxatives include magnesium sulfate (Epsom salts; 0.5-1 g/kg in 8 L water) and dioctyl sodium succinate (DSS). A recent experimental trial showed that MgSO₄ did not provide additional benefit versus balanced electrolyte solution given enterally and was more likely to cause electrolyte disturbances. DSS can be irritating to the colon, and its use has likely declined over time. One should not use either substance in a significantly dehydrated horse as they can exacerbate dehydration via fluid shift to the colon.

Psyllium mucilloid is a bulk laxative often used in the treatment of sand impactions (usually 16 oz in 0.5-1 gallon mineral oil once a day for 3-4 days). Psyllium in water forms a highly viscous gel very quickly (and clog a pump), hence the reason to mix it with mineral oil for nasogastric administration. Psyllium administration was shown to have no benefit in dispersion of sand from the cecum of cannulated ponies.