Medical Management of the Acute Abdomen in the Field: Laxatives, Motility Agents, and Nutritional Management

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Author’s Note: Please see the appendix on page 56 that list drugs, doses indications, and author’s opinion.

Take Home Message

When surgical intervention is not required, the mainstays of therapy for the acute abdomen are medical interventions and dietary management. Many treatments are available, with varying anecdotal or research based support. Drugs in common usage have varying degrees of potency, duration and clinical familiarity.

Introduction

Motility of the gastrointestinal tract is a complex interplay between central stimuli, the autonomic nervous system, the enteric nervous system, amount and physical characteristics of intestinal content, and integrity of the resident microbial flora. Disturbances in motility are common causes of colic and may result from diseases of the gastrointestinal tract itself, such as ischemia, inflammation, endotoxemia or metabolic derangements, or occur secondary to disease processes affecting the peritoneum or systemic health. To re-establish movement of ingesta, laxatives/cathartics or fecal bulking agents may be tried. Depending on the surmised cause of pain, prokinetics or alternatively anti-spasmodic agents will be prescribed. Nutritional management should include the restoration of electrolyte and acid-base derangements that may affect myoelectric potentials and thus intestinal motility, as well as considerations of nutritive value, fecal bulk and consistency.

Laxatives

Due to the extensive nature of the equine gastrointestinal tract, the efficacy of any laxative will be compromised as it is often not possible to provide the volume of laxative required for optimal efficacy. Many laxatives/fecal bulking agents in use are extrapolated from human usage. Dose rates are pro-rated not on a bodyweight basis, but on a colonic weight basis, therefore there is not a linear relationship between human and equine dose rates. Prior to nasogastric administration of any laxative, it is necessary to ensure that gastric dilation and therefore the potential for reflux is not present. Following their use, preferably at 12 hour intervals, the administration of water is recommended to restore volume deficits that may result from the action of osmotic and cathartic agents.
Mineral oil serves as a laxative and marker for gastrointestinal transit. Passage within 12-18 hours of administration is taken as evidence of patency of the gastrointestinal tract. However, it is considered by some that oil can pass around some obstructions without softening them. It is a relatively safe non-toxic stool softener, however, it is necessary to ensure that gastric dilation and therefore the potential for reflux is not present before administration. Fatal aspiration pneumonia can result.1

Magnesium sulfate (Epsom salts) is a saline laxative thought to exert an osmotic effect increasing fecal bulk and water.2 However, the exact mechanism of action is not known. When compared with equal volumes of other substances administered via nasogastric intubation, magnesium sulfate was more effective at increasing fecal water and bulk. All agents stimulated defecation via the gastrocolic reflex.

Dioctyl sodium sulfosuccinate (DSS) is a surfactant agent that can act as an irritant laxative and fecal softener. Toxicity results from mucosal damage to the stomach and small intestinal lining.3 Reports of magnesium toxicity due to enhanced absorption when administered concurrently with DSS exist.4

Psyllium hydrophilic mucilloid acts as a bulk laxative and is widely used for impactions.5,6 Most widely known as Metamucil® (Procter and Gamble). There is little evidence that usage increases passage of sand impactions for which it is often recommended.7

Bran has been used extensively for many years due to its purported laxative effects; however, no change in fecal water has been demonstrated with the feeding of wet or dry bran mashes compared to other diets.8

Vegetable oils may act as laxatives. Castor oil acts as an irritant laxative. In higher doses severe colitis resulting from epithelial disruption has resulted.9,10 It is not recommended for usage in the horse. Linseed oil (raw) similarly at higher doses may cause watery diarrhea, colic, depression and neutropenia.11 Although successfully used, therapeutic index is narrow.

Enteral fluids are cost-effective and efficacious at assisting in the hydration and passage of intestinal impactions. While having a considerable cost advantage over parenteral fluids, they also avoid the complications inherent with intravenous catheterization and permit interval treatment. Indwelling small-bore nasogastric tubes (Mila International, Florence KY) are available for continuous enteral fluid therapy in controlled circumstances. In one study enteral fluids were found more effective at hydrating colonic contents than intravenous fluids combined with oral magnesium sulfate.12

Motility Agents

Adynamic ileus is a well recognized condition that complicates case management; however, the mechanism by which it occurs is subject to controversy. Research into intestinal motility has included in vitro and in vivo mechanical studies, measurement of myoelectrical activity, transit time of nonabsorbable markers, and surgical harvesting of intestinal musculature. Difficulties have arisen in the extrapolation of findings in non-diseased to diseased horses.
Studies have shown that a relationship appears to exist between inflammation and the onset of ileus, with sufficient inflammation in the muscle layers and myenteric plexus disrupting motility. Another proposed mechanism is increased sympathetic stimulation (alpha-2 receptors) and norepinephrine-mediated inhibition of ACh release. Both inflammation and the listed receptors are therefore attractive targets for intervention.

**Cholimimetics** or parasympathomimetic drugs increase ACh by inhibiting cholinesterase (indirect action) or directly stimulating cholinergic receptors (direct action).

*Bethanechol chloride* is a direct acting muscarinic receptor agonist. Gastric emptying was significantly hastened in one study, with increased activity also noted in the ileum, right ventral colon and cecum.

*Neostigmine methylsulfate* is an indirect acting agent (cholinesterase inhibitor). Increased cecal emptying along with increased activity in the ileum, pelvic flexure, right dorsal colon and cecum have been reported.

**Alpha-2 adrenergic antagonists** or sympatholytic drugs block receptors within the enteric nervous system allowing release of ACh from cholinergic neurons promoting intestinal motility. They counteract the inhibitory effect of sympathetic nervous stimulation on intestinal smooth muscle.

*Yohimbine* has shown the ability to increase activity of the right ventral colon and cecum, however cecal emptying was unaffected. In some studies normal motility was not restored. In other studies yohimbine increased activity of the upper intestinal tract with a milder transient effect on the large intestine. The combination of yohimbine and bethanechol may be more effective than bethanechol alone. Gastric emptying was enhanced in one study.

**Benzamides** stimulate the release of ACh from post synaptic cholinergic neurons.

*Metoclopramide* activates 5-HT receptors, antagonizes dopamine and blocks alpha-2 adrenergic receptors. Continuous rate infusion led to a decrease in the volume and duration of gastric reflux. This was more effective than administration in a bolus. Contractile activity in the pylorus, duodenum and jejunum was increased. During *in vitro* mechanical studies of intestinal muscle in horses free from gastrointestinal disease lidocaine usage increased contractility of the proximal jejunum but not adjacent regions. An *in vivo* study of healthy horses displayed similar findings in that overall proximal jejunal motility was unaffected.
However, lidocaine has been shown beneficial in clinical studies of refluxing horses. Prophylactic lidocaine treatment was significantly associated with a reduced incidence of postoperative ileus and enhanced short-term survival in one study. However, it has also been demonstrated that a continuous infusion of lidocaine increased transit time of feces in normal horses.

**Other Agents**

*Alpha-2 adrenergic agonists* are widely used and affect intestinal motility. *Xylazine* decreases motility in the jejunum and pelvic flexure. *Detomidine*, and to a lesser extent xylazine, have been shown to relax the entire large intestine with profound analgesic effects. Both xylazine and detomidine have significant suppressive effects on duodenal motility. Detomidine appears more potent and of longer duration of effect than xylazine. Relaxation of both the small and large colon may be of benefit during attempts to rehydrate and conservatively manage the colon impaction patient, with passage of laxatives around the impaction facilitated.

*Hyoscine-N-butylbromide* (Buscopan, Boehringer Ingelheim) has been shown to have an immediate and profound but short-lived depressive effect on cecum and left ventral colon contractions, but a minor and longer duration of effect on duodenal contractions. Studies have shown little effect on small intestinal motility. Rectal pressure is reduced facilitating more complete and safer examinations *per rectum*. Experimentally, hyoscine-N-butylbromide produced rapid analgesia (within 30 seconds after injection) of at least 20 minutes duration.

**Nutritional Management**

Feeding practices have long been the subject of intense scrutiny in the management of acute abdominal disease in the horse. Consistency of exercise and diet are important in colic prevention. Generally, fresh water and an electrolyte source should be freely offered before and after feeding, and preferably at all times.

Risk factors for colic identified in one study include a recent change in batch of hay, a decreased exposure to grazing on pasture, a recent change in type of grain or concentrate fed, and the feeding hay from round bales.

Feed should be withheld during a colic episode. Water should be withheld if small intestinal disease is diagnosed or nasogastric reflux is present. Avoidance of dehydration must be considered which will necessitate parenteral fluid administration. Following colic, when nasogastric reflux has ceased, and gut motility and appetite are judged to have returned, reintroduction of nutrition should adhere to the following order: water, forage-based feeding, grains or other concentrates. Hand grazing several times per day for 20-30 minutes for the first 1-3 days post colic is beneficial; however, the rate of reintroduction of any feeding is dependent on the severity and duration of the colic episode. Alternatively, offer small quantities of high quality grass hay four to six times daily.

When hay or grass is not available, a slurry of a complete ration pelleted feed (such as senior preparations) is an excellent substitute. Avoid making sudden dietary changes by departing...
significantly from what the horse was eating over the time preceding the colic episode. As the horse is likely to be less active and potentially confined post colic, it is not necessary to rapidly restore the full ration the horse may have consumed if working prior to the bout of colic.

References