

What You Need to Know About Treatment of Colic in the Field

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Take Home Messages:

- Consideration of the signalment of the horse along with a thorough history obtained from the owner can be invaluable in narrowing down a diagnosis to help with determining the optimal method of treatment.
- Know the key components of the physical exam in the colic to aid in assessing severity of disease and whether surgery may be indicated.
- The skillful passage of a nasogastric tube can be both diagnostic and therapeutic in the colic patient.
- The most commonly used drugs for treatment of colic in the field are xylazine, butorphanol, detomidine and flunixin meglumine. Remember that NSAIDs and polymyxin B are nephrotoxic, particularly in the face of dehydration, so be cautious with repeated dosages and avoid combining NSAID drugs.
- Use of point-of-care monitors such as a lactatometer can be highly valuable in determining both diagnosis and prognosis in the colic patient.
- It is important to take the time to both diagnose and stabilize a critically ill horse for transport to a referral hospital when transport time is prolonged or when the risk for death during transport is high.

This presentation will walk through the nuts and bolts of treatment of the equine colic patient in a field setting and the role of the technician in the process. We will cover everything from the key questions to ask owners, to the physical examination and interpretation of diagnostics, as well as treatment. Fundamental components of when referral is indicated using a case-based approach will also be covered.

What can we learn from signalment and history?

Signalment consists of age, breed and sex of the horse and can provide the first clue toward what differential diagnoses are more likely. Neonates (<30d of age) are prone to meconium impaction, clostridial enterocolitis, scrotal hernia (colts), small intestinal volvulus and congenital gastrointestinal atresias. Young horses (<2yrs) may be prone to foreign body obstruction, ascarid impaction, fecoliths or intussusception. Lastly, aged horses (>12yrs) are more susceptible to strangulating lipomas of the small intestine, fecoliths, and large colon impactions. Certain breeds such as the Arabian and Morgan horse have a higher prevalence of enterolithiasis; whereas American Miniatures are prone to fecoliths, sand impactions and enterolithiasis. Stallions may develop inguinal hernias, and these seem to be more frequent within Standardbreds, Andalusians and draft breeds. Lastly, pregnant and post-partum mares may develop uterine torsion, uterine artery rupture, and large colon volvulus.

As a technician assisting with treatment of a horse with colic, you will have ample opportunities to obtain a thorough history that could positively influence the development of an accurate diagnosis to guide treatment. Table 1 provides a list of historical variables and the diagnoses that may be associated with them. Owners should be questioned on duration, severity, and progression of the colic signs, past colic, access to water, fecal consistency, appetite, attitude, response to pain medications, type of feeds and supplements fed, changes in feed type or

quantity, changes in weight, feeding environment (ground or access to sandy soil), deworming protocol, vaccination history, medication history, travel history, prior colic surgery history, current or recent geographic location, other horse illness, cribbing behavior, and use of the horse.

Table 1: Patient historical variables that may be associated with particular diagnoses and may aid in the decision for early referral.¹

Historical Variable	Diagnosis Association
Acute onset, severe colic	Strangulating obstruction
Insidious onset colic of several days duration	Non-strangulating obstruction /displacement
History of recurrent colic episodes	Sand colic; Enterolithiasis; Gastric or colonic ulcers; Impaction; Gas colic
Limited access to water / absent or concentrated urine output	Large colon impaction
Feces: Diarrhea observed early on followed by progressive colic	Small colon impaction
Feces: Persistent soft or watery feces	Colitis
Dull mentation and inappetance	Colitis; Non-GI origin systemic diseases
Variable pain followed by signs of shock (sweating, muscle fasciculations and reluctance to move)	Gastrointestinal rupture
Mild to moderate colic followed by severe colic	Secondary LC displacement or LC volvulus
Colic minimally/unresponsive to alpha-2 agonists	Strangulating obstruction
Cribbing or windsucking behavior	Epiploic foramen entrapment
Changes in feed type or quantity of consumption:	
- Feeding of coastal Bermuda grass hay (East coast)	Ileal impaction
- Change to lower quality fibrous feed	Colon or cecal impaction
- Increase in feeding of concentrates	Proximal enteritis or large colon displacement/volvulus from gas production
- Alfalfa hay as predominant forage source ²	Enterolithiasis
- Access to moldy hay or grain	Proximal enteritis/gastritis/enterocolitis
History of gradual weight loss and soft stool	Sand impaction
Feeding on the ground or access to sandy soil	Sand impaction
Recent anthelmintic administration in a young horse ³	Ascarid impaction
History of chronic NSAID use for musculoskeletal problems ⁴	Right dorsal colitis/gastric ulceration
Geographic location – current or recent:	
- California	Enterolithiasis
- Arizona, Florida, or regions with sandy soils	Sand colic
- UK, Northern Mainland Europe, or South America	Equine Grass Sickness
History of prior colic surgery	Recurrence of original problem / adhesions

Key components of the colic physical examination:

A complete physical examination of a colic patient, when combined with signalment and history, will often provide adequate information to determine whether surgery or referral for surgery is indicated. The most important components of a physical examination in the colic patient include:

- Pain assessment and general appearance/attitude
- Heart rate
- Temperature
- Respiratory rate
- Mucous membrane color
- Auscultation of gastrointestinal motility (normal is ≥ 3 borborygmi/min)
- Perfusion indices (mucous membrane color, CRT, jugular refill, extremity temperature)
- Hydration indices (mucous membrane moisture, skin turgor)
- Digital pulses
- Rectal palpation
- Passage of nasogastric tube for detection of gastric reflux

Tips and tricks for passage of a nasogastric tube:

- Optimize restraint. Method may be dictated by comfort of the owner. Nose or skin twitch may be sufficient, but often facilitated by light sedation.
- Mark the distance on your tube from the nasal opening to the pharynx with a sharpie.
- Use the left nostril when practical to easily visualize the tube as it passes down the cervical esophagus.
- Remember “central and ventral.” Always keep the tube as ventral and central in the nostril as possible to avoid entering the middle or dorsal meati and injuring the ethmoid turbinates. Most severe bloody noses arise from injury to the ethmoids.
- Once in the nasopharynx, flex the head and turn the tube 90 degrees to avoid entering the airway. Search for the soft tissue at the back of the pharynx and apply steady light pressure. Watch for a swallow and advance with moderate pressure immediately as the swallow occurs. Note that some horses will swallow immediately upon touching their pharynx that will facilitate rapid passage of the tube.
- If unsure where you are (e.g. in proximal trachea or esophagus)...you can use the following tricks to find out: check for negative suction on tube that will be present if in the esophagus, grab the larynx and shake it side to side to feel for the tube in the trachea hitting the tracheal and laryngeal cartilages, pass the tube in further and look for it passing down the esophagus along the left side of the neck, and lastly, use the sharpie mark to get you back to the nasopharynx with proper orientation of where the end of the tube is located.
- Watch passage down the left side of the neck
- Length of tube – cardia versus stomach (tube will not advance all the way if stuck at cardia)
- Final check – blow and smell or blow and listen
- Pulling the tube

The nature of the nasogastric reflux obtained (volume, texture, color, smell) can tell you a lot about the cause of the increased volume of reflux. Increases in gastric reflux can occur due to

primary stomach problems such as gastric impaction, gastric dilation/fermentation, gastric outflow obstruction (pyloric stenosis or duodenal ulcers) or gastric atony (loss of normal motility). It can also occur secondary to obstruction or abnormal function of the small intestine. Horses with severe cecal and/or large colon distention may have transient gastric reflux due to duodenal compression. When bile-stained reflux in larger volumes is obtained, a small intestinal strangulation or proximal enteritis is more likely.

Commonly used drugs in the treatment of colic and contraindications for use:

The most commonly used drugs for treatment of colic in the field are xylazine (Rompun), butorphanol (Torbugesic), detomidine (Dormosedan) when pain is unresponsive to xylazine or when longer duration of analgesia is needed, and flunixin meglumine (Banamine) at 1mg/kg IV up to q12 hrs in the absence of dehydration. A table of these drugs and a few others used in treatment of colic, including dose, routes of administration and special considerations for each is provided in Table 2 below. Remember that NSAIDs are nephrotoxic, particularly in the face of dehydration, so be cautious with repeated dosages and avoid combining NSAID drugs (e.g. banamine and firocoxib or dipyrone or bute).

Table 2: List of most commonly used drugs for the treatment of colic including dosages, routes of administration, and mechanisms of action along with treatment considerations.

Drug	Dose (volume in mls is for 500kg horse)	Route of Administration	Considerations
Xylazine (Rompun)	0.25-0.5 mg/kg (1.5-2.5 mls)	IV or IM as needed	α -2 agonist, short-acting (30min)
Butorphanol (Torbugesic)	0.01-0.02 mg/kg (0.5-1 ml)	IV or IM as needed	Opioid analgesic
Flunixin Meglumine (Banamine)	0.5-1.1mg/kg (5-10mls)	IV up to q12 hr; Avoid IM use	NSAID, do not combine w/other NSAIDs, caution in dehydrated horses
Detomidine (Dormosedan)	0.01-0.02 mg/kg (0.5-1 ml)	IV or IM as needed	α -2 agonist, long-acting (~60min), potent
Romifidine (Sedivet)	40-120 μ g/kg (2-6mL)	IV as needed	α -2 agonist, long-acting (~60min), less analgesia than detomidine
Firocoxib (Equioxx)	Loading: 0.27mg/kg (4.5mls), then 0.09 mg/kg (1.5mls) (0.3/0.1 mg/kg for PO)	IV or PO formulations q24 hr	NSAID, do not combine w/other NSAIDs, caution in dehydrated horses

Point of Care Monitors in the Evaluation of the Colic Patient:

A blood and peritoneal fluid lactate level can be readily determined in a field setting using a portable lactate meter. It is one of the most helpful techniques to determine the degree of circulatory and intestinal compromise in horses with colic. Normal blood lactate will be <1.5mmol/L, but levels greater than 3mmol/L are often associated with the presence of strangulated intestine. High levels of blood lactate (>7mmol/L) are associated with lower

survival rates. Typically, peritoneal fluid lactate will exceed peripheral blood lactate by greater than two-fold in the presence of a strangulating lesion.

A blood glucometer can provide some baseline information on prognosis in more severe colic cases. Hyperglycemia ($>135\text{mg/dL}$) is common in horses referred for colic, but extreme hyperglycemia ($>180\text{mg/dL}$) is associated more commonly with surgical colic and decreases in hospital survival.

Other Useful Diagnostics:

Abdominocentesis can be an invaluable tool to assist with the decision for surgery or decision for euthanasia in colic patients. Parameters as simple as color and total protein as measured on a refractometer, when combined with other clinical findings, can provide the necessary guidelines to make critical decisions in the field. Serosanguinous (red) abdominal fluid is most predictive of a strangulating obstruction, especially in the presence of concurrent increases in total protein ($>2.5\text{g/dL}$) and lactate ($>2\times$ peripheral blood lactate). If GI rupture is suspected based on the PE, obtaining an ultrasound-guided abdominal fluid sample (to ensure the gut was not tapped) could confirm the diagnosis and save the horse and its owner a lot of suffering and expense (TP $>3\text{g/dL}$; lactate $>4\text{mmol/L}$; greenish or brownish discoloration).

Abdominal ultrasound is also an invaluable and underutilized tool for diagnosis of colic in a field setting. A whole host of conditions causing colic can be confirmed or diagnosed with the aid of ultrasonography. These include, but are not limited to nephrosplenic entrapment (left dorsal displacement of the colon), right dorsal colon displacement, colonic volvulus, gastric distention, sand enteropathy, strangulating and non-strangulating obstructions of the small intestine, duodenitis-proximal jejunitis, peritonitis, hemoperitoneum, peritoneal effusion, neoplasia, gastrointestinal ruptures, and others. Further benefits of ultrasound include the identification of an optimal location and method for abdominocentesis in the field or at a referral facility assisting in surgical decision making.

Stabilizing the Critical Patient:

If you are faced with a critically ill horse that is clinically unstable (signs of shock and toxicity) and must be transported to a referral facility more than an hour away, decisions must be made on the benefits of treatment with the drawbacks of the time it takes to administer treatment. These decisions should be based on nature of the disease process (e.g. colitis vs. strangulating obstruction) where time may be of greater or lesser importance to survival. If there are delays in transport (e.g. waiting for a trailer), take the opportunity to stabilize the horse as much as possible by beginning IV fluid administration at a rapid rate. Use of hypertonic saline (7.5% NaCl) as a 1-2 liter bolus may assist with stabilizing the patient's blood volume, but must be followed immediately by isotonic fluids. Hypertonic saline alone may be detrimental prior to shipping if IV fluids are not continued. Horses with extensive nasogastric reflux should be shipped with an indwelling tube in place that is secured well with tape. Horses with colitis may benefit from early administration of Biosponge (DTO smectite) prior to shipping. Anti-endotoxic therapy should be restricted to a single dose of NSAIDs until an assessment of kidney function is made. Polymyxin B (3000 IU/kg in 1 L saline q12) can be administered in toxic patients concurrently with Flunixin meglumine when on IV fluids and when kidney function is adequate.

1. Cook VL, Hassel DM. Evaluation of the colic in horses: decision for referral. *Vet Clin North Am Equine Pract* 2014;30:383-398, viii.