Things that go bump in the night. Part 1

David E. Freeman, MVB, PhD, Diplomate ACVS
University of Florida, Gainesville, FL USA

This section will cover recent trends and updates in managing horses with colic, particularly with regard to diagnosis, prevention, and treatment. Special emphasis will be placed on the decision to treat on the farm, and especially those cases that do not have a surgical option. Owner misconceptions complicate this issue.

Role of Risk Factors in Diagnosis

Some diseases seem to be specific for certain types of horses, and knowledge of this can be helpful in making a diagnosis. The following is a list of loose associations with certain types of colic. If other signs fit with the possible "at risk" diagnosis, the odds of that disease being responsible for colic increase accordingly.

Horse Factor (s)	At Risk For:
Male intact Standardbreds, Tennessee Walkers, Saddlebreds	Inguinal Hernia
Miniature horse, small pony of any age, foal	Fecalith
Horse > 10 years	Strangulating Lipoma
Horse < 3 years	Intussusceptions
Mare in late pregnancy	Uterine Torsion
Previous small intestinal surgery	Adhesions
Postpartum mare in severe pain	Large Colon Volvulus
Postpartum mare with mild colic, peritonitis	Small Colon Ischemia
Postpartum mare with mild colic, peritonitis	Ruptured Uterus
Feeding coastal Bermuda grass hay	Ileal Impaction
Recurrent colic in a young horse	Ileocecal Intussusception
Foal <48 hours old	Meconium Impaction
Thoroughbred gelding, cribber	Epiploic Foramen Entrapment
Weight loss in a young horse, with colic after eating	Chronic Intussusception
History of receiving nonsteroidal anti-inflammatory drugs	Gastric, Colonic Ulcers, Right Dorsal Colitis
Mild recurrent colic and poor condition	Gastric Ulcers
Parasitized weanling or foal after worming	Ascarid Impaction
White foal	Overo Lethal White/Hypoganglionosis

Arabian horse in California	Enteroliths
Foal with colic weight loss, fever, retarded growth, lethargy, diarrhea, subcutaneous edema	Proliferative Enteropathy (Lawsonia intracellularis)
Fever, icterus, weight loss in adult horse	Choledocholithiasis
Weight loss, reduced appetite, depression, diarrhea, ventral edema, and fever, with history of penetrating abdominal wound, abdominal surgery, previous respiratory tract infection	Abdominal Abscess
Horse hospitalized and treated for wound or orthopedic disease	Cecal Impaction
Old age, excessive and inappropriate sweating, hyperglycemia, clinical signs and laboratory evidence of blood loss	Ruptured Pheochromocytoma
Horse, especially pony, with access to Persimmon fruit	Gastric Impaction

Horse older than 10 years – strangulating lipoma, with increasing risk with increasing age. For example, the incidence in horses older than 15 years of age is five times higher than in 10- to 15-year-old horses. Supportive findings for referral are small intestinal distention, reflux, and increased HR. Signs of pain can be mild in older horses.

Role of Diet

Incidence of colic can be significantly decreased in horses at pasture and allowed to graze continuously. The risk is diminished further if horses on grass that has a low-fiber, high moisture content, such as lush spring pasture, are supplemented with dry hay. Tinker et al reported that the risk of colic increased with increased amounts of grain/concentrate in the diet, and that horses fed sweet feed were at increased risk of colic relative to horses fed other types of concentrate (pellets, mixes, oats, or barley). Horses fed forage only (pasture, hay, or both) had a lower risk of colic. A change of diet within 2 weeks was associated with a twofold increased risk of colic, regardless of changes in exercise or stabling. The incidence of colic can be higher at farms where horses are subjected to approximately 6 diet changes per year. In a study in the United Kingdom, a change in management was the most commonly reported putative risk factor for spasmodic or undiagnosed colic. In this study, providing access to lush pasture was the most common management change. Compared with horses at pasture, horses confined to a stall appear to be more prone to ulceration of the nonglandular portion of the stomach. Withholding feed alternated with periods of feeding also appear to induce gastric ulcers in horses, evidence that dietary changes could constitute some form of disruption to normal gastric physiology. The best known diet related colic in the southeastern US is ileal impaction with coastal Bermuda grass hay.

What not to do in Referring a Horse with Colic

Most horses with colic can be treated on the farm, but a horse should be referred to a surgical facility if the examining veterinarian anticipates the need to place it where: 1) surgery can be performed BEFORE the horse's condition begins to deteriorate; 2) aggressive and intensive medical therapy can be applied (as for impaction colic or colitis); and 3) it can receive around the clock observation. Several studies have shown conclusively that early referral decreases postoperative complication rates and improves survival, in many cases through preventing a difficult, complicated and expensive resection.

Do Not Delay Referral

Basic Guidelines in Pain Assessment and Prognosis. Do refer when:

- Pain is more severe than can be managed at home with safety.
- The heart rate is >48 beats/minute and remains that high or increases.
- You get reflux from a stomach tube.
- Abdominal distention is getting worse.
- Pain is mild but other signs are abnormal, especially in an old horse.
- One or more physical examination findings seem inconsistent with a medical colic.
- Rectal examination findings are abnormal.
- The horse belongs in a high-risk group (see above).
- The horse has not defecated in >24 hours or its feces have changed in form and/or volume.
- You feel like you need a second opinion or more advanced diagnostic procedures.
- You sense that the owner is becoming concerned.

Do Not Ignore the Age Clue

A horse ≥ 10 years old with severe colic has a strangulating lipoma unless proven otherwise. If you feel distended loops of small intestine on rectal examination, or you get reflux through a nasogastric tube, this horse most likely has a strangulating lipoma. Tightly distended loops are strongly suggestive of strangulating lesions.

Do Not Provide Flunixin Meglumine to Owners

If the owner cannot give an IV injection, then they will give Flunixin Meglumine (Banamine) IM, which can cause severe and fatal myositis in the injection site. Also owners tend to give it too frequently, which puts a dehydrated horse at risk of NSAID-induced renal damage. If the owner gives Banamine before you see it, the early signs of colic might be masked and diagnosis might be delayed. Ideally Banamine is given IV at the correct dose and after the horse has been examined. Do not give it IM or more frequently than every 12 hours.

Do Not Give Up

If the owner agrees and can afford surgery, give the horse that opportunity. Amazing things can be accomplished and many pessimistic guidelines from the past do not apply. Old horses handle colic surgery and anesthesia as well as much younger horses, based on many survival studies. Evisceration looks terrible but affected horses can be saved. Do not return contaminated prolapsed intestine into the abdomen but support it in sheets and towels or under skin sutures, and refer quickly.

After surgery, many horses can have a normal life, are able to race and perform. A mare can have normal foals. There are numerous examples of horses involved in strenuous activities that performed to full potential after colic surgery, even winning races like the Kentucky Derby. Life expectancy after colic surgery is definitely improving.

Do Not Give Intravenous Fluids

We have been taught that horses with severe colic should be stabilized as much as possible before surgery and methods of IV fluid administration have been popular topics at continuing education meetings. However, IV fluids given on arrival at the referral hospital are usually sufficient. The horse has an enormous reservoir for salts and water in its colon that keep it hydrated during times of need. Fluids should <u>not</u> be given at home, because the benefits for colic cases might be outweighed by risks for these reasons:

- Intravenous fluids require an indwelling intravenous catheter which may be impractical.
- Unlikely that intravenous fluids in large volumes can drive water into an impaction and soften it. horses given 3 times maintenance IV fluids can have increased urine production and sodium loss which could contribute to electrolyte abnormalities as well as rebound dehydration when fluids are discontinued.
- It takes time to administer fluids at the farm, which delays arrival at the hospital for assessment and treatment. Although you might improve the horse's condition briefly, the ischemic intestine will continue to decline and will need a resection and anastomosis.
- Some horses can appear to improve after fluid therapy and analgesics, which can create a false sense of recovery. This only adds to the delay.
- Fluid therapy at home adds to the owner's cost and could put the cost of surgery out of their reach. Prices for intravenous fluid bags for horses have undergone a considerable cost increase in recent months, and availability of these fluids can be tenuous.
- Fluid therapy at home can fail to improve the horse's condition and can create problems through fluid overload and electrolyte imbalances.

Do Not Give Lidocaine

Studies that have examined the benefits of lidocaine to promote intestinal motility after colic surgery have some design flaws that render the results contradictory and inconclusive.

- Despite the original claim that lidocaine has prokinetic effects, subsequent studies have demonstrated the absence of such an effect and that lidocaine might even delay intestinal transit.
- Any assessment of lidocaine in management of colic and in improving survival in horses after colic surgery should not ignore evidence that better results can be achieved without it.
- The anti-inflammatory effects of lidocaine, which have been offered to explain its ability to promote motility in inflamed intestine and after colic surgery, have not been demonstrated in equine jejunum and colon after ischemia and manipulation.
- If lidocaine does have a benefit, this might be through its visceral analgesic effects or enhancement of mucosal repair.

Do Not Do an Abdominocentesis

Peritoneal fluid analysis can provide useful information in the horse with colic, but has its limitations, and should be used in selected cases. Bear in mind that the goal (somewhat unrealistic) is to perform surgery before changes have developed in peritoneal fluid, not afterwards. Abdominocentesis should not be used under these conditions:

- In adult horses and in foals with obvious signs of intestinal distension (unless absolutely necessary and with ultrasound guidance),
- As a field procedure. If laboratory facilities are not available, abdominocentesis is a waste of time. Even gross appearance, PCV, and TP are of little value. If the sample has to be brought to a lab, waiting for the results can delay life-saving surgery.
- If the results will not influence the course or selection of treatment.
- Although abdominocentesis is useful in diagnosis of a strangulating small intestinal lesion, it can be non-diagnostic for large colon volvulus and ruptured viscus.
- Abdominocentesis can be used to obtain prognostic information, but is often misleading and should therefore be used with caution for this purpose, if at all.
- An enterocentesis is rarely life-threatening but can cause these complications:
    - Peritonitis.
    - Cellulitis.
    - Interferes with interpretation of subsequent peritoneal fluid samples.

Also, abdominocentesis and other diagnostic procedures that you perform at the farm are repeated at the hospital. This is valid and is required to determine if there is a change in condition and because the hospital personnel are responsible for making crucial decisions about the horse and need information relevant to the time the decision is made. However, owners can question such repeat diagnostics as duplication of procedures and hence an unnecessary expense.

Do not Waste Money

Although time spent on diagnostics and treatment on the farm is well intentioned, remember the same procedures have to be repeated at the surgical facility. Owners do not appreciate this (see above) and spending so much money on repeated procedures could leave insufficient funds for lifesaving surgery.

What to do if Referral is not an Option

When the owner declines referral, you must establish some very clear guidelines for how to proceed. The possible reasons why referral is not an option need to be addressed:

1. Colic surgery is rarely successful.
2. Horse will never be the same after colic surgery.
3. This is a pregnant mare and it will be impossible to save the mare and foal.
4. This is an old horse and old horses do not handle colic surgery well.
5. This horse is much loved/valued but we cannot justify spending the money on colic surgery in our present financial circumstances.

Reason 5 is the only one on this list that is valid. The others are untrue and need to be corrected before the final decision is made.

Once the owner elects treatment at home over referral, the following questions must be answered:

How much am I prepared to spend? What is my financial limit on this horse? How much of my time am I prepared to commit to around-the-clock monitoring and care? Can I handle watching a horse suffer? Is my family supportive of this decision? Will I change my mind or stick the course?

The last question is critical because if referral <u>is a possible option</u> at any point, it should be performed early in the disease process……not after all other medical treatment options have been exhausted and the horse's cardiovascular status has begun to deteriorate.

Specific Diseases and Recommended Approaches

Displacements that are occasionally treated by surgery, such as right dorsal displacement, and impactions of the ileum, cecum, large colon and small colon can respond to medical treatment, if managed appropriately and given enough time. Entrapment of the colon over the nephrosplenic ligament is usually treated nonsurgically (rolling or phenylephrine) at referral hospitals and could be managed in the same way at home. In very rare cases, large colon volvulus can spontaneously correct. On the other hand, some horses can start with an impaction that produces sufficient gas build up to cause displacement or volvulus. Strangulating lesions of the small and large intestines are the challenge if surgery is not an option because these will not resolve medically and should be candidates for euthanasia as soon as the diagnosis is made.

Euthanasia should be considered for horses with evidence that supports a diagnosis of strangulating lipoma. Horse older than 10 years should be considered as having a strangulating lipoma, unless proven otherwise, and the likelihood of this diagnosis increases with increasing

age. Supportive findings are small intestinal distention, reflux, congested mucous membranes, and increased heart rate. Pain can be absent or mild in older horses. It is not unusual for horses with this lesion, despite the severity of intestinal ischemia, to survive for 3 days or more with reflux and increased heart rate, but little evidence of worsening in disease severity.

A postpartum mare with extreme pain and worsening abdominal distention probably has a large colon volvulus. Such cases respond poorly to analgesics and euthanasia is warranted early in the disease course.

Diagnostic Procedures

Palpation per rectum, repeated as needed, is a critical procedure in a horse with colic to detect distended loops of small intestine, tight bands, impactions, and other findings that could indicate life threatening changes. Ultrasonography is very useful for diagnosis of intestinal strangulation (distended, thick-walled intestine), peritonitis (increased volume of peritoneal fluid and decreased intestinal motility), intussusceptions (jejunojejunal, ileocecal, and cecocolic), displacements, renosplenic entrapment of the large colon, peritoneal effusion, diaphragmatic hernia, cholelithiasis, ruptured bladder, ascarid impactions, inguinal and scrotal hernias, and abdominal neoplasia. However, transabdominal ultrasonography can be difficult to interpret if you have limited experience with this diagnostic modality.

Fluid from most horses with nonstrangulating lesions is normal on gross inspection, but fluid from horses with strangulated small intestine is usually serosanguinous. A fluid sample from horses with a ruptured viscus is cloudy and green-tinged, but can be normal if diluted out by a large volume of peritoneal fluid or if intestinal contents are entrapped by omentum or intestine close to the site of rupture (hence the importance of cytological examinations).

Peritoneal fluid with nucleated cell counts greater than 5,000 cells/μl should be considered elevated in foals. Peritoneal fluid protein is usually below 2.0 g/dL. Cytologic evaluation should detect degeneration of cells and bacteria (in rupture), and allow classification of cell populations. Interpret with awareness in that **many horses with a surgical lesion, such as large colon volvulus, can have normal peritoneal fluid**.

Peritoneal fluid lactate can be a better predictor of intestinal ischemia secondary to a strangulating obstruction (SISO) than blood lactate, and therefore could be used for early detection of such lesions, and even rupture. Horses with SISO had a higher peritoneal lactate value (8.45 mmol/l) than those with nonstrangulating obstruction (2.09 mmol/l) and a greater ratio of peritoneal to systemic lactate.

Horses with abdominal pain should be allowed to roll at will if they are considered to have a colonic displacement, contrary to owner's desires to keep them walking. They might need to be placed in a round pen or paddock for this purpose to minimize the risk of injury. Although unsubstantiated, the impression is that vigorous rolling can correct some colonic displacements.

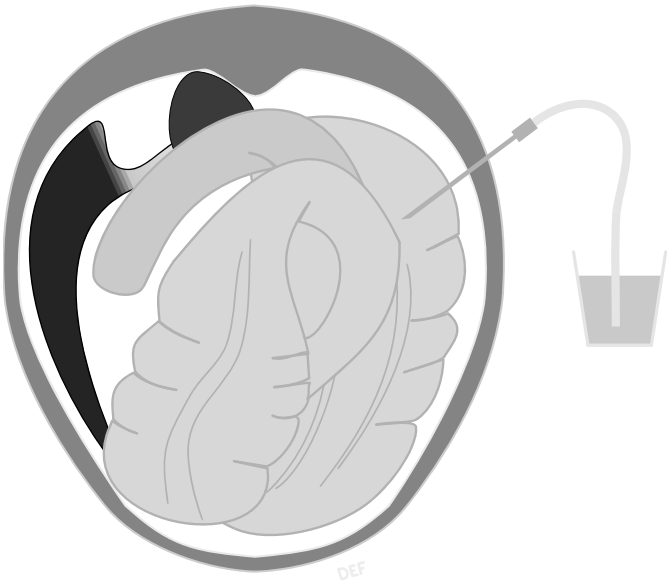
Horses with large colon trapped over the nephrosplenic or renosplenic ligament can have pain of variable intensity and mild to moderate abdominal distension. Treatment by "wait and see" approach, phenylephrine injection, or rolling the horse while anesthetized with short acting intravenous anesthetic are successful, depending on severity. The spleen can be effectively reduced in size by phenylephrine at 3μg/kg/minute for 15 minutes. The horse is then lunged for 10 to 15 minutes or rolled. Lunging is less effective than rolling under anesthesia and phenylephrine does carry a small risk of fatal hemorrhage in old horses.

Decompression by Enterocentesis

Some relief can be achieved in selected cases by decompression of the distended cecum. This procedure is risky, is not routine and can cause life-threatening peritonitis, but can also be valuable when financial constraints preclude surgery. It is best guided by ultrasonographic examination to avoid the cecal and colonic vessels. For cecal tympany, decompression is through a 14 gauge catheter (5 inches long at least) through the right paralumbar fossa, after the site has been prepared for aseptic surgery and infiltrated with local anesthesia. The catheter is connected to an IV tube immersed under water below the level of centesis so that gas egress can be continually monitored and air ingress is prevented. A small volume of gentocin should be flushed through the catheter before withdrawal to remove any aspirated intestinal contents that could drain into the abdominal wall.

Do Not Routinely Decompress by Enterocentesis

Some relief can be achieved in selected cases by decompression of the distended cecum. This procedure. It is risky and can cause life-threatening peritonitis, but can be valuable when financial constraints preclude surgery (see below).



Basic Guidelines in Pain Assessment and Treatment

Pain is the most important indicator of colic severity, but must always be assessed with full regard for some guidelines:

1. Young horses, especially those of racing breeds, tend to manifest pain more severely and persistently than draft breeds with similar lesions. Pain can be mild or even absent in old horses, smaller breeds, Tennessee Walking Horses, American Miniature Horses, draft breeds, and horses with severe endotoxemia.
2. Pain, cardiovascular status, and abdominal distension should be used in combination as measures of the severity of colic. Worsening abdominal distension is always a concern. An adult horse of average size with increasing heart rate or a heart rate persistently above 60 beats/minute (12 to 24 hours) generally has a poor prognosis. Draft horses are prone to all types of colic but are very difficult to assess. Even with mild lesions, they will have very high heart rates. Normal or mild elevation in heart rate can be found in some horses with a surgical lesion, including strangulating lesions of the small intestine. With time, these would be expected to develop an increased heart rate

3. Response to analgesics, such as flunixin meglumine or xylazine, is extremely important in assessing pain. If pain is severe enough to require repeated analgesics or response to analgesics is poor, the prognosis for survival might be poor.
4. Do not repeat analgesics without assessing the horse's progress when their effect is diminished. Do not underestimate the degree of improvement in pain and cardiovascular status brought on by medication.
5. Horses with self-inflicted trauma from violent pain with colic typically have strangulating lesions and should be considered for euthanasia if all other supportive evidence can be established.
6. Horses with persistent reflux and small intestinal distension, with or without pain, but with mucous membrane congestion and other signs of endotoxemia are candidates for euthanasia, especially if they do not respond rapidly to fluid therapy and flunixin meglumine.
7. Horses with persistent reflux and small intestinal distension, with or without pain, but without evidence of endotoxemia and have a history of eating coastal Bermuda grass hay, can be managed conservatively as many of these will resolve with medical therapy.
8. Because the only option in these cases is euthanasia, more time can be allowed for spontaneous recovery than would be allowed before referral. This could extend to days, provided the horse can be kept comfortable and inhumane suffering is prevented.
9. If some doubt persists about the need for euthanasia, the horse can be transported to a referral hospital to confirm the need for euthanasia. This could be less expensive than continued non-productive treatment and disposal is handled by the referral hospital. This approach also provides the horse one treatment option than can be very effective – a trailer ride!!
10. Horses with colic should be deprived of food so that the obstruction is not aggravated or the impaction is not worsened. This creates severe metabolic problems for horses with metabolic syndrome or for minis, ponies and donkeys, often severe enough to be fatal. These are strong arguments for euthanasia if they develop while treating a horse at home because the alternative, hospital treatment, is required to correct this potentially fatal complication.