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Criteria for referral to a hospital and for surgical intervention for horses with colic have been well established over the years. However, this presentation will address some of the flaws in commonly used decision-making techniques, and introduce some new information that should be included in the development of a referral and surgical strategy.

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 in a facility 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 proximal enteritis); and 3) it can receive around the clock observation.

In a horse with a strangulating lesion, prompt referral is associated with the need for minor surgery, excellent prognosis (short and longterm) and a low cost. The more the decision to refer is delayed, the greater the likelihood of a poor prognosis, and, even if the horse survives, the surgery and aftercare can be complicated and even prohibitively expensive. All too often, we overlook the harmful effect of the high cost on colic surgery.

In recent years, we have seen a tremendous improvement in survival after colic surgery. Although, we could claim that advances in surgery and anesthesia are responsible for these improvements, we regard the referring veterinarian as the most likely cause of this change. Horses that require surgery are being referred more promptly, so that they arrive in better condition for anesthesia and surgery, and their life-threatening disease is at a stage that allows easy correction and rapid postoperative recovery.

The criteria for referral need to be reevaluated, however, because we still encounter horses that would have benefited from earlier referral, but still lack those criteria typical of the surgery candidate. The rules have clearly changed. For example, the criteria that determined the need for referral a few decades ago do not apply today. For example, signs of pain and elevated heart rate are, and always will be, clearcut indicators of the need for referral. On the other hand, we frequently encounter horses that demonstrate little if any pain and have mild elevations in heart rate, but yet need surgery. The criteria for referral is a work in progress. The need for advanced diagnostic procedures could be a more important criterion for referral in some cases that are not typical of the classic surgical colic. Such an approach could actually improve promptness of referral and simplify surgical correction even further. We have gathered considerable evidence that some diseases associated with a difficult surgery and a poor prognosis can benefit enormously if they undergo surgery before intestine has undergone sufficient change to require resection.

The onus is on the referring veterinarian and the hospital team to identify these cases and advance colic surgery to the next level. Because of this philosophy, the following guidelines are proposed. Some of these are intuitively obvious but some are not.
- Horse older than 10 years - strangulating lipoma. Supportive findings for referral are small intestinal distention, reflux, and increased HR. Pain can be absent in older horses.
Horse that cribs and windsucker – strangulation in the epiploic foramen. Strongly supportive findings for this decision are small intestinal distention, male, age <20 years, and Thoroughbred, but all other breeds and genders can be affected. Pain can be highly variable in these horses, from mild to severe. Previous dogma that strangulation in the epiploic foramen is a disease of older horses does not apply.

Postpartum mare with extreme pain and worsening abdominal distention – large colon volvulus. These horses benefit the most from prompt referral because colonic ischemia, endotoxemia, and the need for colon resection can increase rapidly over time.

Pain, cardiovascular status, and abdominal distension, alone or in combination, are sensitive measures of the severity of colic. Response to analgesics, such as flunixin meglumine or xylazine, is extremely important in assessing pain.

Absence of pain – individual variation, old age, smaller breeds, draft breeds, and severe endotoxemia can all reduce severity of signs of pain. With the last two, the prognosis is poor.

Normal or mild elevation in heart rate – can be found in some horses with a surgical lesion, although elevated heart rate is a hallmark of a horse with a surgical lesion.

Normal mucus membranes – flunixin meglumine can improve cardiovascular condition and color of membranes considerably, and toxic membranes can represent too advanced a stage in the disease. Do not wait for changes in mucous membrane condition.

Draft horses – very difficult to assess. Even with mild lesions, they will have very high heart rates.

American Miniature Horses – these are prone to fecaliths in the small colon. Colic in these horses can be very complicated because even short periods of fasting associated with surgery can cause hyperlipidemia, liver disease, and death.

Peritoneal fluid – do not take a peritoneal fluid sample at the farm, because once changes have occurred, you have missed the opportunity for a simple, inexpensive surgery with an excellent outcome. Most lesions do not cause any changes in peritoneal fluid in the early stages, when the horse would most benefit from surgery. Also visual assessment of the fluid is meaningless and cytological examination provides the most information. Enterocentesis usually is tolerated, but can be devastating in foals, and can complicate subsequent assessment - and treatment in foals and adults.

Some diseases seem to be specific for certain types of horses, and knowledge of this can be helpful. The following is a list of loose associations with certain types of colic.

| Male intact Standardbreds, Tennessee Walkers, and Saddlebreds | inguinal hernia |
| Miniature horse, Shetland 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 | strangulation in epiploic foramen |
| Weight loss in a young horse, colic after eating | chronic intussusception |
| Nonsteroidal anti-inflammatory drugs | gastric, colonic ulcers, dorsal colitis |
| Mild recurrent colic and poor condition | gastric ulcers |
| Parasitized weanling or foal after worming | ascarid impaction |
| White foal | lethal white/hypoganglionosis |
| Arabian recently moved from California | enteroliths |
- Colic in foals – these are not small adults when it comes to colic, and they can have most of the obstructive diseases seen in adults. They are notoriously difficult to assess and delays in surgery can carry greater risk than in adults.

1. Compared with adults, colic in foals older than 2 days are far more likely to be surgical than medical.

2. Overlap of signs between enteritis and surgical colic in foals can make distinction between the two very difficult.

3. The “watch and wait” or “medical treatment first” approach to foals can carry as much risk as exploratory surgery.

4. Abdominal pain can be difficult to assess in foals, as they can alternate between periods of violent colic and periods of depression. Inability to perform a rectal palpation in foals complicates their examination further. Ultrasound examination compensates for this.

5. As with adults, prognosis for recovery is very good with foals if operated on without delay. Predisposition to intestinal adhesions might be overrated.

SMALL INTESTINAL STRANGULATION OR OBSTRUCTION VS. PROXIMAL ENTERITIS

The following are guidelines that might be helpful in distinguishing between proximal enteritis and mechanical obstructions that require surgery.

- Small intestinal strangulation obstruction can affect a horse of any age whereas proximal enteritis is rare in horses under 1.5 years. But it does occur in foals.

1. Horses with proximal enteritis can have a fever and leukocytosis.

2. Volume of gastric reflux tends to be greater with proximal enteritis than other SI diseases.

3. Horses with proximal enteritis may suffer from severe abdominal pain initially and this progresses to depression and less pain than in horses with strangulation obstruction.

4. After gastric decompression, horses with proximal enteritis usually improve in overall attitude and heart rate decreases.

- Tightly distended loops are suggestive of strangulating lesions.

- Ultraosonography can be used to identify thick-walled strangulated loops of small intestine. Generally small intestine will be distended in horses with proximal enteritis, but the absence of wall thickening on ultrasound does not rule out a strangulating lesion.

ABDOMINAL ULTRASOUND

Ultrasonography is very useful for diagnosis of intestinal strangulation (distended, thick-walled bowel), 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.1

The horse’s abdomen is prepared by spraying it with alcohol to improve acoustic coupling, and both sides of the horse are examined systematically from the line of the diaphragmatic reflection to the ventral midline. A low-frequency probe (2 to 3.5 MHz) is employed in adult horses to demonstrate deeper structures, although the resolution is low. Higher-frequency probes (5 to 10 MHz) can be used in small horses and foals for more detail, but with less penetration.1 The stomach can be examined for squamous cell carcinoma or for the presence of gastric fluid and the need for decompression by nasogastric tube. Ultrasonography is more accurate than abdominal palpation per rectum for identification of small intestinal strangulation. The normal small intestinal wall thickness is 3 mm or less, and ultrasonography can be used to detect small intestinal movement, mural thickness, and dilation. The strangulated segment of small intestine is usually found in the ventral abdominal cavity.1 Small intestinal intussusception will also gravitate towards the ventral abdomen, where it can be identified by ultrasonography. Large colon torsions can be diagnosed by imaging the large colon.
from the ventral abdomen, with a high degree of accuracy and reproducibility.\textsuperscript{2} A colon wall thickness \(\geq 9\) mm can accurately predict large-colon torsion with a sensitivity of 67\%, and can correctly predict absence of torsion with a specificity of 100\%.\textsuperscript{2} Although diagnosis of LCV has been made based on ultrasonographic detection of a colon segment that lacks sacculations,\textsuperscript{3} this approach has not been adequately tested and would appear to be seriously flawed. Ultrasonography is less useful for the detection of enteroliths because of their location and because the acoustic echo from a stone and a gas shadow are similar. Ultrasonography has considerably improved ability to diagnose uroperitoneum in foals, largely through demonstration of a large volume of fluid in the peritoneal cavity, an empty bladder, and possibly a tear in the bladder.

The Dos of referral. Refer when:
- Pain is more severe than can be managed at home with safety.
- Pain is severe enough to require repeated analgesics.
- Response to analgesics is poor.
- 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.
- The horse is not very painful, but you feel that its attitude is not normal.
- 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 below).
- 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.
- You sense that the owner is becoming concerned.

The following are the Don’ts of referral:
- Do not apply criteria for surgery that we learned years ago. They usually apply to a disease more advanced in its course than is ideal for referral.
- Do not delay referral until clinical signs are absolutely convincing.
- Do not be misled by the apparent absence of pain. Some surgical colics display mild pain or none, especially when the stupor of endotoxicemia develops.
- Do not wait for results of laboratory tests if the horse is getting worse.
- Do not delay a return visit to a horse with bad colic.
- Do not rely on the owner’s assessment of progress.
- Do not give drugs or treatments to control pain repeatedly.
- Do not repeat analgesics without assessing the horse’s progress.
- Do not underestimate the degree of improvement brought on by medication.
- Do not instruct owners to walk horses without establishing a protocol for frequent rechecks.
- Do not apply the same clinical criteria to foals as you would to adult horses (see below).
- Do not let the sun set on a bad colic.

REFERENCES