

Equine Colic: How to Make the Decision for Surgery

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Determining the need for surgery in a horse with colic is usually an emergency. The decision is best based on a diagnosis, however, a specific diagnosis is not always possible and use of clinical signs is often necessary to make the decision. The specific signs most helpful in indicating surgery are presented in Table 1. However, a thorough examination must be performed prior to deciding to refer a horse for surgery since each clinical sign by itself has inherent error when used alone to make the decision. There are circumstances when the diagnosis cannot be made and there are no definitive rectal examination findings to help in making the decision. However, unrelenting pain, which does not respond to analgesics, or recurring pain after analgesic administration are indications for surgery if no diagnosis has been made.

There are no strict guidelines or list of parameters that decide the need for surgery as there are varying degrees of severity, and a range of clinical signs for the diseases and every horse can respond in a different way. Therefore, every case should be judged on its own merits based on history and a thorough examination. In certain cases, a rapid decision can be made if a diagnosis is made from the clinical signs. The history and presentation may indicate immediate surgical intervention without processing all the information from a complete examination for colic. Pain by itself if persistent or recurrent is an indication for surgery.¹ This is particularly true if there is no response to analgesic administration. For example a broodmare presented 5 days after foaling with an acute history of severe abdominal pain, severe large colon distension and clinical signs of endotoxemia indicative of a large colon volvulus is in need of immediate surgery based on a presumptive diagnosis.

With the advent of potent analgesics, veterinarians have used the response to treatment to effectively determine which horse needs surgery. This is logical and if used with other physical signs, monitoring pain after treatment is highly successful in determining which horses will need surgery prior to other indicators. The timing of the response still needs refinement, but most veterinarians have determined the response time for the analgesics they use for most cases of colic. Horses that have constant pain, particularly after an analgesic has been administered, are significantly more likely to need surgery.^{1,i} Horses that have return of pain or those requiring a second administration or multiple administrations of an analgesic are also significantly more likely to need surgery (Table 2).^{1,2} The key is monitoring signs and adjusting one's tolerance for any recurrence of pain, as horses may show pain after administration of an analgesic, but the signs of colic can be markedly decreased. Though decreased, any recurrence of pain should be considered a failure of resolution of the problem and therefore an indicator of increased odds that surgery is necessary. Return of pain in horses that have a medical problem,

Table 1: Indications for Surgical and Medical Treatment of Colic***Indications for Surgical Intervention of the Equine Acute Abdomen**

Pain	-Uncontrollable and/or severe -Does not completely respond to flunixin meglumine or detomidine or requires a second treatment.
Gastric reflux	Alkaline yellow fluid >4 L
Rectal examination	-Distended small intestine -Distended and displaced large colon -Distention that cannot be treated medically -Palpable foreign body
Auscultation	-Intestinal sounds absent
Peritoneal fluid	-Increased protein with RBC and degenerate neutrophils

Contraindications for Surgical Intervention of the Equine Acute Abdomen

Pain	-No pain or pain changed to depression
Temperature	>102.5°F
CBC	-Neutrophilia (WBC>15,000/ μ l or neutropenia (WBC<3000/ μ l)
Auscultation	-Progressive intestinal sounds

*These signs are generalizations and may not fit individual cases.

Table 2: Number of horses requiring surgery based on persistence or recurrence of pain. In this study, horses that did not have a return of pain after the initial treatment did not require surgery.¹

Required surgery	Pain			Grand Total
	constant	did not return	returned	
no	11	67	19	97
yes	12	0	16	28
Grand Total	23	67	35	125

which can normally be treated without surgery, is still important. Horses with impactions in the large colon or cecum or obstructions due to sand accumulation can have recurrent pain and can usually be treated medically. However, if the pain persists and there is no evidence of bowel motility, surgery is indicated before the impaction causes bowel ischemia and subsequent mural infarction. In some cases horses may appear depressed but have evidence of trauma to the head that suggests that they experienced severe pain in the recent past (Figure 1).



Figure 1: Abrasions and bruising caused by the horse traumatizing the head during a rolling caused by colic. Though the horse is currently depressed, the previous pain indicated by the trauma may indicate a severe intestinal disease.

Temperature is usually not increased in cases of acute strangulation or obstruction. Horses with enteritis or colitis, which does not require surgery, frequently have an increased temperature suggesting that surgery is contraindicated. There is no exact cut off temperature, but horses with a fever of $\geq 102^{\circ}\text{F}$ usually have a medical condition such as peritonitis, anterior enteritis or colitis. Strangulating disease can cause a fever if it has been present for enough time to cause endotoxemia. Clinicians should also remember that non-steroidal anti-inflammatory drugs such as flunixin meglumineⁱⁱ can decrease or resolve a fever.³

Indicators of hydration and perfusion, such as heart rate, mucous membrane color, mucous membrane refill, packed cell volume, plasma protein are not usually specific indicators for the need for surgery. In most cases signs of shock are linked to complete obstruction, strangulation or enteritis, so that these values by themselves may or may not indicate a need for surgery and more accurately predict the prognosis for survival. For

example, heart rate can be misleading. Low near normal rate can be observed early in very painful diseases. In this instance pain should be considered the most important sign. High heart rates, though associated with severe diseases and poorer survival, do not always indicate the need for surgery. Diseases such as enteritis and tympany may cause high heart rates but do not normally require surgery.

Presence of nasogastric reflux increases the likelihood that the small intestine is obstructed by a disease that requires surgical treatment. Reflux can also be caused by ileus or anterior enteritis, which can most often be treated medically. Obstructions of the colon can also lead to nasogastric reflux due to stasis or obstruction of the duodenum caused by tension on the duodenocolic ligament, but again these problems do not always require surgery. Because of the lack of sensitivity, other physical signs should be used in conjunction with gastric reflux to make a final determination about the need for surgery. Conversely, the lack of gastric reflux does not rule out the need for surgery.

Anterior enteritis, which can cause large volumes of gastric reflux can create a diagnostic dilemma. Anterior enteritis causes pain, gastric reflux, distended small intestine and high peritoneal protein concentration, which together indicate a need for surgery. However, fever and subsequent depression are often observed suggesting the signs are due to enteritis. If in doubt, surgery to make a specific diagnosis is indicated to make sure a strangulating or obstructing lesion is not present. If enteritis is diagnosed at surgery, the bowel can be decompressed and anesthesia and surgery do not appear to decrease survival.

Horses with decreased or complete absence of borborygmi have significantly increased odds of requiring surgery compared to horses with normal intestinal sounds.¹ If borborygmi do not return after an analgesic or other treatment, the disease should be considered more serious, possibly requiring surgery. Decreased intestinal sounds can occur with simple colic and large intestinal sounds can be heard even when there is obstruction of the small intestine.

Finding an intestinal abnormality on rectal examination is not always indicative of a need for surgery. However, any abnormal distention or abnormal positioning of intestine, which has no accompanying diagnosis, is possibly a surgical lesion.^{2,4} However, finding an abnormality on rectal examination does not significantly increase the odds for surgery.¹ Because distention from colon impactions and tympany can often be treated medically, a rectal examination may not be a sensitive test to indicate the need for surgery. Specific rectal findings which identify a disease requiring surgery include: inguinal hernia, tight multiple loops of small intestine, distended and edematous colon, tight cecum filled with fluid ingesta, and massive distention of any intestinal segment. If the findings on rectal examination are not normal, assessment of other clinical signs is necessary to make the decision about the need for surgery. If there are no abdominal abnormalities during the first rectal examination, repeat examinations are indicated, particularly if other signs suggest a surgical disease. Distention not felt at the first examination may become evident in the near future.

Transabdominal ultrasound can also be helpful to find intestinal abnormalities which may not be felt on rectal examination. Specific indications for surgery include markedly distended small intestine, which has no motility and has a thickened wall. Similarly thickening of the large colon has been accurate in ruling out large colon volvulus.⁵ When the large colon was ≥ 9 cm, wall thickness accurately predicted large colon volvulus in 8 of 12 horses while accurately predicting a volvulus was absent in 100% of cases. Ultrasound can also be used to confirm the diagnosis of inguinal hernia, entrapment of the colon in the renosplenic space and in some cases jejunojejunal or ileocecal intussusception (Figure 2).



Figure 2: Sonogram of an ileocecal intussusception in a weanling. The concentric circles represent the layers of intestine within the intussusciptum.

Abdominal fluid analysis is helpful to determine the need for surgery. Protein concentrations, WBC number and ratio, and RBC numbers are helpful in determining the degree of intestinal injury.⁶ Increased protein in abdominal fluid with no change in cell numbers is often due to simple obstruction. If WBC numbers are increased and if the ratio of neutrophils to monocytes is increased, bowel ischemia or degeneration with leakage of bacteria is likely. Excess numbers of RBC's in peritoneal fluid indicate intestinal injury and specifically venous obstruction due to bowel strangulation. Increased hemoglobin concentrations also increases the odds that surgery is needed and increases the sensitivity and specificity of the decision compared to visual assessment of peritoneal fluid.⁷ Finding bacteria in the fluid or engulfed by neutrophils is further indication of intestinal injury including mucosal damage, which allows bacterial to move through the intestinal wall into the peritoneal cavity (Figure 3).³

If abnormal abdominal fluid is present, bowel injury requiring surgery is usually present. However, if the fluid is normal but other physical signs indicate that surgery is necessary, the bowel injury has not occurred yet or is early with no changes in abdominal fluid. Peritoneal fluid should not be used as the only determinant for surgery as waiting for a change could delay surgery and decrease the chance for survival. Acute increase in protein alone is sufficient to warrant surgery if other physical signs are also suggestive. If colic persists for days, peritoneal fluid should be monitored for increases in protein and cell concentrations. Both are indicators of bowel injury and may suggest exploration is needed earlier rather than later.

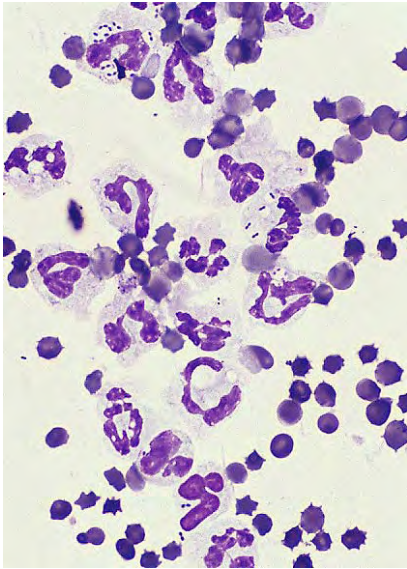


Figure 3: Peritoneal fluid containing increased numbers of neutrophils which have engulfed bacteria. This is indicative of bowel injury which likely requires surgery if there is evidence of pain.

Frequently, physical signs such as heart rate and mucous membrane color and laboratory values will be normal at the onset of colic. The parts of the examination that are most helpful in the early period are observation of pain, rectal examination, abdominal auscultation and the response to analgesic administration. If pain is constant or returns within 1-2 hours after administration of an analgesic such as flunixin meglumineⁱⁱ or detomidine,ⁱⁱⁱ the horse has a significant increase in the need for surgery. Normal values for heart rate, mucous membrane color and refill, and peritoneal fluid should be disregarded if pain, rectal findings and lack of response to an analgesic indicate surgery

Deciding to complete surgery on foals with colic is more difficult due to an inability to complete a rectal examination. However, foals rarely need surgery and radiographs can help distinguish between obstructions and strangulation requiring surgery and enteritis (Figure 4). Chronic distention of the stomach may indicate pyloric stenosis, which warrants surgical exploration.

Determining the need for surgery based on mathematical analysis of the clinical signs has been used. This has not been successful or accepted because most veterinarians deal with a low prevalence of surgical disease making the prediction difficult and unreliable. Parry developed a scoring system so that signs grouped together would more accurately predict the need for surgery than individual signs alone.⁸ The signs including moderate to marked colic signs; tacky to dry oral mucosa which is discolored (especially when brick-red or blue); decreased to absent borborygmi; nasogastric reflux fluid; tachypnea, tachycardia, elevated hematocrit, hyperglycemia and uremia are now considered signs indicating the need for surgery but also a poor prognosis.

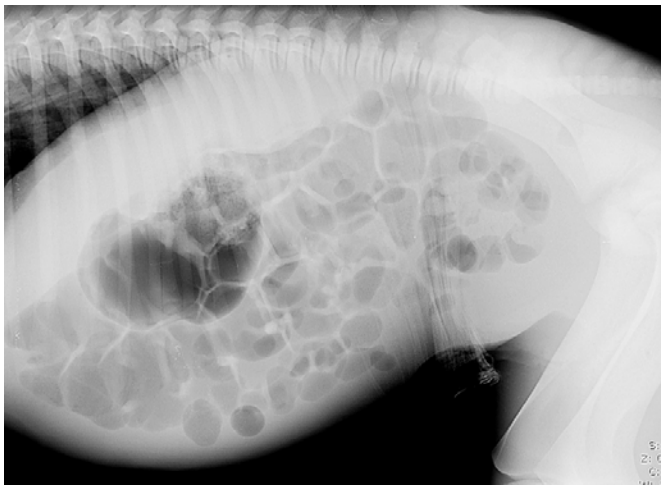
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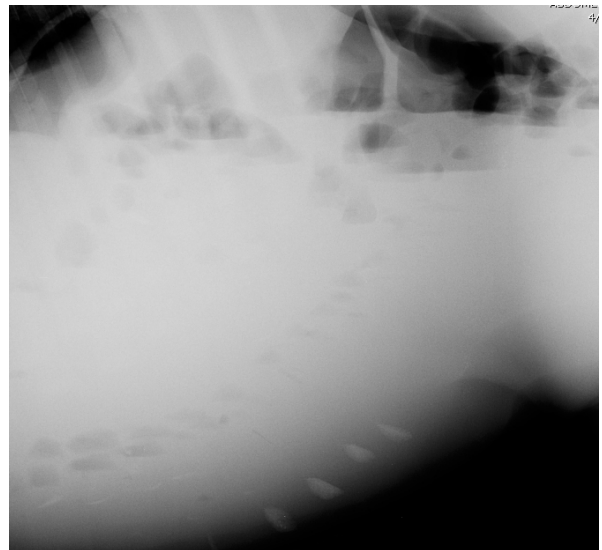
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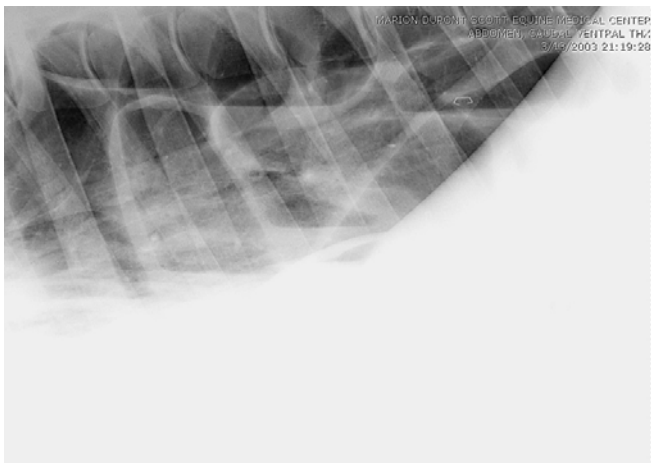


Figure 4: Radiographs of foal abdomens: a) Radiograph of foal with atresia coli depicting gas build up in the proximal colon and some small intestine. b) Volvulus of the small intestine with markedly distended loops of small intestine. The amount of distension is indicative of a severe strangulation obstruction. c) Small intestine enteritis with mild distension due to ileus. This foal did not require surgery. d) Excess abdominal fluid ileus and sand in the ventral colon. e) Radiograph of the thorax of an adult horse with a diaphragmatic hernia. There was no distension of intestine within the abdomen.

Table 3: Referral procedures and recommendations

1. Know the directions to and procedures of the referral hospital.
2. Provide detailed history and treatment to date.
3. Provide adequate analgesia for the duration of the trip.
3. Place a stomach tube to allow any spontaneous gastric reflux.
4. Administer treatments for shock and antibiotics if necessary prior to transport.
5. Prepare owner for costs and need for prepayment of a portion of estimate.

References and Footnotes

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ⁱ White, NA, Unpublished data, 2004.

ⁱⁱ Banamine, Schering-Plough, Brunswick, NJ

ⁱⁱⁱ Dormosedan, Orion Corporation, Espoo, Finland.