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**Equine Colic: Making the Decision for Referral and What Happens at the Referral Facility**

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**Take Home Message**

Signs of pain and response to treatment are the most useful indicators in making a decision about the need for referral for possible surgery and/or intensive care. When in doubt, early transport to a facility that can monitor signs and complete surgery immediately increases the chance of survival. Communications and transfer of information during the referral process is necessary for the best possible outcome.

Determining the need for referral or surgery for a horse with colic is usually made on an emergency basis. 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.

There are no strict guidelines that decide the need for surgery or intensive care, as there are varying degrees of severity and a range of clinical signs for each disease. Therefore each case should be judged on its own merits based on the 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 colic examination. Pain by itself, especially if severe and persistent or recurrent is an indication for surgery. 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 referral for surgery based on the presumptive diagnosis.

With the advent of potent analgesics flunixin meglumine and detomidine, veterinarians have used the response to treatment to effectively determine which horses need 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 in their practice for most cases of colic. Horses that have constant pain particularly after an analgesic has been administered are significantly more likely to need surgery. 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). The key is adjusting one’s tolerance for any recurrence of pain, as horses may show pain after administration of an analgesic, but the signs of colic may 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 the condition will not respond to basic medical therapy, and referral for further evaluation or surgery is necessary.

Table 1: Indications and Contraindications for Surgical Treatment of Colic*

**Indications for Surgery**

**Pain:**
- Uncontrollable or severe pain
- Lack of response or incomplete response to analgesic treatment such as flunixin meglumine or detomidine
- A second or multiple treatment(s) with an analgesic is required

**Gastric Reflux:**
- Greater than 4 liters

**Rectal examination:**
- Distended small intestine
- Displaced or marked distention of the large colon
- Massive distention of the cecum
- Distention that cannot be relieved medically

**Auscultation:**
- No intestinal sounds

**Ultrasound examination:**
- Distended, immotile and thickened small intestine
- Thickened large colon

**Peritoneal fluid:**
- Increased protein, RBC, and WBC
- Increased neutrophil number and ratio

**Contraindications for Surgery**

**Pain:**
- No pain or pain which changes to depression
- Temperature greater than 102 degrees F.

**Auscultation:**
- Progressive intestinal sounds

**CBC:**
- Neutropenia (less than 3000 cells/µl)
- Neutrophilia (More than 15,000 cells/µl)

*These signs are based on the population of horses with colic and may not be accurate in assessing individual cases. Signs should be evaluated collectively, with no one clinical sign used as a sole predictor of the need for surgical or medical treatment.*
Table 2: Number of horses requiring surgery based on persistence or recurrence of pain. In this study horses, which did not have a return of pain after the initial treatment did not require surgery.

<table>
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<th>Required surgery</th>
<th>constant</th>
<th>Pain did not return</th>
<th>returned</th>
<th>Grand Total</th>
</tr>
</thead>
<tbody>
<tr>
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<td>11</td>
<td>67</td>
<td>19</td>
<td>97</td>
</tr>
<tr>
<td>yes</td>
<td>12</td>
<td>0</td>
<td>16</td>
<td>28</td>
</tr>
<tr>
<td>Grand Total</td>
<td>23</td>
<td>67</td>
<td>35</td>
<td>125</td>
</tr>
</tbody>
</table>


Return of pain in horses that have a medical problem, 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 improving intestinal motility, surgery is indicated before the impaction causes bowel ischemia and subsequent 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. Subsequent shock and exhaustion may also decrease the signs of pain even though the disease requires surgery.

Rectal 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 rectal temperature suggesting that surgery is contraindicated. There is no exact cut off temperature, but horses with a fever of > 102°F usually have a medical condition such as peritonitis, proximal enteritis or colitis. Clinicians should also remember that non-steroidal anti-inflammatory drugs such as flunixin meglumine decrease or resolve a fever.

Indicators of hydration and perfusion, such as heart rate, mucous membrane color, mucous membrane refill, packed cell volume, and 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 survival. For example, heart rate can be misleading. Low near normal heart 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. As examples enteritis and tympany may cause high heart rates but normally do not require surgery. Signs of cardiovascular compromise such as an increased heart rate, abnormal mucous membrane color or poor mucous membrane refill are evidence of disease requiring intensive medical management at a facility with the required expertise.

Presence of gastric reflux merely indicates that the disease or condition obstructs the small intestine and may require surgery. Reflux can also be caused by ileus or proximal enteritis,
which are most often treated medically and frequently require referral for appropriate medical management for fluid and electrolyte imbalances. 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; however, colon obstructions with these signs 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, lack of gastric reflux does not rule out the need for surgery.

Proximal 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 rule out a strangulating or obstructing lesion. If enteritis is diagnosed at surgery, the intestine is decompressed. Anesthesia and surgery needed for this evaluation 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. 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 cannot be explained with a diagnosis, is possibly a surgical lesion. When considering all cases of colic, finding an abnormality on rectal examination does not significantly increase the odds of surgery. Because distention from colon impactions and tympany can often be treated medically, a rectal examination is not 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.

Trans-abdominal ultrasound can also be helpful to find intestinal abnormalities, which may not be felt on rectal examination. Ultrasound is particularly helpful in identifying early small intestinal distention that is beyond the reach of the clinician during 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 indicating a diagnosis of large colon volvulus. A large colon with wall thickness ≥ 9-mm, detected by ultrasound accurately predicted large colon volvulus in 8 of 12 horses while accurately predicting a volvulus was absent in 28 of 28 cases. Ultrasound can also be used to confirm the diagnosis in many cases of inguinal hernia, entrapment of the colon in the renosplenic space and in some cases jejunojejunal or ileocecal intussusception.
Abdominal fluid analysis is helpful to determine the need for surgery. Protein concentrations, WBC number and ratio, and RBC number are helpful in determining the degree of intestinal injury. 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 (> 90% neutrophils), intestinal ischemia or degeneration with leakage of bacteria is likely. Excess numbers of RBC’s creating serosanguineous peritoneal fluid is evidence of diapedesis of cells from capillaries in injured intestine and in particular 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. Increased peritoneal fluid lactate concentration compared to plasma lactate is also an indicator of intestinal compromise that indicates a surgical lesion. Increasing lactate concentration from serial measurements also indicates progressive intestinal injury.5

If abnormal abdominal fluid is present, intestinal injury requiring surgery is usually present. However, if the fluid is normal but other physical signs indicate that surgery is necessary, intestinal injury may be early with no changes yet evident in the 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 several days, peritoneal fluid should be monitored for increases in protein and cell concentrations. Both are indicators of intestinal injury and may suggest exploration is needed earlier rather than later.

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 meglumine or detomidine, the horse is significantly more likely to need 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 perform surgery on foals with colic is more difficult due to an inability to complete a rectal examination.1 However, foals rarely need surgery and use of radiographs and ultrasound can help distinguish between obstructions and strangulation requiring surgery and enteritis. Chronic distention of the stomach may indicate pyloric stenosis, which warrants surgical exploration.

When veterinarians are undecided because signs are confusing or suggestive but not convincing about the need for surgery, more in-depth evaluation or surgery will most likely be needed and the horse should be referred for a second opinion at a surgical facility where surgery or intensive medical management can be performed if needed. The decision to refer a horse for surgery is accompanied by a responsibility to provide support for the period of transport, if needed. Specific recommendations for referral of horses with colic are listed in Table 3. It is important to initiate treatment such as antibiotics, flunixin meglumine, and intravenous fluid therapy prior to transport if shock or a strangulating lesion is present. However, these treatments should only be
completed if they do not delay delivery of the horse to a surgical facility. Placing a stomach tube for the trip and providing analgesics, which can be administered by the transporter, may help prevent injury to the horse during the trip to the hospital.

Table 3: Referral Procedures and Recommendations

1. Know the directions to and procedures of the referral hospital.
2. In borderline cases, the further the distance from the referral center, the earlier referral should be considered.
3. Provide detailed history and treatment to date.
4. Provide adequate analgesia for the duration of the trip.
5. Place a stomach tube to allow any spontaneous gastric reflux.
6. Administer treatments for shock and antibiotics if necessary prior to transport.
7. Prepare owner for costs and need for prepayment of a portion of estimate.

Equine hospitals which receive emergency colic cases for critical care or surgery should be set up to rapidly receive horses and be ready for immediate abdominal surgery or intensive monitoring with appropriate medical care. Emergency personnel should be available to admit the horse immediately. The appropriate supplies should be available for the examination including ultrasound, and provisions for evaluating blood for a CBC, blood gas and electrolytes. When an immediate decision for surgery cannot be made, monitoring of the horse while treating for dehydration and pain requires attention from staff specifically trained to assess pain, TPR, mucous membranes, intestinal sounds, and gastric reflux. Personnel to quickly perform surgery and anesthesia should be readily available. Communications with the client before, during and after surgery are important. Referring veterinarians should be called as soon as reasonable to give an update, as this helps with owner communication about why particular treatments are needed and possible complications.

Though an analysis of the cost versus the benefits of referral has not been completed, a decision to refer early in the disease process will improve the chance of survival and often decrease the total cost of care by minimizing the incidence of postoperative complications associated with delayed treatment, such as persistent endotoxemia, ileus, and adhesions.

References
