As an equine professional, the decision to refer a horse for further evaluation of colic continues to be difficult, and one must question if the equine research community has made as much progress as it should have over the last decade. There are typically two parties involved in the decision to refer for possible surgery or intensive care: the owner (or trainer) and the veterinarian. Although numerous parties, such as an insurance company, may be involved, the ultimate decision, to avoid confusion, should be made by the horse owner or trainer with consultation by the veterinarian. This article is intended to provide the vital components of a referral decision, including history and examination findings. Although most of the information used to make a decision to refer a horse with colic has remained the same over time, the method used to make decisions can be approached differently. The overall goal is to identify the population of horses at risk of needing intensive care (not just the clear cut surgical cases) and to make available options very clear to the owner as soon as possible. Author’s address: Department of Clinical Sciences, North Carolina State University, 4700 Hillsborough Street, Raleigh, North Carolina 27606; e-mail: Anthony_Blikslager@ncsu.edu. © 2009 AAEP.

1. Introduction

Veterinarians are called on a frequent basis to evaluate a horse that has developed colic. In many cases, the colic will have either resolved or require simple medical treatment; however, management of colic often requires clear cut decision making rather than attempts to reach a diagnosis in every case.

The goal of this article is to share key steps on how to simplify the decision-making process with the net result of increasing survival of horses with colic. Simply put, almost all horses with colic can be saved if recognition of the problem and treatment are instituted rapidly, and this depends on prompt, firm decision making. The decisions include whether or not surgery is needed and where to send the horse if it is not in a facility where surgery can be completed.

2. Recognition of Colic

Owners have varying abilities to detect colic in their horses. Some owners only notice when the horse has severe colic; however, many notice subtle changes in behavior that are not necessarily clear cut signs of colic but signals to the owner that something is abnormal. As the field of pain management in veterinary medicine has dramatically changed in recent years, so has the veterinarians’ ability to detect pain (Table 1). Horses are expected to follow a daily routine, socialize in a herd, and frequently seek forage in their diet. When an owner calls to report that the horse has abnormal behavior, such as showing a lack of interest in feed, there is a strong likelihood that they have detected behavioral signs of pain, which is most likely caused by colic. As veterinarians, these early signs should be taken seriously with a visit to the farm to make
sure that the horse does not have colic. For example, horses with early signs of colic tend to stand toward the back of the stall, lose interest in observing other horses and people at the barn, and not finish a meal. At veterinary teaching hospitals, behavioral pain scores have been developed to detect subtle behavioral signs of pain that would typically be missed, and they have become a routine component in the monitoring of horses.1 These behavioral pain-scoring systems are quick to perform, and clients can be readily trained to give you a score over the phone.

For horses with behavior caused by colic, it is difficult to try to make sense of all the different manifestations of pain. Instead, it is easier to try to group them into (1) mild (e.g., intermittent pawing and flank watching; Fig. 1), (2) moderate (more vigorous signs, particularly including getting up and down and occasionally rolling), and (3) severe (violent attempts to go down and thrash).3 These behavioral pain-scoring systems are quick to perform, and clients can be readily trained to give you a score over the phone.

3. Initial Considerations for the Owner

Since dipyrone was taken off the market in 1977, it is the author’s observation that horse farms frequently have flunixin meglumine readily available, and it is common for trainers to administer non-steroidal anti-inflammatory drugs (NSAIDs) for lameness or colic without consulting the veterinarian. One approach is to ask the owner or trainer to at least call the practice to let the veterinarian know that they have treated the horse for colic. This gives the veterinarian a more accurate time frame of the duration of the colic if and when they go to evaluate the horse. Owners and veterinarians need to be aware that a full dose of flunixin meglumine (1.1 mg/kg, IV) for treatment of colic is a potent analgesic and has a duration of 8–12 h. The manufacturer’s recommended dose of flunixin meglumine is every 12 h. This time frequency should be very closely followed. In horses that are in

![Fig. 1. A horse showing mild signs of colic. In this case, the horse is pawing after colic surgery.](image)
true need of intensive care, more frequent use of flunixin meglumine, particularly at the labeled dose (1.1 mg/kg, IV), can alter the threshold of pain and make it difficult to detect. Flunixin meglumine will not completely mask signs of colic, but it lessens signs of pain and makes them more difficult to detect, especially for owners. Dipyrocaine was successful, because it was a very mild analgesic and did not completely ameliorate pain in horses requiring surgery. Given the medications presently on the market, xylazine (150–200 mg, IV) is preferred as the initial treatment of colic, because it is a potent analgesic and sedative with a short duration (~30–40 min).

If the owner is not available, farms and stables that are regular accounts with the practitioner should have personnel able to make decisions as to whether or not the horse can be referred for emergency care or surgery. The simplest way to accomplish this is to have the owners sign a legal waiver giving the trainer or farm manager authority to make medical decisions. Owners or trainers should be encouraged to have a plan for transporting their horse in an emergency to avoid a delay that can occur when trying to find an available truck and trailer. Another important part of pre-planning for emergencies is to have owners and trainers decide which horse or horses would be referred for intensive care if this is deemed necessary in an emergency. This could potentially be discussed during routine health care visits and formally written in the medical record to avoid confusion during emergencies. Nonetheless, because of legal circumstances, it is always preferable to confirm these decisions at the time of a colic episode. Some owners may prefer to pursue continued treatment on the farm rather than referral, particularly given the cost of referring the horse. However, if horse owners make a decision ahead of time that they would prefer referral, they should strongly consider major medical insurance, which is typically combined with a mortality policy. This will at least cover a large part of the cost of the referral visit. Alternatively, surgical policies are available; these policies typically cover the cost of surgery itself, and the majority of the costs are pre- and post-operative medical costs. Insurance companies are aware of the need for colic surgery, and insurance adjustors readily give permission if the surgeon decides on this course of action.

4. Initial Examination

To shorten the time needed to examine a horse with colic, consider asking your receptionist to get the signalment, treatments given, and duration of colic. Owners may be reluctant to admit to administering treatments, necessitating some skill in obtaining an accurate history. Therefore, it is important for the receptionist or the veterinarian to ask questions about administration of medications in a way that makes the owner feel comfortable about providing an accurate answer. This is all the history that is needed before initiating the physical examination. Additional history, such as diet, anthelmintic administration schedule, and housing, can be obtained later.

On physical examination, make an educated guess as to whether or not the horse looks bloated to help make a more accurate determination of the level of colic (mild, moderate, or severe). This may require having the horse in its normal environment such as a stall or paddock so that the behavior is not inhibited by being handled. The next step is to assess the cardiovascular status of the horse. This is done by assessing the color of the gums (Fig. 2), obtaining a capillary refill time, and taking the heart rate. It is preferable to take the pulse from the facial artery so that an assessment of pulse quality (“thready” or strong) can be made. However, the horse sometimes makes this difficult, because it is in pain; at that time, auscultation of the chest is appropriate. If the horse is severely painful, obtaining the heart rate in some way is essential, because it has consistently been shown to be the best single prognostic indicator. The exception is the horse with large colon volvulus or acute incarceration of intestine that, despite severe pain, may have a normal heart rate. This is possibly a result from vagal input from grossly distended intestine feeding back to the brainstem and the heart.

5. Initial Treatment of Pain

If a horse is actively showing signs of colic, the owner will be anxious, and after the cardiovascular status has been obtained, this is the time to treat for pain. The author’s choice is xylazine (150–200 mg), because it is short acting (~40 min) and highly effective as an analgesic, and it sedates the horse to facilitate the remainder of the examination. A very popular and effective addition to xylazine is butorphanol (5 mg, IV). If the veterinarian chooses to use flunixin meglumine (0.25–1.10 mg/kg, IV), it...
has a long duration of action (up to 12 h), which may make it more difficult to determine if colic is recurrent when conducting a timely visit. Another medication that has become available is hyoscine N-butylbromide at a dosage of 0.3 mg/kg, slow IV. This is an excellent anti-spasmodic agent, but the product sold in the United States does not contain an analgesic (the product sold in Europe also contains dipyrone and is the favored choice for initial treatment for colic). However, hyoscine N-butylbromide can be administered in combination with NSAIDs available in the United States, such as flunixin meglumine (0.25–1.10 mg/kg, IV). Concerns on transient elevations in heart rate with hyoscine N-butylbromide (~20 min) become irrelevant if the veterinarian has already checked the heart rate and administered an analgesic. If an initial dose of xylazine, particularly if administered with butorphanol, has no effect, the treatment can be repeated, but requirement for a second treatment with an analgesic increases the risk of the need for surgery. If pain continues, more potent sedatives such as detomidine (5–10 mg, IV) can be used and can be repeated as needed if the horse remains painful. Beyond these choices, there are only two options for a severely painful horse—referral or euthanasia. For the latter, response to treatment with any of the mentioned drugs can be used to help make this difficult decision. However, a severely painful horse that does not respond to analgesic treatment and shows other signs should be considered a candidate for emergency surgery. For the horse that responds well to xylazine and the remainder of the examination has been completed within an hour, flunixin meglumine (1.1 mg/kg, IV) is very helpful to make sure that colic does not recur. If colic does recur, the probability that surgery or intensive care is needed is increased. Uncomplicated cases of medical colic may take several hours to fully resolve after you have made sure it is not rapidly recurrent when examining the horse on the farm. However, the owner or trainer should be given explicit instructions to keep the horse in a stall, hold the horse off feed, and regularly monitor the horse for the next 24 h. Many horses that arrive late at referral institutions have been suffering from colic all night, and this can decrease the prognosis with any type of colic.

The next component of the examination is auscultation of the chest to confirm heart rate (heart rate may be decreased because of second degree blocks caused by an α-2 agonist such as xylazine). Only a brief time is needed to listen to the lung fields because of the infrequency of lung conditions causing colic. Auscultation of the abdomen at paralumbar fossa and at a site on the lower flank are completed for ~1 min. Listening to these upper and lower quadrants should be completed on both sides of the abdomen. Experience is needed to classify the intestinal sounds into one of four categories: normal, decreased, increased, or no sounds. Percussing the abdomen while listening with the stethoscope can also be used to check for excess gas. This is most useful with the stethoscope place over the base of the cecum in the right paralumbar fossa. The time required for this part of the examination provides a good opportunity to take the rectal temperature, and this should always be performed. The temperature, which should be taken before the rectal examination, can provide evidence of an infectious disease such as the early phases of colitis. A temperature of >102°F should increase suspicion of an infectious disease associated with colic such as colitis or peritonitis.

Rectal palpation is the most useful diagnostic to determine the intestinal segment associated with colic, but it is not mandatory to perform on every case of colic. It is critical to perform on horses that have repeat episodes of colic. Determining the position of the spleen is important. If it feels larger than normal and pushed away from the body wall, the most frequent reason is that the colon is between the spleen and body wall. Phenylephrine (0.01 mg/kg in saline maximum dose administered over 20 min) and walking or jogging the horse can be very helpful to shrink the spleen to help resolve the problem. The final component of the colic examination is nasogastric intubation. Technically, anything >2 l is abnormal. Again, your opinion is very important. Findings of gas and pH of the fluid are of very little significance in the initial evaluation of colic. When horses have severe pain, the stomach tube should be passed as one of the first procedures during the examination to make sure that the pain is not from a distended stomach that is close to rupture.

7. Reasons to Refer

Unrelenting Pain

There is sometimes confusion as to why a horse is so painful when all other examination findings seem normal (Table 2). A horse with unrelenting pain that does not respond to analgesia most likely needs surgery and should be referred to a surgical facility. If analgesics such as flunixin meglumine or detomidine have little effect, there are no other alternatives to general anesthesia or euthanasia. At referral centers, these horses are immediately taken
Failure to Respond to Treatment

If we consider that ~90% of horses with colic are simple colics requiring basic or minimal treatment, then 10% of cases will require careful examination and decisions about the type of treatment (medical or surgical).10 This group of horses includes those that do not respond to initial treatment as well as those that appear well after initial treatment but have a recurrence of pain several hours to a day later. This does not mean that all horses with return of pain need surgery, but this is the time to talk to the owner about their willingness for referral. The veterinarian should determine if each client wants potentially expensive treatment for their horses with the option to refer for possible surgery. After the costs are understood, the decision to refer or not becomes easier.

For the best outcome, veterinarians should actively try to refer horses before they have shock caused by endotoxin, a high heart rate, or other signs such as large amounts of gastric reflux and multiple loops of intestine. These horses will need surgery and can be saved, but they need to be referred early in the disease process.

Signs of Endotoxemia

All horses that have congested gums, delayed capillary refill time, and elevated heart rates need intensive care, specifically IV fluid administration. Horses improve after administration of flunixin meglumine (0.25–1.10 mg/kg),11,12 but complete treatment for shock is needed. If an investment is made to have balanced electrolyte solutions available for IV administration, at least 20 l of fluid (~one half the deficit of fluids in a moderately dehydrated horse) should be available to make fluid administration a valuable treatment.

Signs Incompatible With a Simple Case of Colic

Some horses that seem to respond well to analgesia and have few signs causing concern but have intestinal distention on rectal palpation or large volumes of gastric reflux should be considered at high risk for needing surgical exploration, and they should be referred or placed on routine and frequent monitoring.

8. Final Thoughts

Owners look to their veterinarians to treat their horses and tell them what to do. If an owner indicates that they do not know what to do, gradually take over control of communications and make suggestions to guide the owner toward a rational decision. Anecdotal stories as to what happened with the last case of colic or reciting the way another veterinarians have handled a case are irrelevant and should be largely ignored. Make sure you give clear cut choices, including percentages (typically educated guesses) of survival and potential for future use. For horses in which referral is a consideration, always offer it no matter what your impression of the owner, the value of the horse, or the quality of the facilities. Ask owners to have patience (listen) while you tell them about the options. Having said all of this, do your utmost to have a congenial, friendly, but decisive relationship with the client. Do not hesitate to call your senior partner or the referral practice for advice (sometimes best accomplished in private). When dealing with referral centers, make sure you and your client get the absolute best service. Multiple conversations with the referral practice as to the decisions being made after the horse has arrived, when it comes out of surgery (within reason), and its progress while in the hospital are all part of developing a team consisting of the referring veterinarian, owner, and referral hospital. If you do not think you are getting this service, call the referral hospital and ask to speak to the attending clinician, service chief, or hospital director. Referral centers need to be responsive to owners and veterinarians and keep all parties informed.

References and Footnotes

1. Pritchet LC, Ulibarri C, Roberts MC. Identification of potential physiological and behavioral of postoperative pain

### Table 2: Normal and Abnormal Parameters That May Be Obtained When Performing an Examination on a Horse With Colic

<table>
<thead>
<tr>
<th>Examination Parameter</th>
<th>Normal</th>
<th>Refer</th>
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<tbody>
<tr>
<td>Colic</td>
<td>None</td>
<td>Recurrent, unresponsive</td>
</tr>
<tr>
<td>Pulse</td>
<td>≤48 bpm</td>
<td>60–80 bpm</td>
</tr>
<tr>
<td>Membrane color</td>
<td>Pink</td>
<td>Congested</td>
</tr>
<tr>
<td>CRT</td>
<td>&lt;2 s</td>
<td>3 s</td>
</tr>
<tr>
<td>Gut sounds</td>
<td>Gurgle q 4–5 s</td>
<td>No sounds</td>
</tr>
<tr>
<td>Rectal</td>
<td>Cecal band, pelvic flexure</td>
<td>Distended intestine</td>
</tr>
<tr>
<td>Nasogastric reflux</td>
<td>&lt;2 l</td>
<td>&gt;2 l</td>
</tr>
<tr>
<td>Abdominocentesis</td>
<td>Light yellow</td>
<td>Serosanguinous</td>
</tr>
<tr>
<td></td>
<td>TP = 1–1.5 g/dl</td>
<td>TP &gt; 1.5 g/dl</td>
</tr>
<tr>
<td></td>
<td>TNCC = 3000–5000 cells/μl</td>
<td>TNCC &gt; 5000 cells/μl</td>
</tr>
</tbody>
</table>

Many of the abnormal parameters, as described in the text, should lead to a conversation with the owner or trainer about the possibility of referring the horse for potential surgery.

aIntervet-Schering Plough Animal Health, Kenilworth, NJ 07033.
bBayer Health Care, Pittsburg, PA 15205.
cSwanson C. Personal communication. 1997.
dBuscopan®, Boehringer Ingleheim, St. Joseph, MO 64506.