# **Colic in Equine Neonates**

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## Abstract

Colic is a term that most horse owners know but none wish to hear. Depending on the cause, it can be simple and resolve quickly, or it can become life-threatening, requiring intensive care and management. While there are some similarities to adults, addressing colic in the equine neonate can differ a great deal from the than that of an adult. There are different presentations, causes, and considerations for nursing care in neonates. Through this presentation, we will discuss recognizing colic in neonates; brief discussion of the most common causes; diagnostic work-up; cornerstones of therapy; and the role of the technician in delivering optimal care for the patient.

#### Introduction

Colic is a relatively non-specific term that refers to abdominal pain. This pain is mostly commonly associated with the gastrointestinal tract, but can also result from other abdominal organs, the peritoneum, or systemic illness.

Neonates generally refer to a newborn horse within the first week of life. However, many of the clinical signs and diseases apply to young foals, up to the age of weaning (4-6 months).

## **Clinical Signs:**

It is important to serially monitor equine neonates closely for behavior, mentation, activity level, nursing, and urination/defecation for subtle changes and trends that may indicate larger problems developing over time. Signs of colic can be non-specific and are indicative of discomfort or distress, and it is important to identify abnormal clinical signs and act rapidly to notify the clinician and assess the causes for these signs. Clinical signs of colic in neonates can be similar to those in adults, but there are several classical behaviors in foals experiencing abdominal pain:

-Laying lateral with front feet pulled to body

-Dorsal recumbency

-Distended abdomen

-Tail flagging and/or straining

#### -Decreased interest in eating/nursing

Foals tend to be less tolerant of pain than adults, and the severity of their signs of pain are not good indicators of severity or cause of colic. Additionally, it is important to consider how other concurrent disease processes may be contributing to their clinical signs. Recumbent foals or those with abnormal mentation or neurologic signs may not demonstrate classical behaviors or it may be difficult to interpret their behaviors. For example, an agitated, recumbent foal may be showing colic signs, seizure-like activity, or distress from trying to right itself. A sudden disinterest in nursing may indicate abdominal discomfort, but could also be due to changes in mentation and neurologic status. A complete and thorough history of the foal, its mare, parturition, and pregnancy are important for interpretation of clinical signs. As with adult horses, the most important component of assessing colic signs in the neonate is to localize the lesion(s) and then determine whether surgical or medical management is the appropriate course forward.

#### How to Diagnose:

When colic signs are suspected in a neonate, it is important to fully assess the entire patient and not tunnel-vision on the gastrointestinal tract. This requires gathering all information and determining if colic is your primary diagnosis, or your only diagnosis. These are all signs that can be easily observed at a distance, without making contact with the foal. Some of the first clinical signs of colic will include: change in appetite, dull demeanor, laying down excessively, rolling onto back, laying in lateral recumbency with feet tucked to body, straining to defecate or urinate, and appearing bloated. Upon further examination, you may discover elevated vital parameters, which can be an indicator of pain. Normal vital parameters vary based on age, breed, and activity of the foal. Normal ranges are: Temperature: 99°F-102°F, Heartrate: 80-120 beats per minute, Respiratory rate: 20-40 breaths per minute. It is important to consider how agitated the foal has become while acquiring vital parameters, and whether there are other concurrent conditions that may be contributing (e.g. dehydration, hypoxemia, and arrhythmia). Complete physical examination should be performed to assess the overall patient. Mucous membrane color, capillary refill time, and hydration status are very important to assess. It is important to put all the information together to determine if the foal is showing colic pain, and if there are additional disease processes going on. If the foal is significantly uncomfortable or too agitated to safely assess, medications should be administered to provide sedation and analgesia. These include alpha-2 agonist medications (e.g. xylazine) and opioids (e.g. butorphanol).

As with adult horses, nasogastric intubation should be performed every time to work up a suspected colic. Fluid builds up in the stomach if it is unable to pass out of the stomach into the small intestine, or if fluid backs up into the stomach due to functional or mechanical obstruction of the small intestine. Due to the inability of the equine species to vomit, their stomach can distend to the point of rupture. If this occurs, secondary peritonitis and sepsis are likely, and the patients' prognosis is grave. Passing a nasogastric tube in a neonate is performed in a very similar fashion to adults, however it is much safer and more efficient with appropriate restraint. When passing a nasogastric tube in a neonate you often cannot visualize it externally travelling down the esophagus, like in an adult. It is important to verify the placement into the stomach prior to administering through the tube, either by endoscopy, palpation, radiograph,

ultrasonography of the esophagus, or the presence of reflux through the tube. An enteral feeding tube, harris flush tube, and small nasogastric tube are commonly used for this purpose. They can remain indwelling and be secured in place, or removed and replaced intermittently. Reflux can vary in appearance and consistency depending on the age of the foal and location of the lesion resulting in generation of reflux. Milk within the stomach curdles and can clog nasogastric tubes, so this can present a challenge.

Rectal palpation can be performed with gentle digital palpation. External abdominal palpation can be performed, but caution should be taken due to fragile abdominal structures within the foal abdomen. Ultrasonography is a vital tool to evaluate the abdomen in foals, as palpation is limited and real-time imaging provides information regarding size, shape, and motility of abdomen organs. It is used to evaluate stomach size, intestinal motility and thickness, bladder size, umbilical stump anatomy, and to determine if there is presence of free fluid in the abdomen. Foals are typically very resistant to the alcohol and/or gel used to provide appropriate imaging contact for the ultrasound. It is important for technicians to safely and effectively restrain the foal while the veterinarian performs ultrasonography, especially with using expensive capital equipment near the foal and mare.

Sampling the fluid from within the abdominal cavity can provide important information regarding abdominal organ function and integrity. It can be very helpful for diagnosis of peritonitis, uroabdomen, or likely strangulating/ischemic lesions. Unlike in the adult, abdominocentesis is not as frequently performed in foals as the risk for complications such as an accidental enterocentesis or omental prolapse occur more commonly than in the adult. If an abdominocentesis in necessary, a transabdominal ultrasound is performed first to assess potential risks and to locate a potential pocket of free fluid. This procedure should be done under aseptic conditions, and appropriate sedation and restraint are critical for safety of the patient and veterinarian.

Laboratory diagnostics are also important. It is important to assess point-of-care, minimum database values to assess trends in the neonatal patient. This includes packed cell volume, plasma total solids, whole blood lactate concentration, whole blood glucose concentration, and urine specific gravity. These tests are simple and fast to perform, and can be clinically very helpful. In neonatal patients, it is important to sample blood in a safe, effective manner while causing minimal trauma to veins. If providing supplemental fluid therapy with dextrose supplementation, it is important to obtain clinically relevant samples prior to administration. Urine specific gravity is significantly helpful for assessing hydration status in neonates, as they live on liquid diets and should have very dilute urine (USG 1.003- 1.007). Additional bloodwork may help in diagnosing the etiology of pain associated with colic. A complete blood count in important to help indicate infection and/or systemic illness. Neutropenia, neutrophilia, significant left shift, toxic neutrophil changes, and hyperfibrinogenemia are indicative of an inflammatory of infectious cause. If these changes are seen, it is suggested that blood should be sampled for blood culture as the foal may have septicemia (bacterial infection within the circulating blood). Chemistry analysis is key in determining and correcting electrolyte imbalances and may also help indicate location of system compromise. Panhypoproteinemia is indicative of loss of protein and may accompany severe

inflammatory lesions of the bowel. Azotemia, hyponatremia, hypochloremia, and hyperkalemia may occur with enteritis, colitis, or uroperitoneum. Organ function values such as GGT and creatinine are also found on the chemistry profile. It is important to interpret serum chemistry values based on reference intervals for foals, as normal ranges vary significantly from those of adults and also change based on the age of the foal.

#### **Causes of Colic**

Because foals are more sensitive to stimuli of pain, it can be difficult to pinpoint the area of concern for colic. It is important to first determine whether the clinical signs are caused by lesions within the gastrointestinal tract

In regards to colic due to gastrointestinal lesions, pain typically comes from pulling on the soft tissue attachments (mesentery) or overstretched organ walls. Lesions are typically classified as strangulating (vascular supply is compromised) or non-strangulating. Strangulating lesions are more emergent and largely require surgical correction. Obstructions of the gastrointestinal tract are considered to be either functional (tract is patent but not providing forward motility), or mechanical (tract is physically blocked). Several areas of concern include: gastric, small intestine, and large intestine. Colic that is gastric related can include: gastroduodenal ulceration and gastric outflow obstruction. This is often diagnosed by presence of reflux and gastroscopy. Small intestinal causes can include: volvulus, enteritis, ileus, intussusception, strangulation, and obstruction. Large intestinal causes can include: displacement, volvulus, colitis, obstruction, and impaction. Inflammatory causes such as enteritis, ileus and colitis, can sometimes be associated with an infectious etiology. Some of the more common infectious organisms seen include: Clostridium, Salmonella, Rotavirus and Coronavirus. These can be confirmed though fecal testing. With inflammatory causes of colic, diarrhea can, and is, often seen. Diarrhea itself can cause signs of colic in a neonate and if being passed excessively, can create more problems such as electrolyte imbalances and dehydration. Other gastrointestinal causes of colic can include congenital defects such as ileocolonic aganglinosis (lethal white syndrome) and atresia coli, recti, or ani. Other causes of colic such as volvulus, obstruction, strangulation, and intussusception usually require surgical intervention. If severe, acute colic signs persist through administration of analgesia and no diagnosis is clear, it may be suggested that an exploratory surgery be done as a diagnostic tool. However, abdominal exploratory surgery in foals carries a greater long-term risks, regardless of the lesion, due to propensity for adhesion formation and likelihood of future colic episodes.

Colic signs can also be associated with organs besides the gastrointestinal tract. Uroabdomen secondary to a ruptured or torn bladder or urinary tract structures causes a chemical-induced inflammatory process within the abdominal cavity (peritonitis). Septic processes can also be introduced into the abdomen, associated with the umbilical structures or gastrointestinal tract, and cause colic signs. Hernias (diaphragmatic, umbilical, inguinal) can also cause pain and signs of colic, typically when abdominal organs become entrapped within the hernia and can become strangulated.

### Treatments

Based on the etiology of pain, treatment plans will vary. It almost all cases, intravenous access is gain for use of fluids therapy and medication administration. Intravenous fluid therapy is important for patients that are dehydrated, have ongoing fluid losses (e.g. reflux, diarrhea), are held off nursing, require diuresis, and/or have severe electrolyte imbalances. Additives to the fluids such as calcium gluconate, potassium chloride, and sodium bicarbonate are often used to help correct electrolyte imbalances. Frequently, supplemental dextrose is added to the fluids to provide supportive energy for the foal. Often times, a colicking foal will either not be interested in nursing, or be restricted from nursing (in the cases of refluxing and diarrhea). If this is the case for a prolonged period of time, intravenous parental nutrition may be used in conjunction with fluids to provide the nutrients needed.

Non-steroidal anti-inflammatories are commonly used to help decrease inflammation and tend to have some analgesic effects. The most common NSAID used is flunixin meglumine. Analgesia is important both to keep the foal as comfortable as possible, and can also help you diagnose if the etiology is a surgical lesion versus medical management. Often, surgical candidates such as a foal with a strangulation, are painful very quickly after administration of analgesics. Analgesics used include: butorphanol, xylazine, lidocaine, and detomidine.

Antibiotics are often used when infection or infectious organisms are indicated or suspected. Common antibiotics used in the foal include: potassium penicillin, ceftiofur, amikacin sulfate, cefpodoxime proxetil, trimethoprim sulfamethoxazole, and metronidazole.

Gastroprotectants are used both prophylactically and as treatment. Stress associated with hospitalization and NSAID therapy increase the risk of gastric ulcerations, and prophylactic antiulcer therapy can be initiated. If ulceration is diagnosed, some medications used include: intravenous or oral ranitidine, oral sucralfate and oral omeprazole. Metoclopramide is more commonly used in foals with delayed gastric emptying secondary to gastric ulceration. Because metoclopramide's actions are to increase gastric motility, it is important to monitor the foal for increased signs of colic once this medication is started. It is administered as a constant rate of infusion with use of a fluid pump. Caution should be taken as overdose can occur and result in neurologic signs (typically excited and abnormal behaviors).

Enemas are a common treatments in neonates. If straining or lack of defecation is noted, an enema can be performed in a matter of minutes. Often time, they are immediately productive after administration. Commercial phosphate enemas (Fleet®) can be used, but repeated uses can increase the risk of phosphate toxicity. Warm water liquid detergent enemas are gentle to the rectal mucosa and can be repeated as needed. Enemas can be achieved by using commercial enemas bags or an enema bucket and harris flush tube.

## **Nursing Care**

As a technician you will perform or assist with all of the above mentioned procedures. In a hospital setting, the technicians usually spend more time looking at a patient. As a technician, it is our job to recognize the first signs of a problem and notify the doctor with all of the

information obtainable through careful observation of trends as well as physical examination. Recording and reporting signalments and vital parameters are necessary before notifying the doctor. If a nasogastric tube is in place, checking for reflux is a good idea as gastric distention can be a source of pain. If one is not present, the veterinarian may choose to pass one in which case, restraint will be warranted. Proper restraint in neonates/foals is imperative. Improper restraint can lead to fractured ribs and ruptured bladders.

Once a treatment plan is made, the technician will carry out those orders. These nursing skills are, but are not limited to: intravenous catheter care; intravenous fluid therapy; intravenous, intramuscular, and oral medication administration; management of fluid lines; use of a CRI pump; refluxing; administering enteral fluids via nasogastric tube; bandaging; phlebotomy; post-operative incision care; supportive care.

#### What to take away?

Even though they are more precocious than many other neonatal companion animal species, foals are just as sensitive as any other neonate species, maybe even more so at times. Colic signs don't always present the same as adults, so knowing what to look for and how they show pain is important in catching colic early. While there is a normal range for vitals, realize that these will vary based on age, breed, and activity of the foal. Recognizing clinical signs, obtaining objective measurements, and interpreting lab work are all pieces that should be assessed for a larger picture. No one sign or measurement can diagnose colic. Instead, multiple, repeatable signalment should be noted and evaluated. There may be multiple concurrent disease processes going on, so it is important to assess the entire clinical picture, not tunnel-vision on the gastrointestinal system, and determine a course of action to address the potential causes of colic signs in your neonatal foal patient.

#### **References:**

- Barton, Michelle Henry. "Gastrointestinal Disease-Colic in the Newborn Foal." *Equine Neonatal Medicine: a Case-Based Approach*, by Mary Rose Paradis, Elsevier Health Sciences, 2006, pp. 191–207.
- Magdesian, Gary. "Gastrointestinal Disease-Gastric Ulcers and Esophageal Reflux." *Equine Neonatal Medicine: a Case-Based Approach*, by Mary Rose Paradis, Elsevier Health Sciences, 2006, pp. 208–212.
- Magdesian, Gary. "Gastrointestinal Disease-Diarrhea." *Equine Neonatal Medicine: a Case-Based Approach*, by Mary Rose Paradis, Elsevier Health Sciences, 2006, pp. 213–220.
- Morresey, Peter R. "Colic in Foals." *Robinson's Current Therapy in Equine Medicine*, by Kim A.. Sprayberry and N. E. Robinson, Elsevier/Saunders, 2014, pp. 758–765.