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Clinical Assessment of Adult Colic

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Colic in horses may be an acute bout that either improves spontaneously or responds to medical or surgical intervention. Some horses suffer from chronic colic which pose a diagnostic dilemma for the medical clinician. In one study by Proudman (1991) only a small percentage (7%) require surgical intervention. Despite this low percentage of horses that would need surgery we as equine veterinarians are still are challenged as to which cases can be treated with medical therapy alone and which cases need surgical intervention. An early decision regarding the need for surgical therapy is essential. A delay in appropriate therapy increases the risk of a poor outcome. This talk will review the basics of the colic physical exam, ultrasonography, laboratory tests and pain management. Case examples will also be presented to help illustrate to the audience that the decision for medical or surgical treatment varies with each case.

Basic Physical Exam

Must assess the following for an abnormality to help determine the need for an exploratory laparotomy:

- Pain
- Cardiovascular Status
- Rectal Palpation
- Nasogastric reflux
- Abdominocentesis (If Warranted)

Pain

Abdominal pain is usually associated with lumen distention, tension of the mesentery and/or ischemic injury. A simple obstruction will usually cause a low grade chronic pain which over time may wax and wane or slowly become worse as the degree of lumen distention increases. A large colon torsion or small intestinal volvulus which may cause rapid distention of the intestine as well as ischemic injury will cause unrelenting abdominal pain. Pain that is easily relieved by NSAIDS or Xylazine may respond to simple medical therapy. A short term response or incomplete response to pain medication is suggestive of a surgical lesion. Buscopan (N-butylscopolammonium bromide 20mg/ml- Boehringer Ingelheim) is an anticholinergic has been FDA approved in the management of gastrointestinal spasmodic colic. Unlike atropine, it has a very short plasma half-life concentration (15-25 min) and receptor activity. Animals that continue to colic through this medication (0.3mg/kg IV) in my experience are more likely to have a surgical lesion. Abatement of pain in the face of persistent depression and deterioration of the cardiovascular parameters (Cold sweat, cyanotic mucus membrane color, Full Body Tremors) may be associated with the presence of non-viable intestine, which is no longer painful due to disruption of its nerve supply. These cases warrant surgical exploration or euthanasia.

Cardiovascular Status

Cardiovascular (CV) compromise in the colic patient will be associated with the severity of the lesion. The CV status is assessed with the measurement of the heart rate, rhythm, pulse quality,
mucus membrane color, capillary refill time and distal limb perfusion (Warm or Cold to palpation).

Hypovolemic shock occurs secondary from a decrease in circulating blood volume that occurs when extracellular fluid is sequestered in a third space such as a distended large colon or small intestine/stomach. Dehydration occurs in patients with hypovolemic shock when fluid is moved from the Intracellular Space à Extracellular Space à Lumen of the distended Bowel. In an effort to provide proper tissue perfusion the heart rate will increase.

Mucus membrane color and capillary refill time are very practical measurements that signal changes in the cardiovascular system. Mucus membrane color may initially with endotoxemic shock be a bright red color with a fast capillary refill time since the endotoxins will initially cause a hyperdynamic state (Increased HR with Capillary Vasoconstriction). As the bowel becomes more compromised then more endotoxins will enter into circulation. Various cytokines such as TNF and IL-1 are responsible for the hypodynamic shock phase. In this phase marked vasodilation occurs (Hypotensive Shock) which compromises peripheral perfusion and causing the darker (cyanotic) mucus membrane color and prolonged capillary refill time.

Rectal Palpation
Rectal palpation is one of the most useful diagnostic tests performed when evaluating horses with colic. A through knowledge of gross anatomical landmarks and familiarity with normal character of the viscera are important for determining the cause of colic. Remember that only about 25-30% of the abdominal cavity can be assessed with a rectal exam. The detection of displaced viscera, abnormal orientation of the taenia, edema of the intestinal wall and distention of viscera are abnormalities that may indicate a surgical lesion. In our referral hospital a rectal palpation combined with ultrasonographic evaluation are usually used together to reach a pre-operative diagnosis of colic.

Rectal evaluations are not without risk. Rectal tears are the most frequent reason for equine veterinary malpractice litigation. It has been suggested that primary factors causing rectal tears include failure of the rectal wall to relax, rectal straining, and patient resistance. A recent study (Luo and Bertone AAEP 2005) evaluated N-Butylscopolammonium Bromide and Lidocaine for control of rectal pressure. It was noted that N-Butylscopolammonium Bromide given at the labeled dose of 0.3mg/kg IV was able to significantly reduce the tension of the rectal wall within 1 minute of injection. No significant effects were noted when 50ml of 2% lidocaine was injected per rectum. This drug along with proper sedation may be of benefit when attempting to rectal a fractious horse. No adverse effects have been documented to the company when using this drug for a rectal exam.

Nasogastric Intubation
Rectal palpation gives an indication of anatomical abnormalities of the caudal abdomen while nasogastric intubation given an indication of the status of the stomach and small intestine. The presence of gastric reflux indicates an obstruction of the small intestine, either mechanical or functional, but can accompany a large colon problem (IE: Colonic entrapment or displacement) because of a delay in the gastric-colic reflex. The presence of 1 or 2 liters of reflux is considered normal with large amounts indicating a pathological condition. The pH of the fluid can be obtained to indicate a source of the fluid. The duodenal pH will be more basic than a delayed gastric emptying disorder with gastric fluid of a lower pH value. Nasogastric intubation should be performed on every colic patient that has had a history of either chronic colic signs or ineffective control of pain with conventional sedatives.

Abdominocentesis
Abdominocentesis is a procedure that will not be performed on every colic case. This procedure is usually used with other diagnostics (rectal exam, ultrasonographic evaluation, physical exam) in horses with mild chronic pain, normal CV status, lack of nasogastric reflux and normal rectal examination. An abdominocentesis can have complications such as an enterocentesis. Enterocentesis usually has no detrimental consequence in the normal intestine, unless unhealthy intestine is punctured (IE: Ischemic intestine) because it is less likely to be sealed by the normal mechanism and therefore increase risk of leakage of ingesta into the abdominal cavity. The use of...
a blunt ended instrument such as a teat cannula may reduce the risk of enterocentesis. The fluid is collected into a sample container containing calcium EDTA or another anticoagulant. Normal peritoneal fluid is straw-colored in which you can “read a newspaper through”. If bowel is compromised the fluid will become darker and appears serosanginous when the intestinal ischemia has resulted in the extravasation of red cells and protein across the intestinal wall. Turbid fluid may indicate the presence of white blood cells and is an indicator of inflammation or infection within the peritoneal cavity. Normal protein levels should be less than 2.5 g/dl. Elevations in protein greater than 2.5 g/dl may indicate compromise bowel or an infection within the peritoneal space. White blood cell count in the peritoneal fluid should be < 5000/µl with an elevation > 10,000/µl indicative of changes within the fluid indicative of either inflammation or ischemia. There are however some exceptions such as dystocias that required a fetotomy may have a mild but insignificant increase of WBC > 10,000/µl. A normal postpartum peritoneal analysis would have WBC and protein levels within the normal range.

Ultrasonographic Examination

Ultrasonographic examination has become the most widespread diagnostic technique in equine practice, primarily used to evaluate the reproductive tract of mares. Recently, the equipment has also become less expensive, and offers more versatility, mainly through the use of various types of transducers. The frequency of the transducer determines the depth at which the focal point of the image may be obtained. For example a 5 MHz transducer allows visualizing structures to a distance of 12 cm from the skin surface, while a 3.5 MHz allow visualizing structures to a distance of 25-30 cm deep to the skin surface. Some transducers offer the possibility of using multiple frequencies.

Examples of intestinal pathologies and their ultrasound image

Small intestinal obstruction caused by a volvulus

Commonly noted in foals and older animals with a strangulating lipoma. Ultrasonographic findings would include marked distention of the small intestinal loops +/- increased bowel thickness (Normal serosal surface < 3mm). Bowel thickness will be noted in a volvulus of prolonged duration and vascular compromise. In an early volvulus hypermotile small distended loops may be noted with no evidence of edema. A re-evaluation of the ultrasound 1 hour later may reveal an ileus with sedimentation of the intestinal contents. This lesion may be associated with gastric distention and increased volume of peritoneal fluid. If the small intestine is > 5cm in diameter immediate referral to a hospital is recommended

Small intestinal obstruction due to other causes

Strangulating lipoma, diaphragmatic hernia, and epiploic foramen entrapment often result in the presence of a segment of small intestine in which the walls are thick, the lumen is distended and motility is absent. Depending on the duration of the problem, excessive peritoneal fluid and/or gastric distention

Proximal enteritis

This type of problem can be diagnosed with increased small intestinal distention with decreased motility. Rarely will you find edema of the intestinal serosa (Unless you have hypoproteinemia). Copious amount of gastric reflux would be noted. The animal usually has a low white blood cell count and a history of fevers. The majority of the small intestine will be distended unlike an animal with small intestine volvulus where usually a segment of small intestine will be distended.

Intussusceptions
Small intestinal and large intestinal intussceptions often generate a “target-like” image corresponding to the various layers of the intestine involved.

**Colon Torsion**
Difficult to assess on ultrasound. If vascular compromise is present, the serosa may be thickened (> 3mm), with loss of sacculations.

**Nephrosplenic entrapment**

Visualized in the left paralumbar fossa the spleen and left kidney should be easily visualized. If the kidney could not be visualized then a rectal exam should be performed to confirm a nephrosplenic entrapment. Contrary to general perception, it is often difficult to establish this particular diagnosis based on ultrasound and rectal palpation is generally a more accurate method. Medical treatment could be instituted first with the addition of 15mg of phenylephrine in 1 liter of saline over 15 minutes for a 500kg horse. (3µg/kg/min for 15 minutes). Once administered the animal is either longed or walked up and down hills for 5-10 minutes. Success rate in our hospital has been > 90%.

Ultrasound examination of the equine abdomen in cases of colic often helps determine the cause of discomfort when used with other diagnostic methods.

**Colic In Pregnant and Periparturient Mares**

In addition to the many clinical conditions that can cause colic in the horse, a number of conditions are unique in the pregnant and periparturient mare. They include:

- Uterine Tear
- Ischemic Injury to Bowel Post Foaling (Most often cecum)
- Uterine/ovarian/intrabdominal hemorrhage
- Uroperitoneum
  - Bladder Trauma
  - Ureter Trauma
- Uterine Torsion (late gestation mare)
- Rectal tears/abscess
- Vaginal tears/abscess