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How I Use Clinical Pathology Data to Evaluate the Acute Abdomen: What Tests are Most Helpful

Peter R. Morresey, BVSc, MACVSc, Diplomate ACT, Diplomate ACVIM (Large Animal)

Author’s address: Rood and Riddle Equine Hospital, PO Box 12070, Lexington, KY 40580; e-mail: pmorresey@roodandriddle.com.

Author’s Note: Please see the appendix on page 56 that list drugs, doses indications, and author's opinion.

Take Home Message

While not a substitute for a complete physical examination, evaluation of blood and peritoneal fluid provide useful ancillary information in the horse displaying acute abdominal pain. No one individual parameter can be relied upon to make diagnostic or prognostic decisions.

Introduction

Handheld analyzers, while available, are not in widespread use. When compared to laboratory analyzers, handheld devices have been shown to have variable results. However, in many cases it is the trend in values obtained that is important. For this reason, the ability to rapidly and repeatedly measure clinical parameters stall-side and monitor the response to therapy adds greatly to the ability to successfully manage cases in the field.

Complete Blood Count

Packed Cell Volume (PCV)

Packed cell volume can be measured by hand-held analyzers or estimated by allowing an EDTA tube to settle undisturbed. In many prognostic models, PCV is an important variable indicating survivability. Elevated PCV above the reference range has been shown as a negative prognostic indicator for survival. In another study, PCV was found to have no prognostic significance. The use of PCV as a sole determinant of prognosis is therefore unwise; however, PCV is an indicator of cardiovascular compromise which is an important determinant of survival in many studies.

White Blood Cell Count (WBC)

In one study of horses with acute abdominal pain, WBC was found to have no prognostic significance. However, other studies have shown some significance. A low WBC implies endotoxemia, possibly with the association of devitalized intestine. Taken in the context of the overall clinical presentation, abnormal WBC is suggestive of endotoxemia or more severe disease. Pleuritis, impending colitis and peritonitis may present with an abnormal WBC and signs of apparent abdominal pain.
**Total Protein/Albumin**

In one study decreased serum total protein concentration at admission was associated with an increased risk of postoperative death in horses recovering from small intestinal surgery.\(^9\) In another retrospective of horses undergoing colic surgery, survival was influenced by total plasma protein, the type of lesion, preoperative PCV and the length of the surgical procedure.\(^10\) Total protein and albumin levels are therefore important parameters to monitor in the management of horses with acute abdominal disease.

**Glucose**

In one referral center study, hyperglycemia was common in horses with colic and was associated with a worse prognosis for survival to discharge from the hospital. Additional factors affecting survival in this study included severity of pain at admission, heart rate, PCV, anion gap, and diagnosis.\(^11\)

**Lactate**

Lactate may be measured in either plasma or peritoneal fluid. Experimentally, both peritoneal and plasma levels of lactate were determined to be lower in control horses when compared to clinical cases of colic.\(^12\) Peritoneal lactate was also shown as a more useful predictor of intestinal ischemia secondary to a strangulating obstruction than blood lactate. As such, lactate levels appear in many prognostic models of equine colic.\(^13\)-\(^15\) Peritoneal fluid lactate has been shown a better predictor of intestinal strangulation than blood lactate.\(^12\) In one model, blood lactate was the second most important predictor of survival.\(^7\) Increasing blood or peritoneal lactate increased the likelihood of surgery, intestinal resection and postoperative ileus.\(^16\) Increasing peritoneal lactate also indicated an increased probability of death.

**Electrolytes**

Mild electrolyte and acid-base disturbances are seen in the majority of horses with colic.\(^17\) Increased lactic acid production secondary to hypovolemia, along with minor cation alterations, are the usual findings. Ionized calcium is likely an important derangement, this being dependent on the cause i.e. diarrhea, exhaustion.\(^17,18\) Hypomagnesemia and hypocalcemia were found common during the perioperative period in horses with strangulating intestinal lesions and ileus, however, neither was shown a predictor of hospitalization time or survival.\(^19\) Hypomagnesemia may be associated with other electrolyte abnormalities and its effects have been reviewed.\(^20\) Correction of calcium improved prognosis in one study due to favorable effects in treating horses with postoperative ileus. However, lack of response to calcium supplementation in these horses was associated with an unfavorable prognosis.\(^21\)

**Creatinine**

As an indicator of general circulatory sufficiency, elevated creatinine levels suggest hypovolemia or progression of systemic compromise to include renal dysfunction. In one study, elevated
creatine was found in horses with signs of colic as compared to controls. Factors associated with renal insufficiency included gastric reflux, abnormal rectal examination, and initial hypochloremia. The prognosis for horses in which azotemia resolves within 72 hours of treatment is more favorable than for horses with persistent azotemia.

Peritoneal Fluid

The evaluation of single peritoneal fluid variables has been shown to have low sensitivity, specificity, and predictive value for determining lesion type, whether medical or surgical treatment was indicated, and outcome. Discoloration commenced early in the course of the disease even while the segment of intestine involved was still viable. However, increased volume of fluid, elevated leukocyte count, increased neutrophil percentage and elevated protein concentrations in one study were less useful criteria for determining the integrity of the intestine. However, in other studies protein levels have been found to be helpful. When evaluated in series, abdominal fluid color and specific gravity have a high positive predictive value for lesion type, while patient age and abdominal fluid color had a high positive predictive value for outcome. Therefore abdominal fluid analysis cannot be used alone to accurately predict lesion type, whether medical or surgical treatment is indicated, or outcome for horses with acute abdominal disease.

References


