



CASE REPORT

EVALUATION OF PHYSICAL AND CLINICAL VARIABLES AS PROGNOSTIC INDICATOR IN A HORSE WITH INTESTINAL VOLVULUS

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ARTICLE INFO

Article History:

Received 11th November, 2017
Received in revised form
23rd December, 2017
Accepted 15th January, 2018
Published online 28th February, 2018

Key words:

Horse,
Colic, Prognostic.

ABSTRACT

This report presents a case of intestinal volvulus in a 3 year old thoroughbred horse. The horse was diagnosed clinically with severe acute abdominal pain, distended small intestine, right dorsal displacement of the large colon and suspected large colon impaction. Blood results showed increased erythrocytes count, hemoglobin concentration, hematocrit count, low mean corpuscular volume (MCV), high mean corpuscular hemoglobin concentration (MCHC), increased neutrophil count, high glucose and high lactate. On post mortem examination pathological changes in the small intestine were observed with torsion of the jejunum without large colon impaction. This case demonstrates the difficulty in making a clinical diagnosis of intestinal torsion in a horse and the importance of blood results as prognostic indicator in the treatment of colic in horses.

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Citation: Gitari Anderson and Vijay S Varma. 2018. "Evaluation of Physical and Clinical variables as prognostic indicator in a horse with intestinal volvulus", *International Journal of Current Research*, 10, (02), 65527-65529.

INTRODUCTION

A correct diagnosis is necessary to predict a reliable prognosis and this helps in making the right decision in the method of treatment. In colic cases, a correct clinical diagnosis of the site and type of the intestinal lesion is often difficult (Blikslager and Roberts, 1995). However, horses with colic due to the small intestine torsion or volvulus are recognized by clinical presentation of nasogastric reflux and distension of the small intestine on rectal palpation. Torsion or volvulus tends to appear at parts of the jejunum, ileum or ileocecal junction, and the latter is the most common. Use of Ultrasound is increasingly becoming popular especially at the evaluation of the diameter of the small intestine, wall thickness and motility (Fischer, 1997). Evaluation of clinical and laboratory variables to determine the prognosis might be useful when making a decision whether to let the patient undergo further treatment or not. A multivariable model by Parry *et al.* (1983) concluded that variables that assess cardiovascular function were good prognostic guides. Other studies showed that clinical and laboratory variables such as heart rate, packed cell volume (PCV) colour of mucous membranes, capillary refill time (CRT), acid- base variables and plasma lactate are valuable prognostic predictors (Pascoe *et al.*, 1990; Reeves *et al.*, 1990; Sandholm *et al.*, 1995; Thoenfer 2000). It is therefore important to note that several variables are often combined to predict survival in horses with colic.

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Reliable prognostic indicators should therefore include assessment of pain intensity, level of intestinal distention, mucous membrane color, the cardiovascular system and laboratory variables.

Case History

A 3 year old was presented with an acute case of colic at a stable in Karen, Nairobi County. The horse had severe signs of colic which include pawing, profuse sweating, repeated lying down and rolling. On physical examination the horse demonstrated severe abdominal pain even after administration of flunixin meglumine (NSAID) at 1.1 mg/kg, butorphanol (opioid) at 0.02mg/kg and lidocaine at 1.2 mg/kg CRI over 10 minutes. The horse had dry mucous membrane, elevated heart rate (68 beats/minute), decreased borborygmi, distended abdomen especially on the right side with the horse being very uncomfortable laying the right side. Nasogastric intubation was performed by the veterinarian and malodorous reflux of approximately 1.5 L of fluid came out. Rectal examination revealed bloated small intestines, distended colon and cecum. There was scanty fecal matter in the rectum. The horse was dehydrated (dry mucus membranes and decreased skin turgor) despite having received 15 liters of intravenous fluid in the course of 12 hours during the treatment. The horse condition continued to deteriorate with unremitting pain and the heart rate increased to 79 beats per minute despite the continued medical treatment. A decision was made to put the horse down as there was no available surgical facility in the area.

Table 1. Hematological and biochemical results from a horse with severe colic

Test	Result	Reference	Comment
RBC	10.98 (10 ¹² /L)	4.47-9.35	High
Hemoglobin	16.2 g/dl	7.4-12.8	High
hematocrit (hct)	44.2 %	22.5-39.9	High
MCV	40.3fl	40.4-56.4	Low
MCH	14.8pg	11.5-18.5	
MCHC	36.7 g/dl	30.2-33.5	High
RDW	33.9 %	20.0-35.9	
platelet count	105 k/ul	147-663	Low
WBC	15.8k/ul	2.71-17.76	
Neutrophil	12.8 (10 ⁹ /L)	3.0-6.0	High
Lymphocyte	2.39 (10 ⁹ /L)	1.5-5	
Monocytes	0.54(10 ⁹ /L)	0.00-0.6	
Eosinophils	0.06 (10 ⁹ /L)	0.00-0.8	
Basophils	0.02(10 ⁹ /L)	0.00-0.3	
S-ALP	165 IU/L	140-500	
S-AST	415 IU/L	43-291	High
Total Protein	56g/l	61-81	Low
Albumin serum	Glubulin 30g/l Alb/Glob ratio 0.9	28-49	
Random Glucose	8.8 mmol/l	3.1 -5.0	High
Serum Lactate	4.45mmol/l	1.0-1.5	High

Post mortem examination

Post mortem examination done and revealed distended stomach with fluid contents mixed with horse meal. The jejunum had serosal hemorrhage in almost the entire length. The large intestine contained some dry content without any pathological lesions in the mucosa and there was no evidence of an impaction. The liver and kidney showed no pathological changes.



Figure 1. Intestinal volvulus in a horse during post mortem

DISCUSSION

This horse had unrelenting pain which was unresponsive to analgesics. The pulse rate kept on fluctuating between 68 to 79 beats/minute. It had high erythrocyte count (RBC), high hemoglobin concentration (HB), high hematocrit (HCT), low mean corpuscular volume (MCV), high mean corpuscular hemoglobin concentration (MCHC), low platelet count, high neutrophils, high glucose and high serum lactate. During the period of treatment the horse had received 15 liters of ringers lactate solution together with combination of analgesics which included flunixin meglumine, butorphanol and IV bolus lidocaine 2 %. Placement of nasogastric tube seems to provide relief and there was reflux of brown fluid which had a foul smell. However, chronic decompression was not possible because the horse kept rolling and the tube was unsecure. The physical and clinical evaluation of this horse was giving a very poor prognostic indication.

This was evidently seen during the post mortem. Prognosis of a horse suffering from colic depends on the findings from physical examination, response to analgesic treatment (Peloso, 1996; White, 2005), CBC, glucose, lactate levels and protein/albumin ratio (Puotunen, 1996; Parry *et al.*, 1983; Hassel *et al.*, 2009 and Proudman *et al.*, 2005). In many prognostic models, PCV is an indicator of cardiovascular compromise which is an important determinant of survival in many studies (Puotunen, 1996). A low White Blood Cell Count (WBC) implies endotoxemia and a probable indicator of devitalized intestine. In a general clinical presentation, an abnormal WBC is suggestive of endotoxemia or more severe disease. Increased WBC is seen in pleuritis, impending colitis and peritonitis with signs of abdominal pain (Morris, 1991). Survival rates are highest for horses showing mild abdominal pain and lowest for those with severe pain. Horses with palpable intestinal distention and no borborygmi on auscultation of the abdomen have lower rate of survival than those with no visible abdominal distention or normal borborygmi sounds. An absence of intestinal borborygmi, particularly if persistent, is associated with the need for surgery (White *et al.*, 2005). Red mucous membranes are frequently associated with endotoxemia, which decreases the survival rate. Cardiovascular system function reflects the degree of shock and increased heart rate correlates with the severity of disease. Therefore, this is an indication of poor prognosis for survival (Furr *et al.*, 1995). However, one has to be careful in the interpretation of the heart rate because it can be misleading. Low or near normal rates can be observed in the early stages of life threatening diseases, even when concurrent with severe pain. In this instance, pain should be considered the most important sign. On the other hand, high heart rates, though associated with severity of disease and poor prognosis, do not always indicate the need for surgery or poor prognosis. Diseases such as enteritis and cecal or colonic tympany may result in high heart rates but do not normally require surgery (White, 1990).

A study showed that horses with colic before admission to veterinary hospitals had increase in acute phase proteins like Serum Amyloid A and haptoglobin both in serum and peritoneal fluid, and plasma fibrinogen, and lactate. Acute phase proteins was significant among disease groups with inflammatory abdominal resulting in the highest acute phase proteins concentrations with Serum amyloid A in serum seemed to be the most significant biomarker (Pihl *et al.*, 2015). A study on foals with *Rhodococcus equi* showed elevated plasma SAA and fibrinogen levels on admission to the hospital. There was decreased levels of SAA with the successful treatment which was also portrayed with the clinical improvement. However, the levels of fibrinogen were still high on discharge. Therefore, Serum amyloid A seems to be able to monitor response to treatment of infections in the respiratory tract (Hultén and Demmers, 2002). Increase in APP has been seen in post surgical complications with inflammation or in castrated horses with high SAA concentrations 8 days post-surgery suggested an infection (Jacobsen *et al.*, 2005). Total protein and albumin levels are important parameters to monitor in the management of horses with colic. A study showed decreased serum total protein concentration at admission was associated with an increased risk of postoperative death in horses recovering from small intestinal surgery (Proudman *et al.*, 2005, Gitari *et al.*, 2016). In another retrospective study of horses undergoing colic surgery, prognosis was influenced by total plasma protein, the type of lesion, preoperative PCV and

the length of the surgical procedure (Pascoe *et al.*, 1983). There is increased demand of amino acids during synthesis of Acute phase proteins (Serum Amyloid A, haptoglobin, fibrinogen and ceruloplasmin), this causes down-regulation of hepatic albumin synthesis and shunting of amino acids, resulting to low albumin. Therefore, albumin is a negative acute phase proteins (Aldred and Schreiber, 1993). Hyperglycemia is common in horses with colic and is associated with poor prognosis in patients (Gitari *et al.*, 2016). Additional factors influencing the prognosis in this study included severity of pain at admission, heart rate, PCV and anion gap (Hassel *et al.*, 2009). Plasma or peritoneal lactate levels are important predictor for survival. Peritoneal lactate has been shown to be 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 (Furr *et al.*, 1995). In another study, blood lactate was the second most important predictor of survival (Parry *et al.*, 1983). Plasma lactate concentration was significantly lower in survivors (2.98±/2.53 mmol/L) compared with non-survivors (9.48±/5.22 mmol/L) with large colon volvulus and lower in horses with a viable colon (3.30±/2.85 mmol/L) compared with horses with a nonviable colon (9.1±/6.09 mmol/L) (Johnstone *et al.*, 2007). Increased blood or peritoneal lactate indicated a likelihood of intestinal resection, postoperative ileus and increased probability of death (Delesalle *et al.*, 2007).

Conclusion

In many situations, each case will present itself differently and the information obtained from the physical and clinical examination together with the experience one has in interpreting different variables as they are presented by the case will determine the success of having a correct diagnosis and prognosis. Intensity of pain together with the interpretation of CBC, serum lactate, glucose and APP will ultimately help in determining the prognosis and craft suitable path of treatment.

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