

Serum Alkaline Phosphatase, Aspartate Aminotransferase and Gamma Glutamyltransferase Levels in the Prognosis of Horses With Colic

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SUMMARY

After clinical examination the blood samples were obtained from twenty five horses with colic and all of them were treated medically. Comparison of these animals with twenty clinically normal horses revealed significant in neutrophil, total protein ($P < 0.001$) and aspartate aminotransferase levels ($P < 0.01$). 17.3 % of the horses with colic died. Comparison of the surviving with died animals revealed significant differences in hematocrit ($P < 0.001$), total leucocyte, total protein ($P < 0.05$) and aspartate aminotransferase levels ($P < 0.001$). In conclusion, it was observed that aspartate aminotransferase had an important role in conjunction with hematocrit, total protein and total leucocyte levels in the prognosis of horses with colic.

Key words: Horse, Colic, AST.

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ÖZET

Sancılı Atların Prognozunda Serum Alkaline Phosphatase, Aspartate Aminotransferase ve Gamma Glutamiltransferase Düzeyleri

Yirmibeş attan klinik muayenelerinden sonra kan alındı ve bütün sancılı atlara medikal tedavi uygulandı. Sancılı atlar ile 20 adet klinik olarak normal atların karşılaştırılmasında nötrofil, total protein ($P < 0.001$) ve aspartate aminotransferase ($P < 0.01$) düzeylerinde önemli farklılık ortaya çıktı. Sancılı atların % 17.3'ü öldü. Sancıdan ölen atlar ile iyileşen atların karşılaştırılmasında hematokrit ($P < 0.001$), total lökosit, total protein ($P < 0.05$) ve aspartate aminotransferase düzeylerinde ($P < 0.001$) önemli farklılık saptandı. Sonuçta, sancılı atların prognozunda hematokrit, total lökosit ve total protein miktarları ile birlikte aspartate aminotransferase düzeyinin önemli rolü olduğu gözlemlendi.

INTRODUCTION

Conditions characterized by abdominal pain are common in horse diseases^{1,2}. The primer lesion is usually in the jejunum, ileum, caecum or the colon³. Although the diagnosis is simple, prognosis varies according to lesion. Heart rate, frequency of colic, hematocrit, total protein, total leucocyte and neutrophil levels are used in the evaluation^{4,5,6}. These parameters guide the veterinarian in the selection of medical or surgical options⁴.

The purpose of this investigation was to: (i) detect changes in serum Alkaline Phosphatase (AP), Aspartate Aminotransferase (AST), Gamma Glutamiltransferase (GGT) activity in horses with colic and in the clinically healthy horses, (ii) compare the alterations in serum those enzyme activities in survived to died horses with colic.

MATERIALS AND METHODS

Twenty-five horses with colic are examined at the Uludağ University, Faculty of Veterinary Medicine, Department of Internal Medicine were included in the study. 20 healthy animals obtained from the Gemlik Military Veterinary Education Command constituted the control group.

After examination, the type of colic was categorized as constipation, spasmodic pain and meteorismus^{2,7}. All horses with colic were given 20-30 mg/100 kg of hyoscine N-butyl-bromide (Buscopan) or hysocine N-butyl-bromide + dipyrone (Buscopan compositium) by slow intravenous injection^{8,9}. Purgatives and some chemotherapeutics were added if necessary. Therapy was repeated in cases of recurrences.

Blood samples were obtained with anticoagulant (3.8 % Sodium citrate; 1:10) for total leucocyte count, differential leucocyte count and hematocrit and without anticoagulant for other parameters¹⁰. After clotting sera were obtained by centrifugation at 3000 rpm for 30 minutes and stored at -20°C at most for one month and total protein and enzyme levels were evaluated^{11,12,13}. AP, AST, total protein (Boehringer) and GGT (Electro-Nucleonics) were determined by using commercial kits. GGT was evaluated at 25°C.

The results were evaluated by Student's t-test¹⁴.

RESULTS

60 % of the horses were female, 15 % gelding and 25 % male. One of the horses was a Haflinger, another a British horse; the rest were warm-blooded cross breeds. The ages varied between 2.5-18. After clinical examination, the type of colic was determined 52 % of the horses had colonic and cecal constipation, 28 % spasmodic colic, 16 % meteorismus. History, frequency of colic, severity of colic and findings in rectal examination were taken into consideration. Autopsy on a horse in which gastric dilatation was suspected, revealed duodenitis and proximal jejunitis.

Four of the horses died, 19 survived. The results of two animals were not evaluated due to address changes.

The results are presented in Table I and Table II.

Table: I
Results of Laboratory Analyses. Mean and Standart
Deviation (Sd) of Values for Horses with Colic and Control Groups

	Control Groups (n = 20)		Horses With Colic (n = 25)		Significance
	Mean	Sd	Mean	Sd	
Hematocrit (%)	30.05	1.37	32.95	1.47	NS
Total protein (g/dl)	6.87	0.17	8.28	0.38	< 0.001
Total leucocyte (mm ³)	8277.77	833.77	8617.39	904.35	NS
Neutrophils (%)	46.29	3.25	69.07	5.37	< 0.001
Lymphocytes (%)	51.70	3.17	30.28	4.20	< 0.001
AP (U/litre)	91.26	5.21	130.40	26.78	NS
AST (U/litre)	145.40	15.07	385.93	75.76	< 0.01
GGT (U/litre)	3.73	0.43	12.96	5.76	NS

AP Alkaline phosphatase, AST Aspartate aminotransferase,
GGT Gamma glutamyltransferase, NS Not significant

Table: II
Results of Laboratory Analyses. Mean and Standard Deviation (Sd)
of Values for Horses With Colic that Survived or Died Groups

	Horses Which Survived (n = 19)		Horses Which Died (n = 4)		Significance
	Mean	Sd	Mean	Sd	
Hematocrit (%)	31.60	1.30	45.00	2.00	< 0.001
Total protein (g/dl)	8.08	0.37	10.36	1.28	< 0.05
Total leucocyte (mm ³)	7688.88	561.94	14533.33	7017.67	< 0.05
Neutrophils (%)	69.7	6.32	75.00	12.12	NS
Lymphocytes (%)	29.9	6.30	24.66	11.79	NS
AP (U/litre)	110.33	24.97	242.95	107.86	NS
AST (U/litre)	272.16	52.53	981.25	177.86	< 0.001
GGT (U/litre)	12.68	7.05	8.21	3.58	NS

DISCUSSION

The average age of the horses with colic was 9.5 and only six horses were younger than 5 years. Reeves et al.⁷ have reported that the frequency of colic increases with age. These investigators have also reported that sex is not a factor. In this study, 60 % of the horses were female. The difference may be due to the fact that female horses are common in our region.

The high frequency of constipation (52 %) may be due to improper dietary practices. Predisposing factors include a low fraction of roughage feeds of poor quality, excessive feeding and insufficient water supply¹⁵.

Total protein, neutrophil and AST levels were significantly higher in comparison to the controls. Although hematocrit levels not increased, total protein levels were significantly higher ($P < 0.001$). Changes in hematocrit and total protein reflect hemoconcentration, because the margin is narrower, the total protein level is more valuable¹. Ischemic and inflammatory changes are the most important findings in the lesion of the intestines³. Accordingly, neutrophils increase ($P < 0.001$) and lymphocytes exhibit a relative decline. Ford et al.¹⁶ have reported neutrophilia and lymphopenia in acute events, but no changes in chronic events.

The increase in the AST levels ($P < 0.001$) may be due to the rolling of the animal on the ground and consequent skeletal muscle injury^{11,17}. Although AP did not increase significantly, the change may be due to increase in the intestinal and hepatic isoenzymes^{18,19}. GGT levels followed the same pattern. The in-

crease in GGT in gastrointestinal disturbances may be explained by secondary hepatic injury¹².

Although the diagnosis in horses with colic is simple, prognosis is varied^{4,5}. Reeves et al.⁴ have reported that prognostic information is important for the owners and trainers and is necessary for deciding the selection of medical or surgical modalities.

Increases of hematocrit up to 45 % ($P < 0.001$) in the animals which have died, may reflect circulatory disturbance⁶. Other investigators have reported hematocrit increases in horses with colic^{5,6,20}. Total protein is increased due to the same reason ($P < 0.05$). Total protein rises in constipations and obstruction because of increased secretions in the proximal intestine and decreased absorption in the colon decrease the plasma volume^{21,22}. Allen et al.²¹ have found no difference in the total protein levels of the animals with small intestinal obstruction where as Orsini et al.⁶ have reported lower levels in horses which have died. This decrease may be due to excessive protein leakage into the lumen or peritoneal cavity after severe mucosal injury^{2,23,24}.

The increase in the total leucocyte count in group with poor prognosis ($P < 0.05$) is in according with the findings of Orsini et al.⁶. This findings may be due to increased inflammatory activity in the intestines and peritoneal leakage^{3,23}.

AST levels increased markedly ($P < 0.001$) in the animals which have died. This condition may be due to severity of colic and its duration. AP has also been reported to increase in gastrointestinal disturbances¹¹. AP increased in the horses which have died but this did not reach statistical significance. The increase may be due to intestinal isoenzymes²⁵. GGT showed insignificant decreases.

In conclusion, AST plays an important role in conjunction with hematocrit, total protein and total leucocyte levels in the prognosis of horses with colic.

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