

Hematobiochemical Changes in Canine Ehrlichiosis and its Therapeutic Management: A Case Report

Dhurba DC^{1*} and Ranjana Ranabhat²

¹*Veterinary Hospital and Livestock Service Expert Center, Hetauda, Makawanpur, Nepal*

²*Department of Microbiology, FAVF, Agriculture and Forestry University, Chitwan, Nepal*

***Corresponding Author:** Dhurba DC, Veterinary Hospital and Livestock Service Expert Center, Hetauda, Makawanpur, Nepal.

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Abstract

Three dogs (9-month-old male and female German shepherd and 4-year-old female Japanese spitz) were brought to Veterinary Hospital and Livestock Service Expert Center, Hetauda, Makawanpur, Nepal with a history of loss of appetite, exercise intolerance, lethargy, high body temperature, tick infestation, and occasional vomiting. Clinical examination reveals fever, severe anemia, and heavy tick infestation. For confirmatory diagnosis, blood samples were tested using a commercially available *E. canis* Ab rapid kit. Also, Giemsa-stained blood smear was prepared and observed under the microscope at magnification 40× and 100×. Both examinations showed positive to *Ehrlichia canis*. Furthermore, blood and serum biochemistry test were done. Finally, the dogs were cured after a month-long treatment with antibiotics, antipyretics, haematinics, fluid therapy, and other supportive drugs.

Keywords: Canine Ehrlichiosis; *Ehrlichia canis*; Anemia

Introduction

Ehrlichiosis is a rickettsial disease caused by *Ehrlichia canis* [5]. *E. canis* is transmitted by tick vector *Rhipicephalus sanguineus* commonly known as brown dog tick [9]. The organism *Ehrlichia canis* passes to blood through the bite of *Rhipicephalus sanguineus* [2]. The disease is characterized by high fever, loss of appetite, weakness, vomiting, and anemia [1,2]. Clinically the disease is divided into three forms i.e. acute, subacute, and chronic. In the acute and chronic form of disease leukopenia and thrombocytopenia are most commonly present while the subacute infection is difficult to diagnose because the disease is present without any clinical signs [2,5,8,11].

The most common hematological and serum biochemical alterations during ehrlichiosis are leukocytosis, neutropenia, lymphopenia, thrombocytopenia, eosinophilia, hypoalbuminemia, hyperglobulinaemia, and decrease in albumin/globulin ratio [6]. Diagnosis of ehrlichiosis is mainly based on blood smear examination. Other molecular and serological diagnostic techniques like indirect immunofluorescence antibody (IFA) test, enzyme-linked immunosorbent assay (ELISA) can be used [6]. Commercially available *E. canis* rapid kit can also be used for the diagnosis of disease.

Case Presentation and Disease Diagnosis

Three dogs (9-month-old male and female German shepherd and 4-year-old female Japanese spitz) were presented to Veterinary Hospital and Livestock Service Expert, Center, Hetauda, Makawanpur, Nepal (N:27.413791, E: 85.025470) with a history of loss of appetite, exer-

cise intolerance, lethargy, increased body temperature, tick infestation, and occasional vomiting. On clinical examination fever (105.4°F), severe anemia (Figure 1A and 1B) increased respiratory rate, dehydration, occasional vomiting and heavy tick infestation (Figure 2) were observed.



Figure 1A: German shepherd with white mucous membrane.

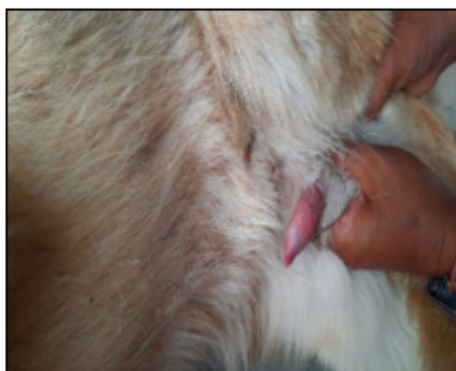


Figure 1B: German shepherd with pale penile mucous membrane.



Figure 2: Rhipicephalus sanguineus tick under microscope.

For confirmatory diagnosis, a commercially available *E. canis* Ab rapid kit manufactured by BIONOTE was used (Figure 3). For test, 1 ml blood was collected in EDTA vial using 3 ml sterile syringe from cephalic vein. Using disposable capillary tube 10 µl of whole blood then 2 drop of assay diluents were placed on rapid test kit. At 20 minutes the test result was found positive to *E. canis* Ab (Figure 3). Furthermore, 10% Giemsa-stained blood smear was prepared and observed on the microscope at magnification 40× and 100× (Figure 4). Blood samples were collected for hematological and serum biochemistry examination.

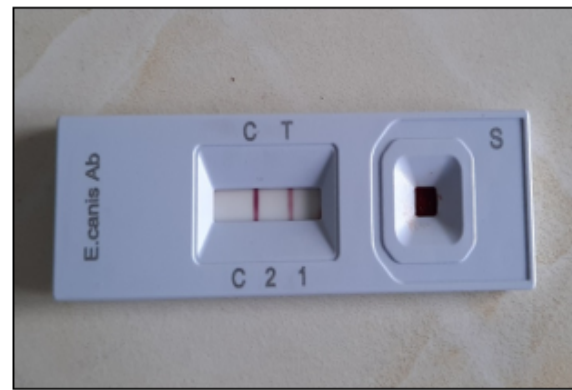


Figure 3: *E. canis* Ab rapid test - Positive.

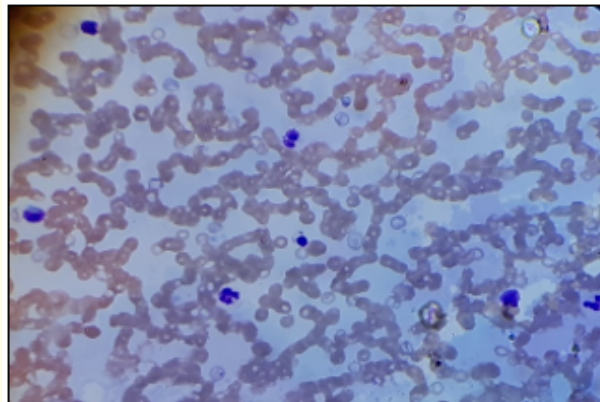


Figure 4: Giemsa-stained blood smear showing *E. canis* under microscope.

Hematological and serum biochemistry parameters

Hematological and serum biochemical parameters for three dogs were tested on day 0 and day 28. In the hematological examination, hemoglobin, total erythrocyte count (TEC), total leukocyte count (TLC), differential leukocyte count (DLC), PCV and Platelets were estimated (Table 1) and in serum biochemistry, total protein, albumin, globulin, creatinine, calcium, phosphorus, potassium, sodium, and chloride were tested (Table 2).

Analyte	Test Value								Reference value
	German Shepherd Male		German Shepherd Female		Japanese spitz Female		Mean value ± SD		
	Day 0	Day 28	Day 0	Day 28	Day 0	Day 28	Day 0	Day 28	
TEC (×10 ⁶ /μl)	4	6.2	4.5	7	2.8	5	3.77 ± 0.87	6.07 ± 1.01	5.5-8.5
Hemoglobin (g/dl)	9	13	10.2	13.5	6	12	8.40 ± 2.16	12.83 ± 0.76	12-19
PCV (%)	27.5	41	28	41.5	30.2	43.4	28.57 ± 1.44	41.97 ± 1.27	29-55
TLC (×10 ³ /μl)	5.2	10.7	5.8	10.4	4.8	9.4	5.27 ± 0.50	10.17 ± 0.68	5.5-16
Neutrophils (%)	84	68	82.6	69	83	68.5	83.20 ± 0.72	68.50 ± 0.50	51-84
Monocytes (%)	1	5	1	6	1	6	1.00 ± 00	5.67 ± 0.58	1-9
Lymphocytes (%)	15	24	16.4	21.5	16	23	15.80 ± 0.72	22.83 ± 1.26	8-21
Eosinophils (%)	0	3	0	3.5	0	2.5	0.0	3 ± 0.5	0-9
Basophils (%)	0	0	0	0	0	0	0.0	0.0	0-1
Platelets (×10 ³ /μl)	154	247	158	250	112	241	141.33 ± 25.48	246.00 ± 4.58	211-621

Table 1: Hematological changes in the dogs with ehrlichiosis.

Analyte	Test Value								Reference value
	German Shepherd Male		German Shepherd Female		Japanese spitz Female		Mean value ± SD		
	Day 0	Day 28	Day 0	Day 28	Day 0	Day 28	Day 0	Day 28	
Total protein (g/dl)	4.5	6.8	4.2	6.8	4	6	4.23 ± 0.25	6.53 ± 0.46	6-7.5
Albumin (g/dl)	2.15	3.1	2	2.6	1.9	2.6	2.02 ± 0.13	2.77 ± 0.29	2.6-4
Globulin (g/dl)	4.2	2.6	4.6	2.4	3.7	2.4	4.17 ± 0.45	2.47 ± 0.12	2.1-3.7
Creatinine (mg/dl)	1.6	1	1.8	1.2	1.5	0.9	1.63 ± 0.15	1.03 ± 0.15	0.5-1.6
Calcium (mg/dl)	9.8	10	9.4	10.2	9.4	10.5	9.53 ± 0.23	10.23 ± 0.25	9.4-11.1
Phosphorus (mg/dl)	2.6	4.2	3.2	4.2	3.2	4.5	3.00 ± 35	4.30 ± 0.17	2.5-7.7
Sodium (mEq/l)	139	143	137	147	136	146	137.33 ± 1.53	145.33 ± 2.08	142-152
Chloride (mEq/l)	105	114	103	115.5	101	118	103.00 ± 2.00	115.83 ± 2.02	110-124
Potassium (mEq/l)	4.3	5	4.2	5.2	4.1	5.4	4.20 ± 0.10	5.20 ± 0.20	4.4-6.1

Table 2: Serum biochemical parameters in dogs with ehrlichiosis.

Hematological examination shows the major changes in hemoglobin and TEC. In Japanese spitz female dog hemoglobin and TEC level was lower than both of German shepherd dog. The tick infestation was also heavy in Japanese spitz than in German shepherd. The level of hemoglobin, TEC, PCV, and platelet count decreased significantly (P < 0.05) in ehrlichiosis [2,6,8].

In serum biochemistry, hypoproteinemia with hypoalbuminemia and hyperglobulinemia were found. The albumin/ globulin ratio was low in *E. canis* infected dogs [4,7,8]. Hepatic insufficiency, nephropathy with protein loss, gastrointestinal losses cause hypoalbuminemia and hyperglobulinemia [10]. Serum creatinine, calcium and phosphorus level was not significantly decreased during *E. canis* infection [8] but sodium, chloride and potassium level was decreased due to vomiting [3].

Treatment

The dog was treated with doxycycline antibiotic (Doxycycline hyclate tablet – 100 mg) tablet @ 10 mg/kg body weight, orally, twice daily for 28 days. Along with antibiotics, antipyretic drug Meloxicam (Meloxin-I from Intracin Pharmaceuticals, India) @ 0.5 mg/ kg body weight was administered intramuscularly for 5 days. Other supportive treatments included, hematinic preparation and liver tonic, Renovo® and Liverco® liquid (Vertex Lifesciences, India) respectively @ 0.5 ml/ kg body weight, PO twice daily for 15 days. Pantoprazole (Pantop®-40 from Aristo pharmaceuticals, India) @ 2 mg/ kg body weight PO, twice daily for seven days. Metoclopramide Hydrochloride (Perinorm® from Ipca laboratories, India) @ 0.5 mg/kg body weight, IM for 5 days. After subsided the temperature (102°F), DNS® (Dextrose normal saline) was used @15 ml/kg body weight, intravenously for 3 days.

Conclusion

This case study mainly focuses on the alteration in hematology and serum biochemistry. Hematological and serum biochemical profile was tested on day 0 (day of disease diagnosis) and the last day (28th day) of a treatment course. On the last day, tested values were found within the normal range. Clinical examination also showed that the dogs were recovered with normal health status and behavior. So, timely diagnosis and appropriate treatment courses can save the life of dog's from ehrlichiosis.

Conflict of Interest

The author declares that there is no conflict of interest.

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