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Case Report / Olgu Sunumu

Case Report of a Dog Heavily Infected with Hepatozoonosis

Bir Köpek Hastada Şiddetli Hepatozoonosis Enfeksiyonu Olgu Sunumu

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Abstract: Canine hepatozoonosis is a widespread tick-borne protozoan disease and generally affects domestic dogs. Diagnosis can be made via PCR, serology, and direct observation of the gamonts of the parasite on stained blood smears. In the present case, a four-year-old female crossbred hunting dog presented to Balikesir University Veterinary Faculty clinics of internal medicine with a history of exercise intolerance, and weight loss for ten days. The dog was highly infected and showed anemia, thrombocytopenia, and neutrophilia. In radiographic analysis, unilateral pulmonary pathology was determined. This case report can be important for clinicians who live in Turkey to recognize the parasite.

Keywords: Dog, Protozoon, Hepatozoon, Pulmonary radiography, Anemia.

Öz: Köpeklerde yaygın gözlenebilen ve kene kaynaklı protozoer hastalıklardan biri olan hepatozoonozis genellikle evcil köpekleri etkiler. Hastalığın teşhisi PCR, seroloji ve periferal kan yaymalarında parazitin gamontlarının doğrudan gözlemlenmesi yoluyla yapılabilir. Bu olguda, Balıkesir Üniversitesi Veteriner Fakültesi iç hastalıkları kliniğine 10 gündür devam eden egzersiz intoleransı ve kilo kaybı şikayetiyle başvuran 4 yaşında dişi, melez av köpeği sunuldu. Yoğun bir şekilde hepatozoonozis ile enfekte olduğu belirlenen köpekte anemi, trombositopeni ve nötrofili olduğu belirlendi. Radyografik incelemede tek taraflı akciğer patolojisi belirlendi. Bu olgu sunumu Türkiye'de çalışan klinisyenlerin paraziti tanıması açısından önemli olabilir.

Anahtar Kelimeler: Köpek, Protozoon, Hepatozoon, Akciğer radyolojisi, Anemi.

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Introduction

Canine hepatozoonosis is a protozoal disease caused by *H. canis* that generally affects domestic dogs (O'Dwyer et al., 2001). This genus has more than 340 species. Of those, two, *H. canis* and *H. americanum*, have been found to infect dogs, while three, *H. felis*, *H. silvestris*, and *H. canis*, have been found to infect domestic cats (Baneth 2011; Giannelli et al 2017). The first description of *H. canis* dates back to 1905, and it is likely the most common vector-borne parasite affecting dogs in Africa, Eurasia, and Latin America. Epidemiologic surveys have revealed different results ranging between 20-59% (Dordio et al., 2021; Heylen et al., 2021; Baneth and Allen, 2022). On the other hand, in Turkey, hepatozoonosis was first described in 1933, and then several epidemiological surveys in the different regions of Turkey were performed (Voyvoda et al., 2004; Karagenc et al., 2006; Paşa et al., 2009; Aktas et al., 2013; Aktas et al., 2015, Aydin et al., 2015). In these studies, the prevalence of canine hepatozoonosis caused by *H. canis* changes between 3.61 %to 36.8%. However, it is important to note that these seroprevalence studies used different diagnosing methods.

H. canis is mainly spread by *Rhipicephalus sanguineus* but by other dog tick species (O'Dwyer et al., 2001; Gavazza et al., 2003). The dog is infected via ingestion of the tick-containing sporulated oocysts. After the sporulated oocysts are ingested, the sporozoites are released into the dog's intestinal tract and they are carried by blood to

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other various tissues where merogony occurs. Some merozoites enter neutrophils or monocytes to develop gametogony (Ezeokoli et al., 1983; Baneth et al., 2007). In addition, vertical transmission of the disease was reported (Schafer et al., 2022).

Hepatozoonosis generally causes asymptomatic disease but may cause fever, severe anemia, weight loss, and lymphadenomegaly in varying combinations depending on the level of parasitemia. In the case of high parasitemia, severe clinical signs, and marked leucocytosis can be observed. In contrast, low parasitemia is associated with general symptoms observed in other tick-borne diseases like babesiosis and ehrlichiosis (Baneth and Weigler, 1997). On the other hand, coinfection of other tick-borne diseases can be important for evaluating prognosis and treatment (Tuna et al., 2020).

Diagnosis of *Hepatozonoosis spp.* can be performed by the detection of gamonts within neutrophils and monocytes determined via peripheral blood smears (Elias and Homans, 1988). Additionally, indirect fluorescent antibody test and polymerase chain reaction (PCR) can also be used (Inokuma et al., 2002;Karagenc et al., 2006). Furthermore, previous studies have shown PCR is 22 times more sensitive than blood smear microscopy (Aktas et al., 2015). Antiprotozoal treatment of *H. canis* and *H. americanum* results in clinical improvement with a gradual decrease in parasitemia but complete elimination of the parasite generally does not occur (Macintire et al., 2001). İmidocarb (5-6 mg/kg 14 days) and doxycycline (10 mg/kg, 21 days) are commonly used in the treatment of disease (Baneth, 2011).

The present study, it was aimed to evaluate a dog referred to Balikesir University Veterinary Faculty internal medicine clinics that positive for *Hepatozoonosis spp.* on its blood smear investigation.

Materials and methods

A four-year-old female crossbred hunting dog presented to Balikesir University Veterinary Faculty clinics of internal medicine with a history of exercise intolerance, and weight loss for ten days.

Clinical examination revealed decreased body temperature (37.0 C°), weight loss, subicteric and pale mucosal membranes, and weakness (Figure 1).

Figure 1: The dog and pale mucous membranes.

Defecation, urination, and food consumption were reported as normal. No tick was found on the patient. No abdominal defense was determined. During thoracal oscultation process, coarse pulmonary sounds were recognized. In hematological analysis, slightly increased leucocyte and neutrophil count, and monocyte proportion were determined. On the other hand, prominently decreased erythrocyte and platelet count, hemoglobin level, and pocket cell volume were determined (Table 1). In blood smear examination gamont of the parasite is commonly determined in neutrophils in every microscopic scene (Figure 2).

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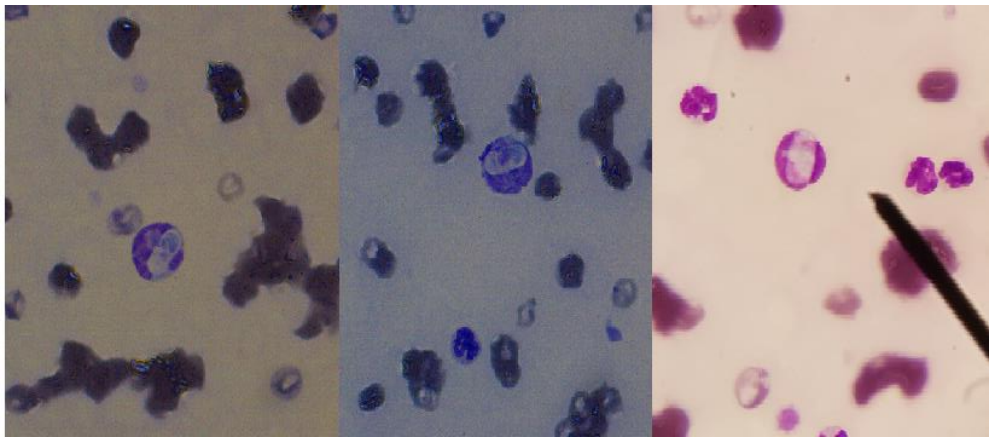

Figure 2: The leucocytes infected with gamont of the parasite.

Table 1: Haematologic examination findings.

Parameters	Result	Rerefence Range
WBC	16.47 10^{*9}/L	6-14.2
LYM	1.75 10^{*9}/L	1.48
MON	0.81 10^{*9}/L	0.2-1.5
NEU	13.75 10^{*9}/L	3-12
EOS	0.15 10^{*9}/L	0.1-1
BAS	0.01 10^{*9}/L	0-0.5
LY%	10.6%	12-30
MO%	4.9%	2-4
NE%	83.5%	62-87
EO%	0.9%	1-8
BA%	0%	0-3
RBC	1.48 10^{*12}/L	5.5-8.5
HGB	3.1 g/dl	12-18
HCT	10%	37-55
MCV	67 fl	60-77
MCH	20.9 pg	19.5-24.5
MCHC	30.9 g/dl	31-34
PLT	48 10^{*9}/L	200-500
MPV	16.0 fl	3.9-11.1

White blood cell (WBC), lymphocyte (LYM), neutrophile (NEU), monocyte (MON), eosinophil (EOS), red blood cell (RBC), hemoglobin (HGB), haematocrit (HCT), mean corpuscular volume (MCV), mean corpuscular hemoglobin concentration (MCHC), mean platelet volume (MPV), platelet count (PLT).

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In radiographic analysis, an alveolar pattern was determined in the right cranial pulmonary lobe was determined (Figure 3). Furthermore, the lam agglutination test was also positive (Figure 4). The owner of the dog did not accept the serum biochemical analysis of the dog due to financial issues. Based on these clinical and laboratory findings, the diagnosis of the case was suggested as hepatozoonosis. The dog was treated with 10 mg/kg of doxycycline (Monodoks 100 mg capsule, Deva, Turkey) orally for twenty-one days. Another supportive treatment is 0.5 mg/kg of methylprednisolone (Prednol 16 mg tablet, Mustafa Nevzat, Turkey) orally for three days because of its antiiflammatory properties. At the end of the treatment process, no reliable data related to the result of the treatment was obtained from the owner of the dog.

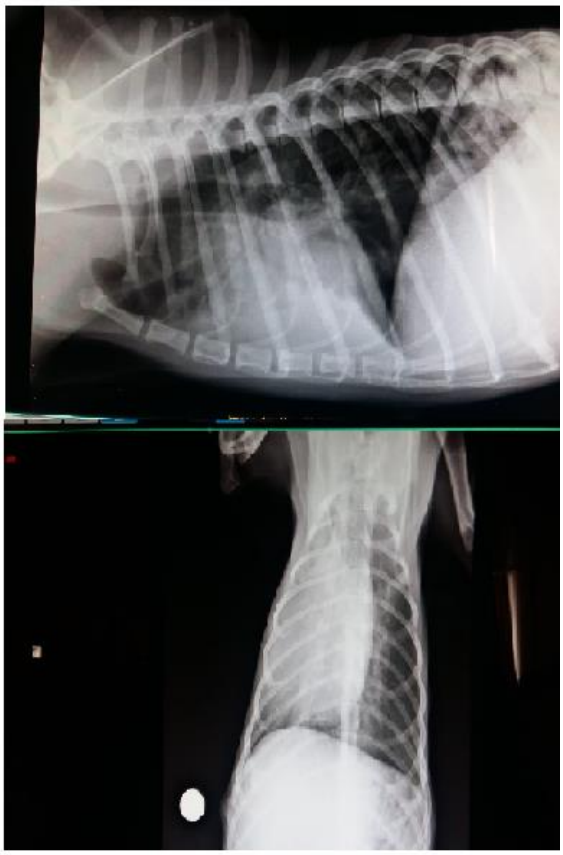

Figure 3: Laterolateral and ventrodorsal radiographies. Alveolar pattern (arrow) and silhouette sign (arrow head).

Figure 4: Positive result of lam agglutination test

Discussion

H. canis is common in Europe, Asia, Africa, and Latin America. However, *H. americanum* is named "The North American parasite" due to its specific distribution. Furthermore, gamonts of *H. canis* can be observed commonly in stained blood smears of infected dogs. In contrast, the gamonts of *H. americanum* are rarely found in stained blood smears (Banet and Allen, 2022). Due to there being no travel history of the patient and determining the *Hepatozoon spp.* gamonts commonly in stained blood smear, it can be suggested that *H. canis* can be responsible for the disease.

The present study determined anemia, slightly increased neutrophile and leukocyte count, thrombocytopenia, and decreased hemoglobin levels in hematological analysis. In parallel to these findings, the lam agglutination test was also positive due to inflammatory response. In the clinical examination weight loss, weakness, poor hair coat, and pale mucous membranes were determined. Clinical and hematological findings are congruent with previous studies (Paşa et al., 2009). In a previous study, gamonts of the *H. canis* were not detected very commonly in blood smear analysis as in our study (Carvajal et., 2012). However, in the present study, at least one gamont was observed nearly every microscopic scene. It can be suggested that the patient exhibitied a pronounced parasitic burden.

Furthermore, a silhouette sign and an alveolar sign were observed in unilateral lungs in radiographical analysis. However, no prominent dyspnea was observed during clinical examination. The exact etiology of the pathologies in the lung could not be determined. On the other hand, according to our literature search, this is the first case report in

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dogs with hepatozoonosis and concurrently pulmonary pathology.

Babesiosis, anaplasmosis, and ehrlichiosis are also commonly determined in dogs with hepatozoonosis(Tuna et al.,2020,). Unfortunately, the existence of these diseases was not eliminated in this case. So, it can be suggested that this is the main deficiency of this case report. On the other hand, none of the diseases stated before was not diagnosed with blood smear analysis. PCR analysis was not performed to determine the species of the parasite due to highly common gamonts of the parasite were observed. *H. canis* is not always commonly observed in stained blood smears. Furthermore, concurrent pulmonary radiographic signs have not been reported before in dogs with hepatozoonosis.

The high number of gamonts in each microscopic scene of the stained blood smears constitutes a significant aspect of the case report. It can be suggested, that this case report can be important for clinicians to recognize the gamonts of the parasite in stained blood smears.

Conflict of Interest

There is no conflict of interest.

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