CASE REPORT

Sokoto Journal of Veterinary Sciences

(P-ISSN 1595-093X: E-ISSN 2315-6201)

http://dx.doi.org/10.4314/sokjvs.v23i1.8

Herbert *et al.*/*Sokoto Journal of Veterinary Sciences*, **23**(1): 60 - 64.

Ehrlichia infection in a two-year-old Boerboel dog

DU Herbert[1], MU Ememe[2]*, CS Ukwueze[2] & UC Arinze[3]

1. *Veterinary Teaching Hospital, Michael Okpara University of Agriculture, Umudike, Abia State, Nigeria*
2. *Department of Veterinary Medicine, College of Veterinary Medicine, Michael Okpara University of Agriculture, Umudike, Abia State, Nigeria*
3. *Critters Veterinary Centre, Lekki, Lagos State, Nigeria*

*Correspondence: Tel.: +2348034947650; E-mail: maryeneme@yahoo.com

Publication History:
Received: 05-11-2024
Revised: 11-01-2025
Accepted: 15-01-2025

Abstract

This paper reports a case of *Ehrlichia* species infection in a Boerboel dog. The 2-year-old dog weighing 39 kg was presented on 4th September 2024 at Critters Veterinary Centre, Lekki, Lagos with lethargy, decreased appetite, and weight loss. Physical examination revealed pale ocular mucous membrane, poor skin rebound, sunken eyes, dry hair coat, ticks on the ears and emaciation. Clinical examination showed a temperature of 40.2°C, pulse rate and respiratory rate were 97 beats per minute and 39 cycles per minute, respectively. Haematological analysis revealed anaemia, thrombocytopenia, neutrophilia and monocytosis. Serum biochemical results revealed slightly elevated aspartate aminotransferase, alkaline phosphatase and gamma glutamyl-transferase levels. The total protein level was high due to an elevated globulin level. Thin blood smear microscopy and specific chromatographic *Ehrlichia canis* test showed infection with *Ehrlichia* spp. The dog was on the first day placed on 500 ml of 5% dextrose saline IV once for 4 hours, piroxicam was administered at 0.3mg/kg (0.015ml/kg) IV stat, multivitamin was also administered at 1ml/10kg IM stat. 10% oxytetracycline was given IV at 10mg/kg (1ml/10kg) for 5 days. The client was then given doxycycline capsules to administer to the dog orally at a dose of 10mg/kg (1 capsule/10kg) orally once daily for 28 days. Clinical improvement was observed 24 hours after the commencement of oxytetracycline therapy, with complete recovery by the end of treatment. Early diagnosis and effective treatment is very important in the management of ehrlichiosis in dogs, as relapse may occur if treatment is not followed carefully during the recommended timeframe.

Keywords: Anaemia, Boerboel, Chromatograph, Ehrlichiosis, Morulae

Introduction

Canine monocytic ehrlichiosis (CME) is a tick-borne infection caused by gram-negative, obligate intracellular bacteria of the genus *Ehrlichia* and of the family *Anaplasmataceae* (Foley, 2020). The disease is caused by several species of *Ehrlichia* including *Ehrlichia canis, E. chaffeensis* and *E. ewingii.* However, *E. canis* has been reported to be the most common cause of canine ehrlichiosis in Africa. It is transmitted by the brown dog tick, *Rhipicephalus sanguineus*, and it can also be transmitted to uninfected dogs through blood transfusion (Mylonakis & Theodorou, 2017).

E. canis affects various organs and systems and has three clinical manifestations, namely acute, subclinical, and chronic. In the acute form, the clinical symptoms in dogs are high fever, anorexia, lethargy, joint pain and stiffness, lymphadenomegaly,

thrombocytopenia, epistaxis, splenomegaly, petechial and ecchymotic skin haemorrhages, ophthalmic lesions and weight loss. In the subclinical phase, the animal may appear normal or exhibit only slight anaemia that can last for months or years. The chronic phase can be either mild or severe and characterized by weight loss, anaemia, neurological signs, bleeding, inflammation of the eye, fever, thrombocytopenia, splenomegaly, significant weakness, renal failure, oedema of the hind legs and death (Foley, 2020).

Diagnostic indicators suggestive of canine ehrlichiosis include clinical signs, haematological abnormalities, serum biochemical findings, microscopic, serological and molecular tests (Mylonakis & Theodorou, 2017). *E. canis* affects cells of the immune system, predominantly macrophages, and leukocytes developing a cytoplasmic membrane-bound cluster of bacteria named morulae (Ramos *et al*., 2024). Serologic tests such as indirect immunofluorescence assays (IFA), enzyme-linked immunosorbent assays (ELISA), and rapid immunochromatographic tests (e.g., Anigen Rapid *E. canis* Antibody Rapid Test Kit) are used to detect antibodies to *Ehrlichia* spp. antigens (Gaunt *et al.,* 2010).

The treatment of choice for canine ehrlichiosis is tetracyclines which is administered for two weeks and doxycycline which is administered for at least 28 days (Aziz *et al.,* 2022). Imidocarb dipropionate is given in case of concurrent infection with babesiosis (Foley, 2020). The best method of preventing canine ehrlichiosis is by controlling the tick vector (Aziz *et al.,* 2022). This paper reports a successful management and treatment of *Ehrlichia* infection in a 2-year-old Boerboel dog.

Case Presentation

Case history

A two-year-old Boerboel dog was presented at Critters Veterinary Centre, Lekki Lagos with the primary complaint of decreased appetite, reduced activity and weight loss. Physical examination revealed weight of 39 kg, pale ocular mucous membranes, poor skin rebound, sunken eyes, dry hair coat, ticks on the ears and emaciation. Clinical examination showed a temperature of 40.2°C, pulse rate and respiratory rate were 97 beats per minute and 39 cycles per minute, respectively.

Laboratory examination

Whole blood was collected from the cephalic vein and stored in an EDTA bottle for complete blood count (CBC), microscopy and rapid chromatographic test. Whole blood was also placed in sterile bottle without anticoagulant to harvest serum for biochemical test.

Complete blood cell count was done using the method described by Davies & Lewis (1991). Thin blood smear was made and stained with Giemsa stain. The slide was examined under a microscope at a 100X oil immersion. A rapid chromatographic test for *E. canis* using Zoetis–Vetscan Canine Ehrlichia Rapid Test® (Bioscint, Malta) was done using whole blood. This test is used for qualitative detection of *Ehrlichia canis* antibodies in canine whole blood, serum or plasma. The test kit has a letter of "T" and "C" as test and control lines on the surface of the device. A single red line on C indicates a negative result, while double lines on both C and T indicates a positive result.

Complete blood count revealed erythrocytopenia and low haemoglobin levels. Packed cell volume and the mean corpuscular volume (MCV) were low. The mean corpuscular haemoglobin was also, but close to normal range and mean corpuscular haemoglobin concentration was normal. There was thrombocytopenia. White blood cell count showed neutrophilia and monocytosis (Table 1).

Serum biochemical test result revealed slightly elevated aspartate aminotransferase (AST), alkaline phosphatase (ALP) and gamma glutamyl-transferase

Table 1: Haematological analysis of a case of canine monocytic ehrlichiosis in a 2- year-old Boerboel dog

Haematological Parameters	Observed Value	Normal Range
Haemoglobin (g/dL)	8.51	12.0 - 18.0
Erythrocyte count (10^{12}g/L)	4.41	5.50 - 8.50
Packed Cell Volume (%)	24.7	37 – 55
Mean corpuscular volume (fL)	56.0	60 – 77
Mean corpuscular haemoglobin (pg)	19.4	19.5 – 24.5
Mean corpuscular haemoglobin concentration (g/L)	34.6	32 – 36.0
Thrombocytes (10^9/L)	118	165 – 500
Leucocytes (10^9/L)	18.22	6.0 – 17
Basophil (10^9/L)	0.02	0 – 0.1
Eosinophil (10^9/L)	0.15	0.1 – 0.75
Neutrophil (10^9/L)	15.14	3 – 11.4
Lymphocytes (10^9/L)	1.02	1- 4.8
Monocytes (10^9/L)	1.99	0.15 – 1.35

(GGT) levels. The total serum protein level was high due to elevated globulin level. Total serum bilirubin and blood glucose levels were lower than the normal range (Table 2). Giemsa-stained smear showed morula stage of *Ehrlichia* spp. in the cytoplasm of monocyte (Plate I). A rapid chromatographic test for *E. canis* using the Anigen Rapid *E. canis* Antibody Rapid Test Kit was positive (Plate II).

Management and treatment

Based on the clinical signs, blood test, microscopy and rapid chromatographic test for *E. canis,* a diagnosis of ehrlichia infection was made. The dog was on the first day placed on 500 ml of 5% dextrose saline (Dana Pharm., Nigeria) IV once for 4 hours, piroxicam (Shandong Xier Kangtai Pharm., China) at 0.3mg/kg (0.015ml/kg) IV stat and multivitamin (Hebei Kexing Pharm., China) at 1ml/10kg IM stat. 10% oxytetracycline (Alfasan Pharm., Netherlands) was given IV at 10mg/kg (1ml/10kg) for 5 days. The dog was hospitalised for 5 days for proper feeding and monitoring. 24 hours following the first oxytetracycline therapy, the dog showed some positive response, with its appetite improved.

On the 5th day, the dog was discharged. The client was given doxycycline capsules (Advent Pharm., Australia) to administer to the dog orally at a dose of 10mg/kg (1 capsule/10kg) daily for 28 days.

The client was advised to return with the dog one month or after doxycycline therapy for repeat tests to ensure that the bacteria had completely cleared the bloodstream. The client did not return for the repeat blood test but reported that the dog had been healthy after treatment.

Discussion

The signs of fever, anorexia, lethargy, weight loss and reduced RBC counts, Hb, PCV and thrombocytopenia

Table 2: Biochemical analysis of a case of canine monocytic ehrlichiosis in a 2-year-old Boerboel dog

Biochemical Parameters	Observed value	Normal range
Alanine aminotransferase (u/L)	57	10 – 125
Aspartate aminotransferase (u/L)	59	8.9 – 50.0
Alkaline phosphatase (u/L)	226	23 – 212
Gamma glutamyl-transferase (u/L)	13	0 – 11
Total Bilirubin (µmol/L)	0.33	0.5 – 13
Urea (µmol/L)	5.9	2.5 – 8.3
Creatinine (µmol/L)	85.0	44.3 – 122
Protein (g/L)	92.6	54.0 – 75.0
Albumin (g/L)	36.1	25.0 – 41.0
Globulin (g/L)	56.5	25 – 45
Chloride (mmol/L)	119	110 – 124
Biocarbonate (mmol/L)	21	22 – 29
Potassium (mmol/L)	5,2	3.9 – 5.1
Sodium (mmol/L)	145	142 – 152
Glucose (mmol/L)	2.4	3.3 – 6.1

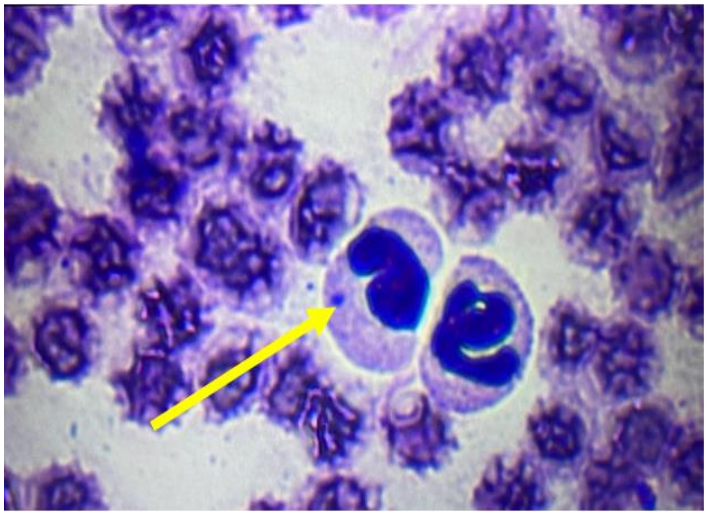

Plate I: *Ehrlichia canis* in the monocyte of a 2-year-old-Boerboel dog

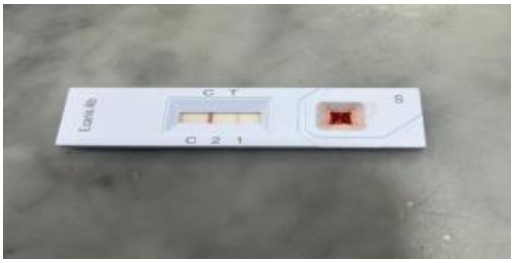

Plate II: A rapid test kit for the detection of *E. canis-specific* antibody

observed are consistent with the findings of Shrestha & Karmacharya (2016) and Gahalot *et al.* (2017). Thrombocytopenia observed could be due to the combined direct and indirect effect of *E. canis,* which has a direct effect on the life span of platelets and an indirect effect on bone marrow function that suppresses erythropoiesis activities (Ybañez *et al.,* 2016). Neutrophilia reported in this case was similarly reported by Gahalot *et al.* (2017). The neutrophilia and the presence of *E. canis* morula in the monocyte revealed the acute stage of the disease in the present case. This was also reported by Shrestha & Karmacharya (2016). One of the limitations of microscopy is that it is extremely insensitive in the chronic and subclinical phases of the infection.

The specific chromatographic test for *E. canis* helped to diagnose the infection. The band seen on the rapid test kit result well was light. This could be due to fewer antibodies. Antibody response may be delayed for several weeks; hence, serologic testing may not be a reliable diagnostic tool at the early phase of the disease (Shrestha & Karmacharya 2016).

Furthermore, the elevated liver function parameters can be attributed to an inflammatory response to the infection as evidenced by the increased AST, ALP, GGT and globulin levels (Mylonakis & Theodorou, 2017).

The hospitalization of the dog allowed for close monitoring, optimum care, and judicious administration of the medications, which contributed to the quick and sustained recovery achieved.

The antibiotics used (10% oxytetracycline IV, and subsequently doxycycline PO) were standard treatment options for canine ehrlichiosis as reported by Aziz *et al.* (2022). Piroxicam was administered to control the temperature, while multivitamin was administered to boost immunity, haematopoiesis, and to enhance the dog's appetite.

The dog's recovery 24 hours after the commencement of oxytetracycline therapy is in line with the findings of Gahalot *et al*. (2017) who reported a successful treatment of canine monocytic ehrlichiosis in a one-year-old German shepherd using the same treatment. Prolonged administration of the doxycycline capsule is to ensure the complete clearance of the parasite (Igarashi *et al.,* 2024). Aziz *et al.* (2022) reported that a reduction in the treatment duration disrupted the complete elimination of *E. canis* thereby resulting in the development of carriers.

In conclusion, this case report showed a successful management and treatment of Ehrlichia infection in a 2-year-old Boerboel dog. The clinical signs, haematological abnormalities, serum biochemical findings, microscopic examination and serological test helped in the diagnosis of the disease. Ehrlichiosis, although highly treatable, can also be a fatal disease if overlooked. Development of a career state and possibility of a relapse may occur if early diagnosis and recommended treatment are not instituted within the time frame.

Conflict of Interest

The authors declare that there is no conflict of interest.

References

Aziz MU, Hussain S, Song B, Ghauri HN, Zeb J & Sparagano OA (2022). Ehrlichiosis in dogs: A comprehensive review about the pathogen and its vectors with emphasis on South and East Asian Countries. *Veterinary sciences*, doi.10.3390/vetsci10010021.

Davies JV & Lewis SM (1991). *Practical Haematology*, seventh edition. London: Churchhill Livingstone. Pp 659-661.

Gahalot SC, Meena DS, Singh R, Singh YP, Mali MM, Bargurjar J, Jeph N & Meena S (2017). Therapeutic management of canine ehrlichiosis in a German shepherd bitch: A case report. *Research Journal* for *Veterinary Practitioners*, **5**(4): 37-39.

Gaunt SD, Beall MJ, Stillman BA, Lorentzen L, Diniz PPVP, Chandrashekar R & Breitschwerdt EB (2010). Experimental infection and co-infection of dogs with *Anaplasma platys* and *Ehrlichia canis*: Hematologic, serologic, and molecular findings. *Parasites & Vectors,* doi.10.1186/1756-3305-3-33.

Foley JE (2020). Ehrlichiosis, Anaplasmosis, and Related Infections in Animals. *MSD Veterinary Manual*. Merck & Co., Inc., Rahway, NJ, USA. https://www.msdvetmanual, retrieved 02-11-2024.

Igarashi H, Nagai N, Yamada Y, Ito T, Neo S, Gotokoshino Y, Kanai E, Aihara N, Takagi S, Kamiie J & Hisasue M A (2024). Canine case of *Ehrlichia canis* infection without a history of being in an endemic area in Japan. *Journal of Veterinary Medical Science*, **86**(4): 354–357.

Mylonakis M & Theodorou K (2017). Canine monocytic ehrlichiosis: An update on diagnosis and treatment. *Acta Veterinaria,* **67**(2): 299-317.

Ramos RMC, Vilela BB, de Oliveira LA, Mulini LISS, Almeida NZ, Aptekmann KP, de Oliveira LL & Barioni G (2024). Occurrence and haematological aspects of dogs with canine monocytic ehrlichiosis. *Brazilian Journal of Development*, **10** (2): e67337.

Shrestha A & Karmacharya R (2016). Ehrlichiosis in a dog: A case study. *International Journal of Veterinary Sciences and Animal Husbandry*, **1**(5): 20-23.

Ybañez AP, Ybañez RHD, Villavelez RR, Malingin HPF, Barrameda DNM, Naquila SV & Olimpos SMB (2016). Retrospective analyses of dogs found serologically positive for *Ehrlichia canis* in Cebu, Philippines from 2003 to 2014. *Veterinary World*, **9**(1): 43–47.