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CASE REPORT

Babesiosis in a -3-Month-old Nigerian Indigenous Male Puppy

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SUMMARY
Babesiosis is a protozoan disease caused by *Babesia* spp, which is an intra-erythrocytic parasite of domestic and wild animals. The parasite is mainly transmitted by infected ticks through bite and it is characterized by fever, paleness and icteric mucous membranes and emaciation. This paper reports case of babesiosis in a 3-month-old Nigerian indigenous male puppy at Veterinary Teaching Hospital, Ahmadu Bello University, Zaria. The relevant history, clinical signs and laboratory evaluations were recorded. The effects on some hematological parameters were studied and recorded. The dog was successfully transfused with 226 ml of blood and then treated with a single dose of 4% Diminazene aceturate at the dose rate of 4 mg/kg intramuscularly (I.M). Thereafter, the patient was monitored until fully recovered.

Keywords: Puppy, *Babesiosis*, Diagnosis, Blood transfusion and Treatment

INTRODUCTION

Babesia spp are tick-borne blood protozoan parasites that infect the erythrocytes of domestic and wild animals and humans. The distribution of canine babesiosis is worldwide and different species of *Babesia* have been described in dogs (Irwin, 2009; Solano-Gallego and Baneth, 2011). The clinical manifestations of the disease may vary with species, and strains, virulence, as well as other factors that determine the host's response to infection such as age, immune status, and the presence of concurrent infections (Jacobson, 2006; Irwin, 2009).

The disease onset is often acute with affected dogs suffering from fever and lethargy, and thereafter may display clinical manifestations of anemia, icterus and hemoglobinuria (Jacobson 2006; Irwin, 2009; Eichenberger *et al*., 2016). The parasite can be identified under the microscope by its morphologic appearance in the erythrocytes, where large forms are designated *Babesia canis*, whereas small forms are designated to be *Babesia gibsoni* (Schetters *et al*., 1997; Solano-Gallego and Baneth, 2011).

Several drugs and drug combinations have been reported to be effective against canine babesiosis (Irwin 2009, Solano-Gallego and Baneth, 2011; Beugnet and Moreau, 2015). A single intramuscular injection of Diminazene aceturate (Azidin®, Berenil®, Ganasag®) at a dose of 3.5

mg/kg IM once (Plumb, 2015) or 5 mg/kg (Birkenheuer *et al*., 1999; Taboada, 1998) or Imidocarb dipropionate (Imizol®, Carbesia®) with a labeled dose of is 6.6 mg/kg intramuscularly (IM) or subcutaneously (SC) with a repeated dose in 2 weeks as approved by the Food and Drug Administration (FDA) (Conrad et al., 1991 and Checa *et al*., 2017).

Supportive therapy such as intravenous fluids and blood transfusions are employed when necessary (Birkenheuer *et al*., 1999).

CASE REPORT

Case History

A 3-month-old Nigerian indigenous male puppy weighing 6 kg was presented to the Small Animal Clinic of the Veterinary Teaching Hospital, Ahmadu Bello University Zaria, with the complaints of general weakness and off feed. History revealed that the puppy was first noticed to be off-feed 3 days prior to presentation. The puppy was dewormed by the client two days earlier with a quarter of fenbendazole tablet (unknown concentration). The puppy had not received any vaccination.

RESULTS AND DISCUSSION

On clinical examination, the patient's vital parameters were:- temperature 39.6 ^{0}C, pulse rate 168 beats/minute and respiratory rate 32 cycles/minute. Other clinical findings were; bilateral muco-purulent ocular discharges, icteric ocular and oral mucous membranes, icteric skin discoloration around the inguinal region, pinna, and inter-digital spaces. Furthermore, increased capillary refill time (10 secs), bilaterally enlarged superficial lymph nodes (sub-mandibular, pre-scapular, and popliteal), 6% dehydration (dry muzzle and increased skin tenting), shallow breathing, lethargy, lateral recumbency (Plate 1) and yellowish-green urine obtained via cystocentesis (foamy upon vortex) were also observed. Based on the clinical signs observed, a tentative diagnosis of canine babesiosis was made. To further the diagnosis, blood samples were collected for hemo-parasite screening and a complete blood cell count. The collected urine sample was also sent for urinalysis.

Plate 1: Recumbent and lethargic puppy under blood transfusion

The hematological analysis revealed severe anemia (PCV-7 %) with marked polychromatic cells and anisocytosis. Leucocytosis due to neutrophilia was also observed (Table I). The urinalysis result revealed mild proteinuria and marked bilirubinuria. *Babesia* parasites +3 were seen on thin blood smear (Plate 2).

TABLE I: Haemogram of the patient on the first day of presentation

Parameters	Patient's Values	Reference values
RBC (10^{12}/L)	1.0	5.0-10.0
HB(g/dl)	2.3	12.0-18.0
PCV (%)	7.0	37-55
WBC (10^9/L)	18.4	6-17
NEUTROPHILS (10^9/L)	14.72	3.0-11.5
LYMPHOCYTES (10^9/L)	3.31	1.0-4.8
EOSINOPHILS (10^9/L)	0.36	0.1-1.25
TOTAL PROTEIN (g/dl)	5.6	5.4-7.7

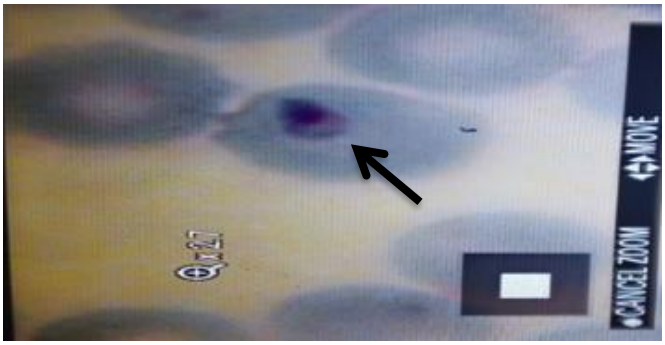

Plate 2: Microscopic view of the *Babesia* parasite (arrow) in the RBC on thin blood smear

TABLE II: Haemogram of the patient a day after Transfusion

Parameters	Patient's values	Reference values
RBC (10^{12}/L)	5.0	5.0-10.0
HB(g/dl)	10.6	12.0-18.0
PCV (%)	32	37-55
WBC (10^9/L)	15.1	6-17
NEUTROPHILS (10^9/L)	11.32	3.0-11.5
LYMPHOCYTES (10^9/L)	3.47	1.0-4.8
EOSINOPHILS (10^9/L)	0.30	0.1-1.25

A decision to conduct blood transfusion was taken because of the severe anaemia. For this purpose, another Nigerian indigenous dog was sourced to serve as the donor dog. After the dog was physically examined and ascertained to be clinically healthy blood and fecal samples were collected to screen for hemoparasites and gastrointestinal parasites. The dog tested negative for parasites for both of the samples screened. Moreover, the PCV of the dog was also determined and ascertained to be adequate for blood donation. The volume of blood required for the transfusion was calculated based on the formula given by Sackmen (1998):

$$\text{Blood volume to be infused (ml)} = \frac{\text{Body weight (kg)} \times 90 \times (\text{Required PCV} - \text{Recipient's PCV})}{\text{(Donor's PCV)}}$$

Consequently, 226 ml of blood was collected through the jugular vein of the donor dog in a blood bag and transfused to the puppy via the cephalic vein with the intention of raising its PCV to 18 %. During the course of blood transfusion to the patient, 4 % Diminazene diaceturate injection (4 mg/kg, I.M, once) was given. In addition, Vitamin B-complex injection (0.1 ml/kg, I.M) for five days was also given.

The onset of canine babesiosis is often acute with affected dogs suffering from fever, lethargy, and thereafter may display clinical manifestations of anemia, icterus and hemoglobinuria (Jacobson 2006; Irwin, 2009; Eichenberger *et al.*, 2016).

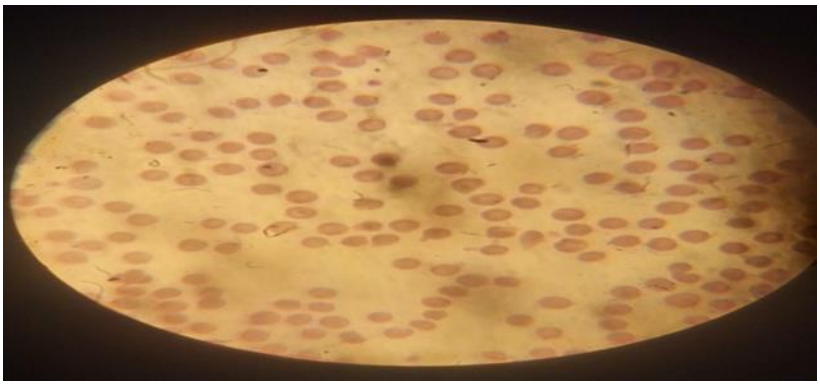

Plate 3: Microscopic view of the RBC two days after treatment

TABLE III: Haemogram of the patient a day after Transfusion

Parameters	Patient's Value	Reference values
RBC (10^{12}/L)	5.0	5.0-10.0
HB(g/dl)	10.6	12.0-18.0
PCV (%)	32	37-55
WBC (10^9/L)	15.1	6-17
NEUTROPHILS (10^9/L)	11.32	3.0-11.5
LYMPHOCYTES (10^9/L)	3.47	1.0-4.8
EOSINOPHILS (10^9/L)	0.30	0.1-1.25

Interpretation: Anisocytosis

TABLE IV: Haemogram of the patient on day 4 of re-presentation

Parameters	Patient's Values	Reference values
RBC (10^{12}/L)	4.7	5.0-10.0
HB(g/dl)	10.3	2.0-18.0
PCV (%)	31	37-55
WBC (10^9/L)	13.5	6-17
NEUTROPHILS (10^9/L)	8.77	3.0-11.5
LYMPHOCYTES (10^9/L)	3.10	1.0-4.8
EOSINOPHILS (10^9/L)	1.08	0.1-1.25

Interpretation: Anaemia.

The disease diagnosed here was acute given the onset (3 days) of clinical sign of anorexia as reported by the client. The parasitized erythrocytes were hemolysed at a very fast rate and hence the paleness of the mucous membranes and the icterus as a result of buildup of the conjugated bilirubin in the plasma. This was reported by Abdullahi *et al*., (1990) in Nigerian indigenous dogs naturally infected with *Babesia* spp.

TABLE V: Haemogram of the patient on day 5 of re- presentation

Parameters	Patient's values	Reference values
RBC (10^{12}/L)	4.0	5.0-10.0
HB(g/dl)	8.6	12.0-18.0
PCV (%)	26	37-55
WBC (10^9/L)	10.0	6-17
NEUTROPHILS (10^9/L)	6.1	3.0-11.5
LYMPHOCYTES (10^9/L)	3.7	1.0-4.8
EOSINOPHILS (10^9/L)	0.1	0 .1-1.25

Interpretation: Normal leukogram with moderate anemia.

Similar observation was also reported by Cunha *et al*., (2011) and Kanwarpal *et al*., (2020). The low PCV and bilirubinuria seen in the hemogram and the urinalysis result further confirmed the anemia and icterus respectively. Marked polychromatic cells (cells of different staining characteristics) and anisocytosis (cells of different sizes) observed were suggestive of a significant bone marrow response.

Supportive therapy such as intravenous fluids and blood transfusions had been advocated during acute babesiosis (Birkenheuer *et al.*, 1999). The 7 % packed cell volume recorded

upon the first presentation of the puppy was too low that blood transfusion was indispensable. Moreover, Kanwarpal *et al*., (2020) reported that blood transfusion had remarkably improved the prognosis of the disease in a Labrador dog. Twenty four hours post transfusion the PCV increased to 32 % (Table III). However, subsequent sampling indicated a progressive decrease in the PCV which could probably be due to continuous clearance of the parasitized RBC from circulation which is expected to affect the overall PCV of the patient.

Babesia canis treatment with Diminazene aceturate only or in combination with Imidocarb dipropionate had been demonstrated to be an effective treatment options (Beugnet *et al.*, 2014) However, there use are associated with some complications such as pain at the injection site, hepato-renal impairment but in this case, none of such was seen.

CONCLUSION AND RECOMMENDATION

The role of blood transfusion in canine babesiosis has proved to be vital and possibly the game changer in determining the prognosis of this case. We therefore, recommend that the decision to undertake blood transfusion in cases of babesiosis presenting with a very low PCV should not be delayed as that is critical in determining the prognosis of the disease.

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