CLINICAL MANAGEMENT OF ACUTE KIDNEY INJURY IN DOGS WITH BABESIOSIS: A CASE REPORT

ABSTRACT

One two-year-old Indian local dog was presented with ahistory of low appetite, urinary incontinence, hind leg weakness for last 3 days. Upon physical inspection, notable findings included high rise of temperature (104.1°F), dehydration, pale mucous membranes, anuria, recumbency and severe debilitation. RBC count, Hb level were lowered. The animal showed high level of serum creatinine, blood urea nitrogen and thrombocytopenia. Based on blood smear examination and haematology, the case was diagnosed as canine babesiosis with acute kidney injury. The case was successfully treated with combined therapy of Diminazene aceturate and Doxycycline supplemented with renal support.

Keywords: Canine babesiosis, Acute Kidney Injury, Diminazene, Doxyclycline

1. INTRODUCTION

Canine babesiosis is a clinically significant emerging tick-borne disease of dog and other wild canids in India as well as around the world with substantial morbidity and mortalitycaused by intra-erythrocytic protozoan haemoparasites of genus *Babesia*, mainly comprising of two species, distinguished morphologically based on size, *viz*. *B. canis* (larger counterpart) and *B. gibsoni* (smaller counterpart) [1, 2] with prevalence rate of 33.17 to 56.75 % in Assam [3, 4]. Clinically canine babesiosis may occur in different forms as subclinical, per-acute, acute and chronic which may also act as potential carriers with the exhibition of a wide range of inconsistent clinical findings characterised by fever, depression, pallor, jaundice, lymphadenopathy, splenomegaly, weakness and collapse associated with intravascular and extravascular haemolysis, hypoxic injury, systemic inflammation, thrombocytopenia and pigmenturia [5]. Babesiosis may also be classified into un-complicated or complicated from, especially due to haemolysis alone or presence of systemic inflammatory response syndrome and multiple organ dysfunction syndrome (MODS)[6, 7, 8] which

includes acute kidney injury as one of the most frequent complications of babesiosis in dogs [9]. Elevated serum urea in babesiosis is an unreliable marker of renal insufficiency as there is a disproportionate increase in urea in contrast to creatinine. This may be triggered by the catabolism of lysed erythrocytes. Based on continued assessment of urine volume, urinalysis, and azotaemia, renal failure is usually diagnosed [10].

2. PRESENTATION OF CASE

One two-year-old local Indian dog breed was presented with a history of loss of appetite, lack of urination, weakness in hind legs and swelling in the hock joint for the past three days. During the physical examination, there was high rise of temperature (104.1°F), dehydration, pale mucous membranes, anuria and severe debilitated. Blood samples (whole blood) were collected for the detection ofheamoprotozoan organisms and serum was separated for biochemical analysis. On blood examination, *Babesia gibsoni* was detected. The affected dog was found to have low Hb level, low Hct value and low RBC count which indicated anaemia in the body. There was mild thrombocytopenia in the affected dog. The dog had elevated serum creatinine and blood urea nitrogen. Based on the clinical findings and blood smear analysis, the case was diagnosed as canine babesiosis with acute kidney injury and accordingly the treatment had been initiated.

3.DISCUSSION

Initially, the therapy was commenced with Ringer's lactate infusion for fluid replacement, alongside pantoprazole administered1 mg per kg body weight (b. w.) OD IV for 7 days. Ondansetron was administered 0.1 mg per kg b. w. IV BID for 5 days, supplemented by Vitamin B complex (Tribivet Inj., Intas) at a dosage of 1 ml per 8 kg b.w. IV OD for 7 days. Ceftriaxone was injected at 25 mg per kg b. w. IV OD for 7 daysto control the secondary bacterial infection. Meloxicam along with paracetamol (Melonex plus inj., Intas) was given 0.5 mg per kg b. w. IM OD for three days. After confirmation of canine babesiosis and based on haematology, the animal was injected with two shots of antiprotozoal drug,Diminazene aceturate (Nilbery Inj., Intas), 3.5 mg per kg b.w. deep IM at 48 hours interval. One shot of Chlorpheniramine maleate (Anistamin Inj., Intas) was administered 0.2 mg per kg b.w. IM prior to Nibery inj. Diminazene aceturate is an aromatic diamidine and its mechanism of action on Babesia spp. is not still completely understood. It may disrupt the DNA synthesis and aerobic glycolysis of the parasite [15].Prednisolon was injected at 1.1 mg per kg b.w. IM OD for 3 days. Frusemide (Lasix Inj., Sanofi)was administered 2 mg per kg. b.w. IM for 3 days. Doxycycline (Doxypet 100, Savavet) was given orally10 mg per kg b.w. OD for 14 days. Daily supplementation of hematinic,Sharkoferol pet was given orally 5 gram per day for 21 days; Renodis capsule at 1 cap. orally OD for 30 days. Owner was asked to provide good nutrition to the animal.After 7 days of treatment, the animal showed good response and started taking its normal activities. Blood samples were collected on 28th day of treatment and subjected for haematological analysis (Table 1). The animal showed negative for parasite on peripheral blood smear examination.

Table 1: Various blood parameters of dog affected with Babesiosis

Blood parameters	Before onset of Treatment	28th day of treatment
Hb (g/dl)	9.1	11.2
RBC (M/mm^3)	5.0	5.4
MCV (fl)	50.8	51.2
Hct (%)	25.6	27.6
Platelets (M/mm^3)	115	121
Serum Creatinine (mg/dl)	3.5	2.0
Blood Urea Nitrogen(mg/dl)	50	30
Aspartate aminotransferase (U/L)	53	23
ALT (U/L)	62	48
Albumin (g/dl)	2.4	2.7

While babesiosis mainly affects erythrocyte destruction, it can also lead to multiple organ dysfunction syndrome. Acute kidney injury (AKI) is an uncommon complication of babesiosis and typically manifests as anuria or oliguria despite sufficient rehydration [8]. High blood urea nitrogen along with high level of serum creatinine strongly indicate reduced renal perfusion which may be due to decreased blood pressure or hypovolemia. A recent finding demonstrated the frequent occurrence of hypotension in canine babesiosis and its intensity increased with increased disease severity [10]. However, elevated creatinine levels might serve as a valuable marker for renal insufficiency as demonstrated by some investigations indicating that high level of serum creatinine are associated with increased risk of mortality in canine babesiosis [11]. In the present case study, there was low level of Hb which may be due to intra vascular haemolysis in RBC [12]. This is one common cause of AKI in the dog which potentially can cause ARF in babesiosis [13]. Although the current treatment protocol often improves the clinical symptoms of the infection, recrudescence may still occur in immunocompromised dogs as the organisms are seldom eliminated[14]. The most effective way to prevent reoccurrence of canine babesiosis is to control the tick infestation in the animal body.as it requires at least 48 hours before babesia transmission occurs.

4. CONCLUSION

The current case study demonstrated that a dual treatment approach comprising Diminazene aceturate @ 3.5 mg/kg and Doxycycline @ 10 mg/kg, supplemented with renal supportand good nutrition, effectively manages canine babesiosis with acute kidney injury without any observed adverse effects.

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COMPETING INTERESTS

Authors declarethat there are nocompeting interests regarding this work.

REFERENCES

1. Boozer AL, Macintire DK. Canine babesiosis. Vet Clin N Am Small Animal Pract. 2003; 33:885–904.

2. Zahler M, Rinder H, Zweygarth E, Fukata T, Maede Y, Schein E, Gothe R. Babesia gibsoni of dogs from North America and Asia belong to different species. Parasitol. 2000; 120:365–369.
3. Bordoloi G, Boro PK, Sharma M, Khuman LS, Kalita MK, Khargharia S, Boruah K, Baruah A, Patowary P. Prevalence of canine babesiosis in Lakhimpur and Dhemaji districts of Assam and adjoining areas of Eastern Himalayan foothills in Arunachal Pradesh, India. Pharma Innovation. 2022; SP-11(2): 500-502
4. Laha R, Bhattacharjee K, Sarmah PC, Das M, Goswami A, Sarma D, Sen A. Babesia infection in naturally exposed pet dogs from a north- eastern state (Assam) of India: detection by microscopy and polymerase chain reaction. J Parasit Dis. 2014; 38(4):389-393.
5. Irwin PJ. Canine babesiosis: from molecular taxonomy to control. Parasit Vectors. 2009; 2 (supplement 1, article S4) doi: 10.1186/1756-3305-2-S1-S4
6. Sivajothi S, Sudhakara Reddy B, Rayulu VC, Venkatasivakumar R. Babesiosis in dogs: A report of two different cases. Adv Appl Sc Res. 2014; 5(3):276-279.
7. Welzl C, Leisewitz AL, Jacobson LS, Vaughanscott T, Myburgh E. J S Afr Vet Assoc. 2001; 72:158–162.
8. Jacobson LS, Clark I. J S Afr Vet Assoc. 1994; 65: 134–145.
9. Winiarczyk D, Michalak K, Adaszek L, Winiarczyk M, Winiarczyk S. Urinary proteome of dogs with kidney injury during babesiosis. BMC Vet Res. 2019; 15: 439.
10. Lobetti RG, Jacobson LS. Renal involvement in dogs with babesiosis. J S Afr Vet Assoc. 2001; 72(1): 23-28.
11. Van Zyl M. Prediction of survival in hospitalised cases of canine babesiosis. M. Med. Vet thesis, University of Pretoria. 1995.
12. Venkatesakumar E, Kumar V, Ramprabhu R. Diagnosis and Management of Concurrent Ehrlichiosis and Babesiosis in a Dog. Intas Polivet. 2018;19(2):267-268.
13. Pages JP. Epidemiologic et pathogenic de la babesiose du chein. Proceedings, Premieres Recontres veterinaries Internationales du Limousin. 1992; 1-8.
14. Irwin PJ. Vet Clin Small Anim. 2010; 40: 1141–1156.
15. Plumb D.C. Plumb´s Veterinary Drug Handbook. 7th ed. PharmaVet Inc.; New York, NY, USA: 2011. pp. 1191–1195, 1839–1843.