

Case Study

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Therapeutic Management of *Babesia gibsoni* Induced Acute Kidney Injury in a Rottweiler Dog: A Case Report

P. A. Enbavelan*, A. Kumaravel, N. Muniyappan and S. Dhivya

Veterinary University Training and Research Centre, Collectorate campus, Krishnagiri, India

*Corresponding author

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A female Rottweiler aged 8 months was presented with the history of pyrexia, anorexia, lethargy and Epitaxis to the GP pet clinic in Dharmapuri. Upon clinical examination, animal had high body temperature (40.1°), congested mucous membrane and lymphadenopathy. On hematology showed anemia and the presence of piroplasms of *B.gibsoni* (++) and in serum biochemistry revels increased BUN, creatinine and phosphorous values indicated that acute renal failure. Drug of choice Imidocarb at 6.6mg/kg body weight is given intramuscularly along with fluids is given for correcting acid – base and electrolytes. Triple therapy was initiated with Clindamycin @ 25mg/kg body weight, Metronidazole @15mg/kg by orally for twice daily and Doxycycline @ 10mg/kg once in a day for 14 days. On the 15th day the animal recovered completely and peripheral blood smear has negative for the parasitic infection. The present study was carried out to evaluate the efficacy of Triple therapy in internal infection of *Babesia gibsoni* in dog.

Introduction

Canine babesiosis is a complex disease which may cause dysfunction of more than one vital organs of body, known as multi organ dysfunction syndrome (MODS). It is a tick-borne, protozoal, haemoparasitic disease that can cause varying degrees of haemolytic anaemia, splenomegaly, thrombocytopenia and fever. There are two hosts for the transmission of *Babesia* spp., viz. Invertebrate (tick) and vertebrate host. Canine Babesiosis is one of the most important life threatening tick haemopprotozoan diseases of dogs caused by intraerythrocytic protozoan parasite of the

genus *Babesia* reported worldwide. *Babesia canis* and *Babesia gibsoni* are the two organisms commonly known to infect the dogs are transmitted by ixodid tick vectors (Sunitha *et al.*, 2011). *B. Canis*, the larger organism (4 to 5 µm) is more common in the United States. *B.gibsoni* the smaller one (1 – 5 µm) has been recognized as an important pathogen that affects dogs in the Middle East, Africa, Asia, Europe, and many areas of the United States (Taboada and Merchant, 1991). A wide variation of clinical signs like anorexia, lethargy, haemolytic anaemia, icterus, vomiting and marked loss of body condition was reported in canine Babesiosis

(Ettinger and Feldman 2005) along with clinicopathologic abnormalities like ascites, haemoglobinuria, disturbances, azotemia and elevation in the levels of liver enzymes (Irwin, 2010). AKI is an uncommon complication of babesiosis and typically presents as anuria or oliguria despite adequate hydration. Renal changes in babesiosis have also been attributed to hemoglobinuria and referred to as hemoglobinuric nephropathy. One study, however, showed that hemoglobinuria, of the magnitude seen in canine babesiosis, did not induce a significant nephropathy, regardless of the presence of concomitant anemia. The study also showed that the glomerular filtration rate (GFR) was reduced in dogs that were rendered as anemic as dogs with severe babesiosis and this might then be one mechanism of kidney injury (Lobetti RG., *et al.*, 1996).

Lactate has been established as a prognosticator in that mean lactate in non-survivors (145 mg/dL) was higher than in survivors (13.8 mg/dL). Pre-treatment hyperlactatemia (>45 mg/dL) and subsequent serial lactate concentrations that failed to return to normal reference range (persistently >40 mg/dL) indicated a poor prognosis (Nel M.*et al.*, 2004).

In *Babesia*-infected dogs, intravenous fluid therapy is required for patients in shock, with signs of renal disease, clinically dehydrated patients and dogs with intravascular haemolysis and haemoglobinuria. Usually intravenous crystalloid fluid is indicated with correction of electrolyte and acid-base abnormalities. It is important to maintain blood volume and adequate end-organ perfusion diuresis and prevention of red blood cell sludging in capillaries (Ayoob AL. *et al.*, 2010)

A few drugs and drug combinations are used in the treatment of Canine Babesiosis often

without complete parasite elimination and the dog usually become chronic carriers or present with recurrent episodes of acute infection (Baneth, 2018). Several drugs and drug combinations have been reported to be effective against Canine Babesiosis (Beugnet and Moreau, 2015) borne.

Case history

A Female 8 months old Rottweiler dog was presented with the history of pyrexia, anorexia, lethargy, vomiting, and epiphaxis. The dog was treated locally with Oxytetracycline and Diminazene acetate without success. On clinical examination the animal had high temperature (40.1°C) congested mucous membrane with lymphadenopathy. The whole blood was collected in EDTA and clot activator for routine haematology and serum biochemical analysis. A thin peripheral blood smear revealed the presence of annular and signet ring shaped piroplasms in red blood cells indicating that the animal is infected with *B.gibsoni*. The blood picture showed anaemia changes like anisocytosis, poikilocytosis, polychromasia, nucleated RBCs and neutrophilia with left shift due to marked systemic inflammatory response, the case was diagnosed as canine babesia due to *B.gibsoni* infection.

Results and Discussion

The typical clinical sign observed in canine Babesia is haemolytic anaemia as parasitemia results in increased osmotic fragility of erythrocytes and serum haemolytic factors causing haemolysis (Jacobson and Clark 1994). Clinical signs of canine babesia include fever, anorexia, depression, vomiting, lethargy, pale mucous membrane, and dyspnoea (Irwin, 2010), which coincide with our case. The dog was treated with Oxytetracycline @ 10mg, Diminazene

aceturate @ 3.5mg/kg with supportive treatment for 5 days without success. On peripheral blood smear examination the dog remains positive for *B.gibsoni*. Although doses of Diminazene aceturate 3.5 to 5 mg/kg are often effective in *B. canis* infections, doses of 7.5 to 10 mg/kg are recommended in treating *B. gibsoni* infections (Taboada, 1998). The drug binds to and inhibits parasite DNA synthesis. The most common side effect is pain at the injection site. Serious complications are rare (<0.1%) and include ataxia, seizures, and death (Brosey BP, 2003). Hence high dose rate of drug may chance to risk to animals. Then the dog was treated with drug of choice as Imidocarb dipropionate @6.6 mg/kg given intramuscularly. Imidocarb is the only agent licensed for treating babesiosis in the United States and has direct action against the parasite DNA that causes unwinding and denaturation (Wozniak EJ, 1997).

The animal is having acute kidney injury is managed with Amoxicillin Cloxacillin @ 10mg/kg intravenously, Ringer's Lactate 10ml/kg i/v, Ondansetron 0.2mg/kg i/v, Pantaprazole 1mg/kg i/v for 5 days. AKI is an uncommon complication of babesiosis and typically presents as anuria or oliguria despite adequate hydration. Renal changes in babesiosis have also been attributed to hemoglobinuria and referred to as hemoglobinuric nephropathy. The study also showed that the glomerular filtration rate (GFR) was reduced in dogs that were rendered as anemic as dogs with severe babesiosis and this might then be one mechanism of kidney injury (Lobetti RG. et al., 1996). Sodium bicarbonate 8ml in i/v as single bolus intravenously. Fluid therapy is required for patients in shock, old dogs with history of renal disease, clinically dehydrated patients and dogs with intravascular haemolysis and haemoglobinuria. It is important to maintain blood volume and

adequate end-organ perfusion diuresis and prevention of red blood cell sludging in capillaries(Ayoob AL, 2010), Intravenous dextrose-25% provides sufficient energy to hepatic cells which acts as the energy of Liver. Azotaemia is a peculiar character indicating acute renal damage which was evident by abnormally high blood urea nitrogen (BUN) and creatinine (Jacobson et al., 2000).

Fluid therapy on the basis of serum electrolyte balance and diuretic action of frusemide in combination play a major role in establishing the glomerular filtration rate thus improve the renal function and Iron sucrose 2ml diluted and administered intravenously for maintaining the iron containing haemoglobin concentration. Ivermectin injection @ 200mcg for eliminating the ticks on the animals for further reoccurring the disease.

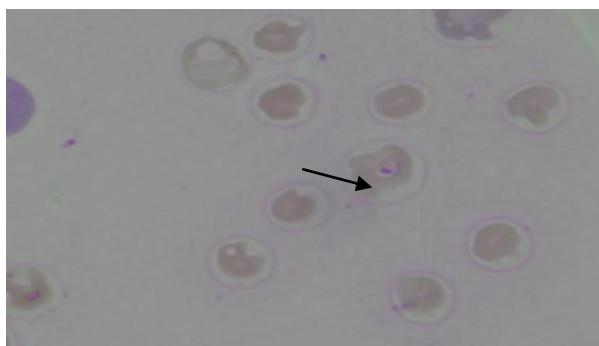
Since, the blood smear examination revealed *B.gibsoni* combined therapy of Clindamycin 25mg/kg, Metronidazole @ 15mg/kg twice daily and Doxycycline @10mg/kg once daily for 15 days along with hematinic and liver tonic. This combination works well for this case the animal recovered uneventfully. Combination therapy of clindamycin (CLDM), metronidazole (MNZ) and doxycycline (DOXY) is an efficacious alternative treatment strategy for *B.gibsoni* infection (Nandini MK, et al., 2016). However, this treatment takes a relatively long time to show its therapeutic effect (Suzuki K, et al., 2007). In this study also the effect of therapeutic is similar. After the successfully treatment the peripheral blood smear was negative for the parasitic infection. Haematological values evaluated after 30 days significantly increased values in PCV - 37, Hb 14.1g/dl, RBC 5.63 cumm/cells and platelets 3lakhs and Serum biochemical analysis reveals that decreased values in BUN 28.7 mg/dl, Creatinine 1.94 mg/dl.

Table.1 Haematology values

Parameters	Observed values
Haemoglobin (g/dl)	10.9
PCV %	27.7 
RBC ($\times 10^6$ μ /ml)	4.36 
WBC($\times 10^3$ μ /ml)	27.9
Neutrophils	68
Lymphocytes	24
Monocytes	6
Eosinophils	2

Table.2 Serum Biochemistry values

Parameters	Observed values
BUN (mg/dl)	140.0 
Creatinine (mg/dl)	7.55 
ALP (IU/L)	551
Phosphorous (mg/dl)	15 
Total Protein (g/dl)	4.48 
Albumin (g/dl)	1.93 
LDH (mg/dl)	32.1 

Fig.1 Blood smear 100 X, Leishman-Giemsa stain

(B.gibsoni – piroplasms)

In conclusion the spectrum of Babesia pathogens that infect dogs is gradually being elucidated with the aid of new molecular techniques and meticulous clinical investigation. Species of Babesia that cannot be distinguished morphologically cause diverse diseases and are transmitted by different vector ticks. Treatment for canine babesiosis consists of three components:

Treatment to eliminate the parasite.

Supportive care for the complications and metabolic derangements.

Blood transfusions to treat severe anaemia.

Above three steps of treatment protocol has been recommended through the recent

studies. By this approach the disease has been cured almost to the extent of 100% effectively. Hence this treatment protocol has been very effective in eliminating the disease. Babesiosis when diagnosed makes the veterinarian biased towards *B.canis* and corresponding treatment procedure curing the disease symptoms but surprisingly *B.gibsoni* has been prime cause for the onset of disease this concept is many times given a back seat by practicing veterinarian and hence the treatment procedures has not been effective but the protocol recommended in this article it followed correctly will create a perfect cure for disease caused by *B.gibsoni*.

This article recommended triple therapy with renal restoration therapy for quick recovery of the animal from the disease which is very common in dogs. Hence it would be a boon to canine practitioner in the arena of treatment to *B.gibsoni* which is proved to be more disaster than *B.canis* which disease indelible imprint in the mind of canine practitioners.

References

Ayoob AL, Hackner SG, Prittie J. Clinical management of canine babesiosis. Journal of veterinary emergency and critical care (San Antonio). 2010;20:77-89

Baneth G. 2018. Antiprotozoal treatment of canine babesiosis. Vet Parasitol. 254:58-63

Beugnet, F., Moreau, Y., 2015. Babesiosis. Rev. Sci. Tech. 34, 627–639

Brosey BP: *Babesia gibsoni*: A clinical perspective from Southeast Asia. Proc 21st ACVIM:720-721, 2003.

Ettinger SJ, Feldman EC. Text book of veterinary internal medicine. 6. Missouri: W.B. Saunders Company; 2005. pp. 643–644

Irwin, P.J. 2010. Canine babesiosis. Vet. Clin. North Am. Small Anim. Pract. 40: 1141-1156.

Jacobson, L.S., Lobetti, R.G. and Waughan-Scott, T., 2000. Blood pressure changes in dogs with babesiosis. J. S. Afr. Vet. Assoc., 71: 14–20

Jacobson, L.S. and I.A. Clark, 1994. The pathophysiology of canine babesiosis: New approaches to an old puzzle. J. S. Afr. Vet. Assoc., 65: 134-145.

Lobetti RG, Reyers F. Met-haemoglobinuria in naturally occurring *B.canis* infection. J S Afr Vet Assoc. 1996;67(2):88–90.

Nandini MK, Vishwakarma P, Kamran CA. New therapeutic protocol for canine babesiosis: A case report. Journal of Dairy, Veterinary & Animal Research. 2016;3(3):112-113.DOI:10.15406/jdvar.2016.03.00082

Nel M, Lobetti RG, Keller N, Thompson PN. Prognostic value of blood lactate, blood glucose, and hematocrit in canine babesiosis. J Vet Intern Med. 2004;18(4):471–476

Sunitha Karunakaran, U. N. Pillai, H. P. Sasidharan. 2011. *Babesia gibsoni* infection in a German Shepherd dog. Vet. World. 4(6): 269-270.

Suzuki K, Wakabayashi H, Takahashi M, et al. A possible treatment strategy and clinical factors to estimate the treatment response in *Babesia gibsoni* infection. The Journal of Veterinary Medical Science. 2007;69(5):563-568

Taboada J, Merchant SR. Babesiosis of companion animals and man. Veterinary Clinics of North America: Small Animal Practice. 1991;21:103-123

Taboada J: Babesiosis, in Greene CE (ed): *Infectious Diseases of the Dog and Cat*. Philadelphia, WB Saunders, 1998, pp 473-481

Wozniak EJ, Barr BC, Thomford JW, et al: Clinical, anatomic, and Immunopathologic characterization of *Babesia gibsoni* infection in the domestic dog (*Canis Familiaris*). The Journal of Parasitology 1997;83(4):692-699.

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