The Pharma Innovation Journal 2017; 6(11): 632-634

www.ThePharmaJournal.com

The Pharma Innovation

ISSN (E): 2277- 7695
ISSN (P): 2349-8242
NAAS Rating 2017: 5.03
TPI 2017; 6(11): 632-634

www.thepharmajournal.com
Received: 19-09-2017
Accepted: 20-10-2017

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Hemato biochemical alterations and therapeutic management of babesiosis in a Pit bull Dog: A case study

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Abstract
Canine babesiosis is clinically significant haemoprotozoan infection and is typically characterized by hemolytic anemia, thrombocytopenia, fever, and splenomegaly. An eight month old male Pitbull dog was presented to the Sanjay Gandhi Animal Care Centre Rajouri garden, New Delhi, India with a history of decreased feed intake, dullness, and lethargy since one week. Clinical examination revealed pyrexia (105.7°F), tachypnea, and pale mucous membrane. Haematology revealed anaemia (Hb- 8.11 g/dl), thrombocytopenia (Platelet count- 105 thou/mm^3) and neutrophilia (77 %), *B. gibsoni* (+++) was evidenced in blood smear. Treatment was initiated with Metronidazole @ 15mg/kg IV, Ringer lactate 150 ml IV, Rantidine (Ranloc) 0.7 ml IM, Meloxicam (Melonex) 0.6 ml IV on the day of presentation to hospital, followed with prescribed combination therapy of Doxycycline @ 5 mg/kg PO q 12h, Metronidazole @ 15 mg/kg PO q 12h, Clindamycin @ 25 mg/kg PO q 12h for 10 days and Eupotorium Q 200 3 drops TID PO. There were no adverse reactions and the dog showed clinical and haematological improvement from day 5 of the treatment and recovered completely by the end of therapeutic protocol.

Keywords: *Babesia gibsoni*, clindamycin, doxycycline, eupotorium Q, metronidazole, hematology

1. Introduction
Canine Babesiosis is an important disease of domestic dogs and has been attributed to infection with either *Babesia canis* or *B. gibsoni*. Canine babesiosis is a clinically significant and geographically widespread haemoprotozoan disease of domesticated dogs and wild canids [1]. The large *Babesia canis* and the small *Babesia gibsoni* are two organisms commonly known to infect the dogs. Both organisms have *Ixodid* tick vectors and are found throughout Asia, Africa, Europe, the Middle East, and North America, with *B. canis* being more prevalent [2]. A typical intra erythrocytic piroplasma is pear-shaped and often occurs in pairs [3]. The disease can be clinically classified into uncomplicated and complicated forms. Uncomplicated babesiosis has been suggested to be a consequence of haemolysis while complicated canine babesiosis has been suggested to be a consequence of the development of systemic inflammatory response syndrome (SIRS) and multiple organ dysfunction syndrome (MODS) [4]. The clinical signs and outcome of canine babesiosis depends upon the infecting species, signalment, and host immunity. The incubation period is around 10–28 days which means the disease manifests after the vector tick has fed and detached from its host, a process which is usually complete within a week [5]. Most infections are reported in spring and/or summer and are characterized by fever, lethargy, and varying degrees of haemolytic anaemia with associated signs. Following the acute phase most dogs become chronically infected with no or only poorly characterized signs. To a large extent the signs shown and outcome of infection depend on the *Babesia* spp. Involved [6]. It is diagnostically important to determine the species that causes canine babesiosis, since the virulence, prognosis, and response to anti babesial drugs may be different for each organism [7]. *Babesia gibsoni* was first recognized in India in 1910 [8]. There are at least three distinct isolates of *B. gibsoni* that are morphologically identical: one from Asia, one from California, and a third from Europe. The Asian isolate is the original organism found in India and is considered *Babesia gibsoni Sensu stricto* [9]. Most infections cause mild signs in the acute phase but some B. gibsoni infections can cause severe anaemia and be misdiagnosed as IMHA either due to the parasite not being visible on blood films due to low parasitemia or due to low level of suspicion in non-endemic areas [10]. Most dogs are depressed, have a history of anorexia, and are diagnosed with regenerative anaemia [11]. Many dogs are Coombs' test positive. Despite the thrombocytopenia, coagulation profiles are normal with no clinical signs of haemorrhage [12].

A case of protein-losing nephropathy (membrano proliferative glomerulonephritis and immune complex deposition) has been described in a Labrador retriever that was polymerase chain reaction positive for *B. gibsoni* and resolved with elimination of the infection [13]. Cutaneous vasculitis secondary to *B. gibsoni* infection in a Satsuma dog was characterized by generalized alopecia, ear tip papules and erosions, and necrosis of the skin of the forelimb. The skin changes were due to immune complex adherence to blood vessel wall and perivascular pathology [14].

Case history, clinical observations and diagnosis

A male Pitbull dog eight months old was presented to Sanjay Gandhi animal care Centre Rajouri garden New Delhi, India with a history of decreased feed intake, dullness, and lethargy since one week. Clinical examination of the dog revealed rise in body temperature (105.7ºF), tachyponea (40/min), tachycardia (110 bpm) (Table 1), pale mucus membranes and dullness.

Blood was collected and subjected to routine haematology and biochemistry. Peripheral blood, whole blood with EDTA was collected for laboratory examination. Peripheral blood smear examination revealed presence of piroplasmic organisms in the RBC (Fig. 1). Hematology revealed Anaemia ((Hb- 8.11 g/dl), Thrombocytopenia (Platelet count- 105 thousand/mm^3), Eosinophilia (15%) and Neutrophilia (77 %) (Table 1). Based on clinical signs, haematological and biochemical report case was suspected for haemoprotozoan infection and blood smear confirmed it as *B. gibsoni* infection.

The dog was treated with Doxycycline @ 5 mg/kg PO q 12h, Metronidazole @ 15 mg/kg PO q 12h, Clindamycin @ 25 mg/kg PO q 12h, and Eupotorium Q 200 @ 3 drops PO for 10 days and was advised for follow up after 5 days. On day 5 of the treatment, vital parameters were normal (Table 1), parasitemia was reduced significantly with clinical and hematological improvement. Owner was further advised to come after two days for blood test (Table 2).

Results and Discussion

Based on the clinical signs, haematological analysis and laboratory examination, the condition was diagnosed as *babesiosis* in pit bull dog. Initially treatment was given with Metronidazole @ 15mg/kg IV, Ringer lactate 150 ml IV, Ranitidine (Ranloc) 0.7 ml IM, Meloxicam (Melonex) 0.6 ml IM on the day of presentation to hospital. After confirmation of the condition the dog was treated with Doxycycline @ 5 mg/kg PO q 12h, Metronidazole @

15 mg/kg PO q 12h, Clindamycin @ 25 mg/kg PO q 12h and homeopathic Eupotorium Q 200 @ 3 drops TID PO as platelet enhancer for 10 days. Supportive therapy was given with inj. Optineuron @ 1 ml, inj. Meloxicam @ 0.5 mg/kg body weight for three days and advised for daily supplementation of *aRBC's* pet syrup @ 5 ml per day.

Table 1: Showing vital parameters of dog on day 1 and day 5 of treatment

Parameters	Day 1	Day 5
Temperature (°F)	105.7	101.5
Respiration rate (bpm)	40	20
Heart rate (bpm)	110	90

Table 2: Haematological and Biochemical findings in the babesia affected dog

Parameters	Day 1	Day 7
Haemoglobin (g/dl)	8.11	12.5
RBC'S (mill/mm^3)	4.62	5.56
PCV (%)	26.7	36.5
MCV (fl)	60.0	64.0
MCH (pg)	20.3	22.1
MCHC (g/dl)	31.2	32.5
TLC (mill/mm^3)	12.5	13.2
Neutrophils (%)	77	65
Lymphocytes (%)	18	15
Monocytes (%)	2	3
Eosinophils (%)	15	11
Basophils (%)	0	0
Platelets (thou/mm^3)	105*	324*
SGOT (AST) IU/L	39.2	40.4
SGPT (ALT) IU/L	94.6	85.6
BUN mg/l	24.3	23.5

*Reduced platelet count confirmatory of haemoprotozoan infection

Conventional therapy for canine Babesiosis includes 2 doses of Inj. Imidocarb dipropionate @ 5 mg/kg SC or IM 2 weeks apart. It reduces morbidity and mortality but ineffective for clearance of *Babesia* infection. Other drug used to treat Babesiosis is single injection of Diminazene aceturate @ 3.5 mg/kg SC or IM, but this is potentially dangerous and shows a propensity to develop severe cerebral toxicity with classic cerebellar sulci haemorrhages. Moreover, *Babesiosis* are very difficult to clear with such conventional therapy and dogs usually become chronic carriers or present with recurrent episodes of acute babesiosis [5].

The first treatment that has been shown to be effective against *B. gibsoni* is a combination of atovaquone and azithromycin [15]. Unfortunately Atovaquone is not available in India and it's expensive for import. Moreover Possible Emergence of Drug- Resistant Variants of *B. gibsoni* in clinical cases treated with Atovaquone and Azithromycin has also been reported [16].

In the present case, combination therapy of Doxycycline, Clindamycin and Metronidazole gradually reduced level of parasitemia and Clindamycin treatment reduced the clinical symptoms characteristic of *Babesia* infection, including anaemia, anorexia, and listlessness also subsided. Eupotorium Q 200 enhances the platelet count which helps to combat the infection. Clindamycin is effective for treatment of *B. gibsoni* infection has also been reported by several workers [17]. But it's been suggested that clindamycin might not eliminate parasites rapidly from the peripheral blood but damages it which might stimulate humoral and cellular immunity against Babesia infection and results in improvement in clinical condition [18]. So, a Combination therapy of clindamycin, metronidazole, doxycycline and Eupotorium Q as an effective alternative treatment strategy for *B. gibsoni* infection with no adverse effects has been suggested [19]. It was concluded that a combination therapy of Doxycycline @ 5 mg/kg, Metronidazole @ 15 mg/ kg and Clindamycin @ 25 mg/kg for 10 days and Eupotorium Q as platelet enhancer is an effective therapeutic protocol against *B. gibsoni* with no adverse effect and the dog showed uneventful recovery.

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