A unique case of *Babesia gibsoni* infected dog with paraplegia

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Abstract A 4 year old male Rottweiler was presented to Teaching Veterinary Clinics of GADVASU with a primary complaint of paraplegia, fever and inappetence. The dog was found to be dull with elevated rectal temperature (105 °F), heart rate (158 per minute) and respiration rate (57 per minute). Blood smear examination and PCR assay revealed that dog was positive for *Babesia gibsoni*. Elevated bilirubin, alanine aminotransferase, alkaline phosphatase, creatinine, total leucocyte count, neutrophils and hypoglycaemia were haemato-biochemical alterations. The therapy targeting babesiosis was carried out with a single dose of diminazene aceturate in combination with doxycycline, enrofloxacin and metronidazole for 21 days. Complete follow up of the case revealed complete clinical recovery within 21 days.

Keywords *Babesia gibsoni* · Dog · Haemato-biochemical · Paraplegia · Therapy

Introduction

Canine babesiosis is one of the most important life-threatening tick borne haemoprotzoan diseases of dogs caused by intraerythrocytic protozoan parasites of the

genus *Babesia* which are reported worldwide and in various parts of India including Punjab state (Eljadar et al. 2012; Singla and Kaur 2013). The variable prevalence of both *B. canis* and *B. gibsoni* has been observed in India (0.66–21.7 %) and in Ludhiana the prevalence was recorded as 5.26 % (Eljadar 2010). The pathogenesis of canine babesiosis varies in different regions (Saud and Hazarika 2000), possibly due to variation in the pathogenicity of different strains of *Babesia* species in various ecological conditions (Purnell 1981). The severity of babesiosis is related to the extent of parasite replication in the host's red blood cells with subsequent cell lysis. A wide variation of clinical signs like anorexia, lethargy, haemolytic anaemia, icterus, vomition and marked loss of body condition have been observed (Ettinger and Feldman 2005; Vial and Gorenflot 2006) along with variable clinicopathologic abnormalities including ascites, haemoglobinuria, hypoglycemia, acid–base disturbances, azotemia and elevations in the levels of liver enzymes (Irwin 2010). Paraplegia is one such sign that has been rarely reported (Jacobson 2006). In the present report, a rare case of babesiosis due to *Babesia gibsoni* with paraplegia has been discussed.

Case history and clinical observation

A 4 year old male Rottweiler was presented to Teaching Veterinary Clinics of GADVASU with a primary complaint of paraplegia, fever, tick infestation and inappetence (Figs. 1, 2). On physical examination the dog was observed to be dull and vital parameters viz., rectal temperature (105 °F), heart rate (158 per minute) and respiration rate (57 per minute) were found to be elevated. Blood sample was sent for haematological, biochemical and

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Fig. 1 Paraplegic dog before treatment

Fig. 2 Recovered dog after treatment

parasitological examination. Blood smear examination of the freshly prepared peripheral blood smears stained with Giemsa revealed trophozoites of small form of *Babesia* spp. (Fig. 3) which were confirmed to be *Babesia gibsoni* by PCR using *B. gibsoni* specific primer (Miyama et al. 2005; Fig. 4). Haematological examination revealed neutrophilic leucocytosis. Elevated bilirubin, alanine aminotransferase (ALT), alkaline phosphatase (ALKP), creatinine and hypoglycaemia were biochemical alterations (Table 1). Radiological examination of the lumbo-sacral area in lateral and dorso-ventral frame revealed no apparent abnormality. Blood samples were collected on day 0, 7 and 30 for parasitological, PCR, haematological, and biochemical analysis.

Fig. 3 Blood smear of the infected dog with small circular shaped trophozoites of *Babesia gibsoni* in erythrocytes

Fig. 4 *Babesia gibsoni* species specific PCR assay Lane M Generuler™ 100 bp Ladder, Lane 1 negative control, Lane 2 day 0, Lane 3 day 7, Lane 4 day 30 and Lane 5 positive control

Treatment and discussion

Babesia gibsoni is a small parasite that commonly appears as individual ring forms or pyriform bodies ranging between 1.0 and 2.5 μm in size (Conrad et al. 1991). Traditionally, all small canine piroplasms are identified as *B. gibsoni* based on blood smear examination assuming that no other small *Babesia* species infects dogs hence it was tentatively diagnosed as *B. gibsoni* based on blood smear examination. The final confirmation was made based of PCR assay (Miyama et al. 2005). The therapy targeting babesiosis was carried out with a single dose of diminazene aceturate @ 3.5 mg/kg body weight deep I/M with oral

Table 1 Haemato-biochemical parameters in the dog infected with *Babesia gibsoni* at day 0 and on 7th and 30st day of the therapy

Parameters	Reference range ^a	Day 0	Day 7	Day 30
Hb (g/dL)	12–18	12.4	12.1	12.5
TLC ($10^3/\mu\text{L}$)	6–17	18.20	18.10	10.65
TEC ($10^6/\mu\text{L}$)	5.5–8.5	6.1	6.2	6.4
PCV (%)	35–55	36.8	36	37
Platelet ($10^5/\mu\text{L}$)	2–9	2.7	2.91	3.06
Neutrophils (%)	60–70	74	79	78
Lymphocytes (%)	12–30	24	19	22
Eosinophils (%)	2–10	02	02	0
Albumin (g/dL)	2.6–4	3.3	3.3	3.4
Total protein (g/dL)	5.5–7.5	7.7	7.9	8.4
Total bilirubin (mg/dL)	0.1–0.6	0.8	0.5	0.1
ALT (U/L)	8.2–57	94	72	31
ALKP (U/L)	10.6–101	117	91	57
BUN (mg/dL)	8.8–26	24	20	09
Creatinine (mg/dL)	0.5–1.6	1.8	1.3	1.1
Blood glucose (mg/dL)	62–108	41	65	71

^a Kahn et al. (2005)

combination of doxycycline, enrofloxacin and metronidazole with dose rate of 5, 3 and 10 mg/kg body weight, respectively for 21 days. The follow up of the case was carried out on day 7 and day 30. At day 7 and day 30, peripheral blood smear with Giemsa stain was negative for *B. gibsoni*, but it was positive in PCR. Positive results of the therapy adopted were observed within 21 days with complete clinical recovery and the animal showed good response and uneventful recovery (Fig. 2).

Naturally occurring cases of babesiosis in dogs are manifested by a wide variety of non-specific vague clinical signs (Irwin and Hutchinson 1991). Paraplegia is one of the signs that has been rarely reported (Jacobson 2006). Dimenazine acetate and imidocarb dipropionate are the two of the most widely used babesiacides. But oral administration of a doxycycline–enrofloxacin–metronidazole combination (Lin and Huang 2010) with injections of diminazene acetate was found to be very effective in the management of paraplegia in naturally occurring canine babesiosis caused by *B. gibsoni*.

Mild elevation of bilirubin, ALT and AKP are indicative of a liver insult. Whether the insult is due to inflammatory cytokines, hypoxic damage, or a combination of these is not known. Hypoglycaemia observed in the present case improved 7 days after the treatment. Schoeman (2009) also reported hypoglycaemia in 20 % of the babesiosis affected dogs.

Animals that survive babesiosis remain sub clinically infected. These dogs may suffer a relapse of disease in future or serve as point source for further spread of disease in a given area (Cleveland et al. 2002). The owner had been

made aware of the possibility of subclinical infection and relapse of disease in future but in this case there was no subclinical infection or relapse of disease up to 8 months and it was found negative in PCR.

References

- Cleveland CW, Peterson DS, Latimer KS (2002) An overview of canine babesiosis. Veterinary clinical pathology clerkship program. College of Veterinary Medicine, The University of Georgia, Athens, GA
- Conrad P, Thomford J, Yamane I, Whiting J, Bosma L, Uno T, Holshuh HJ, Shelley S (1991) Hemolytic anemia caused by *Babesia gibsoni* infections in dogs. J Am Vet Med Assoc 199:601–605
- Eljadar MSM (2010) Clinico-diagnostic studies on vector transmitted haemoprotozoan diseases in dogs. M.V.Sc Thesis, Guru Angad Dev Veterinary and Animal Sciences University, Ludhiana (Punjab)
- Eljadar MSM, Singla LD, Mustafa Radya AA, Uppal SK (2012) Morphometric variations in piroplasms of *Babesia canis* from naturally infected dogs from Punjab (India). Appl Biol Res 14:207–210
- Ettinger SJ, Feldman EC (2005) Text book of veterinary internal medicine, 6th edn. W.B. Saunders Company, Missouri, pp 643–644
- Irwin PJ (2010) Canine Babesiosis. Vet Clin North Am Small Anim Pract 40:1141–1156
- Irwin PJ, Hutchinson CW (1991) Clinical and pathological findings of *Babesia* infection in dogs. Aust Vet J 68:204–209
- Jacobson LS (2006) The South African form of severe and complicated canine babesiosis. Clinical advances 1994–2004. Vet Parasitol 138:126–139
- Kahn CM, Line S, Aiello SE (2005) Reference guide table 6 and 7 in Merck manual, 9th edn. Merck & co., Inc., White house station, NJ, USA, pp 2584–2587

- Lin M-Y, Huang H-P (2010) Use of doxycycline–enrofloxacin–metronidazole combination with and without injections of diminazene diaceturate to treat naturally occurring canine babesiosis caused by *Babesia gibsoni*. *Acta Vet Scand* 52:27
- Miyama T, Yoshimi S, Yojiro S, Shoji O, Malaika W, Kauzuhito I, Masaru O, Rodolf AV, Xuenan X, Hideyuki N, Hisashi I (2005) Epidemiological survey of *Babesia gibsoni* infection in dogs in eastern Japan. *J Vet Med Sci* 67:467–471
- Purnell RE (1981) Babesiosis in various hosts. In: Ristic M, Kreier JP (eds) *Babesiosis*. Academic Press Inc., New York, pp 25–63
- Saud N, Hazarika GC (2000) Studies on incidence and biochemical changes of babesia infection in dogs. *Indian Vet J* 77:944–947
- Schoeman JP (2009) Companion animal clinical studies. *Onderstepoort J Vet Res* 76:59–66
- Singla LD, Kaur P (2013) Babesiosis. In: Garg SR (ed) *Zoonosis: parasitic and mycotic diseases*. Daya Publishing House, New Delhi, pp 207–223
- Vial HJ, Gorenflot A (2006) Chemotherapy against babesiosis. *Vet Parasitol* 138:147–160