

Therapeutic Management of *Babesia canis* in a German Shepherd Dog

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Abstract

A four-year-old male German shepherd dog was presented to the Veterinary Clinical Complex, SVPUAT, Meerut, Uttar Pradesh with a history of scrotal infection, pyrexia, tetraparesis, generalized seizures, blindness, stupor, and vocalization. Clinical examination revealed lymphadenopathy, loss of pupillary reflex, tetraparesis, elevated rectal temperature (105.0F), tachyarrhythmia, and infestation with *Rhipicephalus* spp ticks. Based on the clinical signs, a provisional diagnosis of cerebral babesiosis was made and the patient was transferred to the critical care unit. A blood sample was taken for a blood smear and hematobiochemical examination. Therapy was initiated with a topical water bath, oxygen therapy, rectal administration of diazepam, intravenous administration of fluid therapy, mannitol, doxycycline, flunixin meglumine, and B complex for 5 days. Imidocarb dipropionate was administered subcutaneously @ 6.6 mg/kg body weight. The dog's condition improved with the establishment of a normal rectal temperature, the absence of seizure over the next twenty-four hours, and improvement in the demeanour of the dog. The medication was well tolerated by the dog, appetite returned from day 5, and complete recovery after 21 days.

Keywords: Cerebral Babesiosis, Doxycycline, Imidocarb, Tetraparesis, Ticks.

Introduction

Canine babesiosis is a tick-borne hemoprotozoal disease of domesticated and wild dogs (Irwin, 2010). Canine babesiosis is clinically characterized by high fever, hemolytic anemia, icterus, lymphadenopathy, hematuria, epistaxis, and thrombocytopenia (Gonde *et al.*, 2016). *Rhipicephalus sanguineus* is the most common tick vector associated with transmission of babesiosis in India (Chao *et al.*, 2017). Complicated cases of canine babesiosis associated with acute respiratory distress syndrome acute renal failure or cerebral babesiosis have the worst prognosis with case fatality rates approaching 100% (Keller *et al.*, 2004). Cerebral babesiosis occurs due to endothelial damage caused by the sequestration of babesia-infected erythrocytes in small vessels of the brain resulting in microvascular necrosis, hemorrhage, and perivascular edema (Jacobson *et al.*, 1994). The neurological manifestations of cerebral babesiosis are credited to the sludging of small vessels of the brain by babesia-infected erythrocytes, the release of inflammatory cytokines, and cerebral hypoxia (Schetters and Eling, 1999). Encephalic or cerebral babesiosis is clinically manifested with palsies, motor disorders, and convulsions (Adaszek and Winiarczyk, 2017). The onset of ataxia is hyperacute in most cases with dogs becoming tetraplegic within a few hours of the onset of hindlimb ataxia but delayed onset has also been reported (Jacobson *et al.*, 1994). The present study reports the successful treatment of a dog with delayed onset tetraplegia due to cerebral babesiosis.

Case History and Observations

A four-year-old male German shepherd dog was presented to the Veterinary Clinical Complex, College of Veterinary and Animal Sciences, Meerut with the clinical signs of scrotal infection, pyrexia, tetraparesis, generalized seizures, blindness, stupor and vocalization (Fig.1). Clinical examination revealed lymphadenopathy, loss of pupillary reflex, tetraparesis, elevated rectal temperature (105⁰F), tachyarrhythmia and infestation with *Rhipicephalus* tick. A blood sample was collected in an EDTA vacutainer for laboratory examination.

Laboratory Examination

A thin blood smear was prepared, air-dried, stained with Giemsa stain, and examined under oil immersion (x100), which revealed an infestation with *Babesia canis*. The haemato-biochemical details of an infected dog are listed in Table 1. The diagnosis was confirmed based on history, clinical examination, and laboratory tests. The clinical case was suspected to be cerebral babesiosis due to *Babesia canis*.

Table 1: Haematological parameters of the affected dog

Parameter	Unit	Result	Reference range
WBC	10 ⁹ /L	17.65	5.0–14.1
Neu#	10 ⁹ /L	14.92	2.9–12.0
Lym#	10 ⁹ /L	1.38	0.4–2.9
Mon#	10 ⁹ /L	1.09	0.1–1.4
Eos#	10 ⁹ /L	0.26	0–1.3
Neu%	%	84.5	58–85 (segmented)
Lym%	%	7.8	8–21
Mon%	%	6.2	2–10
Eos%	%	1.5	0–9
RBC	10 ⁶ /μL	5.45	4.95–7.87
HGB	g/dl	13.4	11.9–18.9
MCH	pg	24.7	21.0–26.2
MCV	fL	70.4	66–77
MCHC	g/dl	35.0	32.0–36.3

(Latimer KS, Duncan & Prasse's *Veterinary Laboratory Medicine: Clinical Pathology*, 5th ed., Wiley-Blackwell, 2011)

Result and Discussion

Therapy for the dog began with treatment of the high rectal temperature by bathing with plain water. Dyspnea was treated with oxygen therapy using an oxygen concentrator for 3 hours. To control the seizures, diazepam was administered rectally @ 1 mg/kg body weight. An intravenous line was placed to initiate fluid therapy, mannitol @

1 g/kg body weight, intravenous doxycycline @ 10 mg/Kg body weight, flunixin meglumine @ 1.1 mg/kg body weight, and b complex injections @ 2 ml daily for 5 days. Once the diagnosis was established, imidocarb dipropionate @ 6.6 mg/Kg body weight was administered subcutaneously after premedication with atropine @ 0.05 mg/kg body weight. The dog's condition was improved with normal rectal temperature, absence of seizures over the next twenty-four hours, and improvement in the dog's behavior. Treatment was continued with oral administration of doxycycline @ 10 mg/kg body weight for the next 14 days. Cerebral babesiosis refers to cases with neurological manifestations in *Babesia*-infested dogs (Van de Maele *et al.*, 2008). Cerebral babesiosis is not common and develops in 1-4% of babesia-infected cases. Neurological manifestations such as impaired consciousness, paresis, and seizures are consistent with previous reports (Boozer and Macintire, 2003; Van de Maele *et al.*, 2008). The diagnosis of babesiosis is based on the detection of paired piriform, and paired apicomplexan in erythrocytes in blood smears. The parasite is present in large quantities in the blood sample from the capillaries of the ear pinna, which enables a better detection limit (Bohm and Leisewitz, 2006). Cases with cerebral babesiosis have poor prognosis and a high mortality rate but early diagnosis and treatment can lead to a favourable outcome in some cases (Van de Maele *et al.*, 2008). Imidocarb dipropionate, an aromatic diamidine is recommended by the FDA for the treatment of *Babesia canis*. The recommended therapeutic dose regimen is intramuscular or subcutaneous administration at the dose rate of 6.6 mg/kg body weight in two doses 14 days apart. The clinical cure with imidocarb is rapid and good in large piroplasms compared to small piroplasms (Solano-Gallego and Baneth, 2011). In most cases affected by large piroplasms, clinical improvement occurs within 1-5 days, in some it is delayed up to 15 days, but most cases recover completely (Jacobson, 2006). The administration of imidocarb is associated with parasymphomimetic manifestations such as excessive salivation, nasal discharge, epiphora, and vomiting, which can be alleviated by atropine premedication (Sikorsk *et al.*, 2010). Antibiotics are generally not considered as treatment of choice for *Babesia canis*. However, doxycycline has been reported to reduce the severity of manifestations and reduce the morbidity and mortality of *Babesia canis* (Lin and Huang, 2010). Supportive fluid therapy is essential to maintain adequate organ perfusion and to prevent the sequestration of brain microcapillaries (Matsuu *et al.*, 2004).



Fig: German Shephard dog suffering from cerebral babesiosis before and after recovery

The control and prevention of babesiosis is mainly focused on controlling tick infestation (Solano-Gallego *et al.*, 2016). Acaricidal products offer varying lengths of protection, namely acaricidal collars for 6-8 months, spot-on preparations for 3-5 weeks, oral tablets for 1-3 months, and sprays for a few days of infestation (Solano-Gallego *et al.*, 2016). A vaccine against *Babesia canis* using soluble parasite antigens from the supernatant of culture media is available in Europe and is administered at 5 months of age and then repeated annually (Schetters *et al.*, 2009). Vaccines do not prevent infection and only reduce the severity of manifestations and also do not provide cross immunity for small forms (Solano-Gallego *et al.*, 2016). Chemoprophylactic treatment with oral doxycycline has also been reported to reduce the severity of signs and can be used in immunocompromised patients in endemic areas (Vercammen *et al.*, 1996). In conclusion, patients with babesiosis can be successfully treated with imidocarb dipropionate and supportive therapy.

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Contribution by Authors

Equal contribution. All authors declared that 'written informed' consent was obtained from the approved parties for the publication of this article and accompanying images.

Conflict of Interests

There is no conflict of interest.

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