

MYOCARDIAL DYSFUNCTION DUE TO BABESIOSIS IN A DOG

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ABSTRACT

A two year old, intact female Great Dane was presented with the history of dyspnea and anorexia for a period of six days. The dog was already treated in a private clinic. Based on the clinical, haematological, biochemical and peripheral blood smear examination, the case was diagnosed as canine babesiosis caused by Babesia gibsoni. Echocardiographic examination revealed both systolic and diastolic dysfunctions. The dog was treated with doxycycline, clindamycin and metronidazole. Histopathological examination revealed myocardial necrosis and haemorrhage.

Keywords: Babesiosis, Cardiac dysfunction, Dogs

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Canine babesiosis is a tick borne hemoprotozoal disease, characterized by fever, splenomegaly, haemolytic anaemia and thrombocytopenia. Based on intraerythrocytic form, canine babesiosis can be divided into two groups viz. small babesia (*B. gibsoni*, *B. conrade*, *B. microti*) and large babesia (*B. canis*, *B. rossi*, *B. vogeli*). Severity of the infection ranges from subclinical form to multi organ failure and death (Irwin, 2010). Complicated or untreated canine babesiosis

results in septic shock and multi organ dysfunction syndrome. Among this, cardiac dysfunction plays a major role in mortality but goes undetected in many cases. In human beings, around 40 to 50% septic shock patients will develop myocardial dysfunction. Cardiac dysfunction has been reported in canine sepsis but remains clinically difficult to diagnose as the signs of sepsis induced cardiac dysfunction such as dyspnea and weakness are overlapped by anaemia, acute respiratory distress syndrome and metabolic acidosis (Lobetti, 2005). Echocardiography has been described a more sensitive tool for detection of cardiac dysfunction in dogs (Dvir *et al.*, 2004).

Case history

A two year old, intact female Great Dane was presented to the Critical Care Unit

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of the Department of Veterinary Clinical Medicine, Madras Veterinary College Teaching Hospital, Vepery, Chennai with a history of dyspnea and anorexia for the past six days. The dog was already treated in a private clinic. The pet's vaccination and deworming details were up to date.

Observations

On physical examination emaciation (Fig. 1), congested conjunctival mucus membrane, enlarged popliteal and prescapular lymphnodes with a temperature of 105.2°F was observed. Ventral abdomen showed severe ecchymotic patches (Fig. 2). Heart rate was 168 beats per min and respiratory rate was 58 breaths per min. Abdominal palpation revealed severe splenomegaly.

In routine haematology, anaemia (Hb- 7.2 g/dl, PVC- 23.4%) thrombocytopenia (19000/ cmm) was observed. Serum biochemistry revealed elevated Blood Urea nitrogen (48 mg/dL) and creatinine (3.2 mg/dL) and increased activity of liver enzymes activity (ALT – 183 IU/L, ALP – 320 IU/L) (Table I). Peripheral examination revealed signet ring shaped merozoites with in the cytoplasm of erythrocyte (Fig. 3). Doppler systolic blood pressure was 60 mmHg. Electrocardiographic finding was ST coving which indicated myocardial hypoxia (Fig. 4). Echocardiographic examination of M mode, pulse wave Doppler and tissue Doppler imaging revealed both systolic and diastolic dysfunction (Table II) (Fig. 5, 6 and 7). With the above clinic pathological and echocardiophic findings the case was confirmed as Canine Babesiosis induced cardiac dysfunction.

Treatment

The dog was treated with Inj. Ringer's lactate @ 10 ml/kg q12h, Inj. Doxycycline @ 10 mg/ kg q24h, Inj. Clindamycin @ 25 mg/ kg q24h, Inj. Metronidazole @ 15 mg/kg Inj. Pantoprazole @ 1 mg/kg q24h. (Di Cicco and Birkenheuer, 2012).

The dog did not respond favorably to the course of standard treatment and died on the second day. Post mortem and histopathological examination revealed myocardial necrosis and haemorrhage (Fig. 8).

Discussion

Despite recent advances in Veterinary Medicine, sepsis is the major cause for mortality in critical care unit. Sepsis is defined as a life threatening organ dysfunction caused by a dysregulated host response to the infectious agent such as bacteria, virus, fungus and parasite. Canine babesiosis is a common tick borne disease worldwide. Common complications associated with canine babesiosis are acute renal failure, cerebral babesiosis, disseminated intravascular coagulation (DIC), hepatopathy, immune mediated hemolytic anaemia, pancreatitis, cardiac dysfunction and acute respiratory distress syndrome (ARDS).

Cardiac dysfunction in canine babesiosis is considered as a rare complication. The factors involved in babesiosis induced cardiac dysfunction have been attributed to disturbed coronary blood flow, myocardial depressant factor, inflammatory cytokines, nitric oxide and reactive oxygen species, mitochondrial dysfunction, β adrenergic

Table I. Haemato - biochemical values

Hb (g/dL)	7.2	Glucose (mg/dL)	168
PCV (%)	23.4	ALT (U/L)	183
RBC (m/cmm)	3.8	ALP (U/L)	320
WBC (/cmm)	6500	Total protein (g/dL)	7.6
Platelet (/cmm)	19000	Albumin (g/dL)	3.2
Neutrophil (%)	78	BUN (mg/dL)	48
Lymphocyte (%)	20	Creatinine (mg/dL)	3.2
Monocyte (%)	2	Total bilirubin (mg/dL)	0.6
Eosinophil (%)	0	Direct bilirubin (mg/dL)	0.2
Basophil (%)	0	Cholesterol (mg/dL)	228

Table II. Echocardiographic parameters

LVIDd (cm)	3.15	Mitral valve E vel (cm/s)	152.61
LVIDs (cm)	2.55	Mitral valve A vel (cm/s)	49.71
EDV (mL)	39.42	E/A	3.07
ESV (mL)	23.54	Sa lateral (cm/s)	10.62
EF (%)	40.28	E' lateral (cm/s)	-7.28
FS (%)	18.2	A' lateral (cm/s)	-15.17
SV (mL)	15.88	E'/A'	0.48
CO (L/min)	2.6	E/E'	20.95



Fig. 1. Emaciation in the affected dog



Fig. 2. Ecchymotic patches in the affected dog

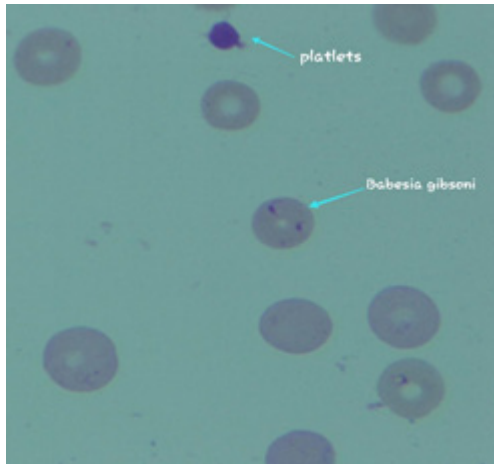


Fig. 3. Merozoites in the cytoplasm of the RBCs of affected dog

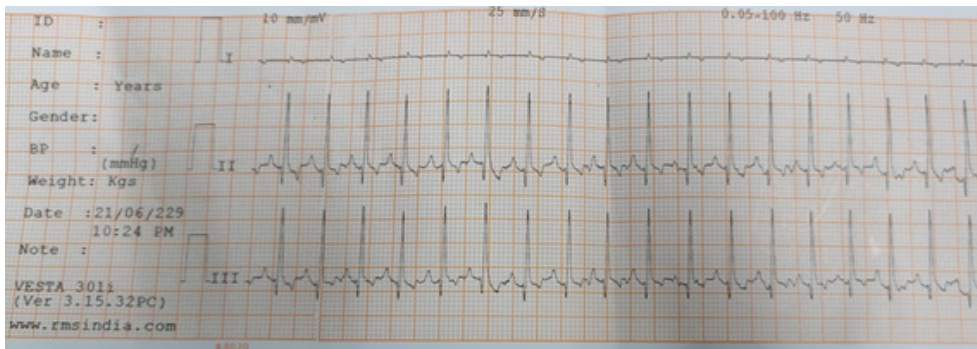


Fig. 4. ECG- ST coving

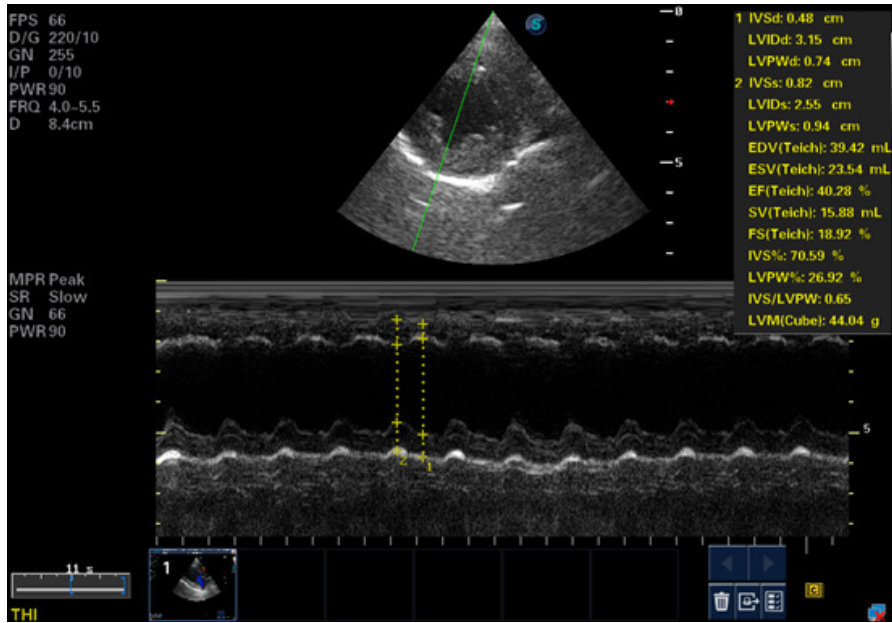


Fig. 5. M mode – Systolic functional parameters

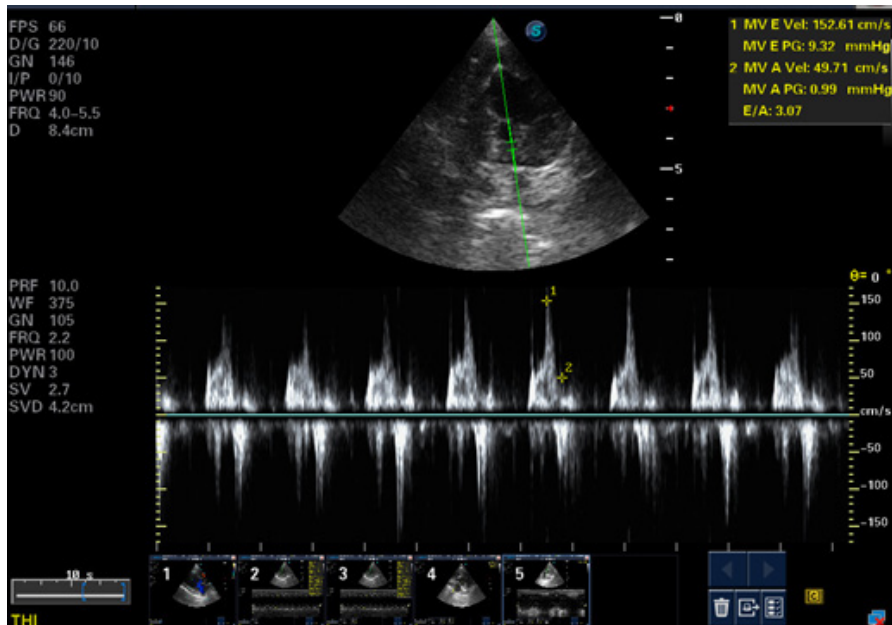


Fig. 6. Pulse Wave Doppler – Diastolic functional parameters

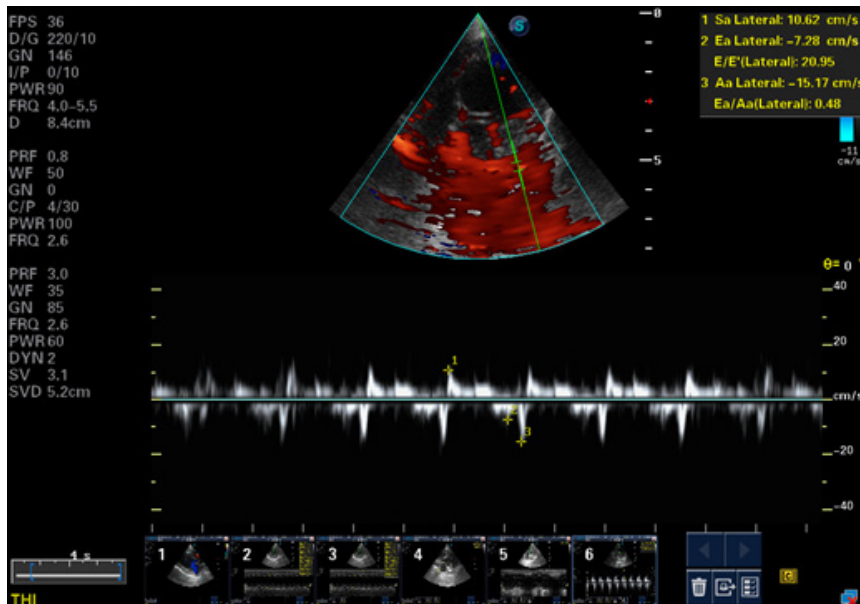


Fig. 7. Tissue Doppler Imaging - Diastolic functional parameters



Fig. 8. Histopathology – cardiac myocytic necrosis and haemorrhage

signaling dysregulation, calcium trafficking and cardiomyocyte apoptosis. Common clinical signs associated with cardiac dysfunctions have been described as dyspnea, tachycardia and weakness which could be overlapped by the underlying diseases. Dogs with babesiosis can develop a variety of ECG changes like sinus tachycardia, ST coving, first degree AV block, notching of R wave, atrial fibrillation and ventricular premature complex (Dvir *et al.*, 2004). ST coving and ventricular premature complex (VPCs) has been indicating myocardial injury. Cardiac troponin I is a sensitive marker of myocardial injury in canine babesiosis (Koster *et al.*, 2015) but estimation of cardiac markers is time consuming and economically too not feasible. Common histopathological changes reported earlier in canine babesiosis were myocardial necrosis, inflammation, haemorrhage and microthrombi which might be due to the inflammatory reactions against parasites (Rasoulzadeh *et al.*, 2021).

Echocardiographic examination of left ventricle systolic and diastolic functional parameters has recently been considered to be more sensitive to assess the cardiac dysfunction and is considered as an important prognostic indicator in complicated canine babesiosis (Ayoob *et al.*, 2010). Management of the specific cardiac dysfunction along with standard therapy for babesiosis might be helpful in improving the clinical outcome.

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