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Therapeutic management of *Babesia canis vogeli* infection associated with hepato-renal complications in a dog

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Abstract

A five-year-old Labrador female dog was presented to the Referral Veterinary Polyclinic, IVRI, Izatnagar having the history of progressive abdominal enlargement, vomition, anorexia, fever, lethargy and tick infestation. Clinical examinations revealed pale mucous membrane, fever (104.1°F) and enlarged lymph node. Ultrasonographic examination showed hepatomegaly, splenomegaly, renal cortical thickening along with the ascites. The hemato-biochemical report showed marked reduction in Hb, TEC, PCV, hypoalbuminemia and elevated SGPT, SGOT, BUN and creatinine levels. Blood smear examination with Giemsa's staining technique revealed basophilic; teardrop shaped piroplasms of *B. canis vogeli* inside the red blood cell. On the basis of clinical history and laboratory findings the case was diagnosed as *B. canis vogeli* infection with hepato-renal complications. The institution of treatment of the dog with fluid therapy and diaminazine aceturate, doxycycline, clindamycin along with supportive therapy brought successful recovery in 28 days.

Keywords: *Babesia canis vogeli*, regenerative anaemia, splenomegaly, carica papaya extract

1. Introduction

B. canis vogeli is a large and mild to moderately pathogenic subspecies of *Babesia*, with an intraerythrocytic piriform (teardrop) shaped piroplasm (size 3 µm × 5 µm) present as a singlet or in pairs and transmitted by specific ixodid tick *Rhipicephalus sanguineus* (Brown dog tick)^[1]. It is an endophilic, monotropic tick and its biotopes have cohabited with premises, habitations, kennels in which man and dogs are regularly contacted^[2, 3]. *Babesia canis vogeli* generally leads to a relatively mild infection, often without clinical signs^[4, 5]. Reduced platelet count, anaemia, fever, bilirubinuria is found in acute cases whereas prolonged convalescence and depression is noticed in the chronic form of the disease^[4, 2]. Imidocarb dipropionate or Diminazene aceturate with Doxycycline and clindamycin has been used to manage *B. canis vogeli* infection in the dog. This report describes the successful therapeutic management of *Babesia canis vogeli* infection in the dog.

2. Methodology

2.1. Case history

A five-year-old Labrador female dog weighing 20 kg was admitted to Referral Veterinary Polyclinic of ICAR-Indian Veterinary Research Institute, Izatnagar having history of progressive abdominal enlargement, vomition, anorexia, fever, lethargy and tick infestation.

2.2. Clinical examination and laboratory findings

Clinical inspection revealed severe lethargy, ataxia, nasal discharge, sticky salivation and dark yellowish urine was passed by animal (Fig.1). Detailed examination revealed fever (104.1°F), dehydration, pale mucous membrane (Fig.2), sluggish pupillary light reflex and menace reflex, tachycardia (115/min) and tachypnoea (70/min), enlarged lymph node. Ultrasonographic examination showed hepatomegaly, splenomegaly, renal cortical thickening along with the ascites. The hemato-biochemical report revealed marked reduction in Hb, TEC, PCV, hypoalbuminemia and elevated SGPT, SGOT, BUN and creatinine level (Table.1). Blood smear examination with Giemsa's staining revealed basophilic, teardrop shaped piroplasms of *B. canis vogeli* inside the red blood cells (Fig.3). On the basis of clinical history and laboratory

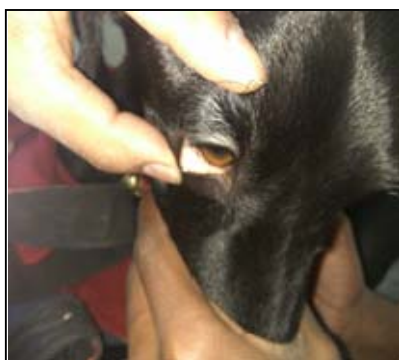
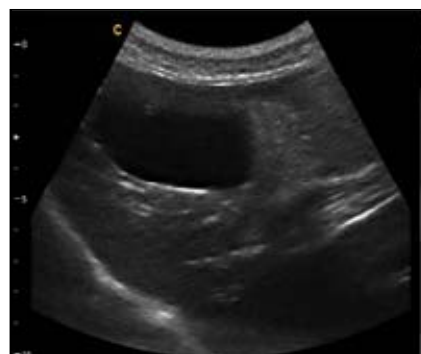
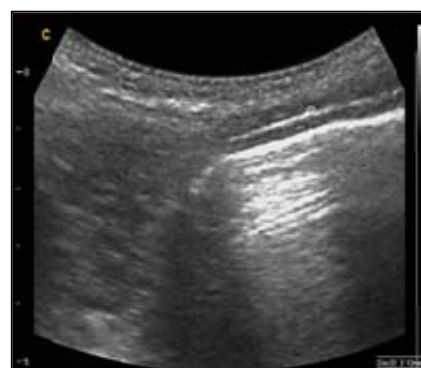
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Table 1: The haemato-biochemical parameters of affected dog

Parameters	Reference range ^[6]	0 day	21 day
Hb (g/dl)	11.9-18.9	7.4	11.5
PCV (%)	24-46	12	30
TEC (10^6 /cmm)	4.95-7.87	3.54	5.37
TLC (10^3 /cmm)	5.0- 14.1	8.4	7.5
Neutrophils %	58-85	76	78
Lymphocytes %	8-21	20	22
Monocytes%	2-10	2	0
Eosinophils%	0-9	2	0
Basophil%	0-1	0	0
Platlet count (10^6 /cmm)	211-621	93	255
SGPT(U/L)	10-109	220	44
SGOT (U/L)	13-15	148	27
Serum Creatinine(mg/dl)	0.5-1.7	2.48	1.3
BUN (mg/dl)	8-28	93.5	18
Serum total Protein (mg/dl)	5.4-7.5	5.3	6.7
Serum Albumin (mg/dl)	2.3-3.1	2.1	3.1
Serum Globulin (mg/dl)	2-7-4.4	3.2	3.6
Serum amylase (U/L)	226-1,063	995	-

**Fig 1:** Infected dog**Fig 2:** Pale conjunctival mucous membrane**Fig 3:** Teardrop shaped**Fig 4:** Renal cortical thickening**Fig 5:** Hepatomegaly**Fig 6:** Splenomegaly

2.3 Therapeutic management

Treatment

Following the diagnosis of the case, treatment was started with inj. Diminazene aceturate 5mg/kg b.wt. deep intramuscularly and repeated after 14 days, Doxycycline 5mg/kg BW bid for 21 days, Clindamycin 25mg/kg BW bid for 14days orally along with the intravenous normal saline infusion. Supportive therapy included inj. meloxicam 0.2mg/kg b.wt. IM, inj. Omeprazole 0.5mg/kg b.wt. IV, inj. Metoclopramide 0.2mg/kg b.wt. IM, inj. Neohepatex 3ml IM, syrup Sylbion 5ml bid and syrup Haem-up 5ml bid orally for 21 days. Recombinant human erythropoietin 100 IU/kg BW subcutaneously OD three times on the alternate day. Carica papaya leaf extract syrup (275mg/5ml) 5ml bid orally for 7 days was also administered.

3. Results

The dog started showing recovery from third day after initiation of treatment and showed improved pupillary light reflex and menace reflex. Blood smear examination on 14th

day post-treatment was also found negative for *B. canis vogeli*. Complete recovery was noticed after the 28 days of treatment.

4. Discussion

Canine babesiosis is a tick-borne protozoal disease caused by different *Babesia* species with global allocation and importance. Canine babesiosis was first reported from Italy in 1895^[7]. Large forms of *Babesia* (2.5–5.0 µm) were nominated as *Babesia canis* and small forms of *Babesia* species (1.0–2.5 µm) were nominated as *Babesia gibsoni*^[8]. *B. canis vogeli* is comparatively less pathogenic subspecies of *B. canis* than other species and produce mild, subclinical or moderate clinical diseases^[9, 5]. In puppies, it is a fatal disease leading to harsh haemolytic anaemia, regenerative anemia, leucocytosis with left shift, thrombocytopenia and with clinical signs like fever, lethargy, anorexia and jaundice^[10, 11]. Immunocompromised conditions, simultaneous infectious diseases, splenectomy, renal diseases are the main predisposing factors for the *B. canis vogeli* infection in adult dogs^[12]. *B. canis vogeli* mostly causes regenerative anemia, whereas other *Babesia* species leads to non-regenerative anaemia^[4]. Direct erythrocyte lysis due to multiplying intracellular parasites and indirect lysis through immune mechanisms triggers complement activation. Oxidative stress due to red blood cell phagocytosis, spherocytosis and reduced erythrocytic osmotic fragility leads to intravascular as well as extravascular haemolysis^[11, 13]. Oxidative stress due to free reactive oxygen species, injurious cytokines coupled with endothelial damage and increased vascular permeability leads to non-cardiogenic pulmonary oedema in canine babesiosis^[14]. Severe haemolysis leads to hemoglobinemia, haemoglobinuria, bilirubinemia and bilirubinuria. Anaemic hypoxia and haemoglobinuria cause hypoxic damage to the kidneys due to tubular haemoglobin casts and haemoglobin droplets in the renal tubular epithelial cells in infected dogs^[15, 16]. Antibody formation against erythrocyte has been reported in *B. gibsoni* and *B. vogeli* but not in *B. canis* infection^[17, 11].

Imidocarb dipropionate^[18] and Diminazene aceturate^[19] showed good results and was effective against *B. canis vogeli* infection along with Doxycycline^[20]. Omeprazole (proton pump inhibitor) inhibits the H⁺-K⁺ ATPase pump and lead to diminished hydrochloric acid production from gastric parietal cells and enhanced gastrokines gene regulations and maintain gastric homeostasis^[21, 22]. Metoclopramide (dopamine-antagonists) elevates the threshold activity of chemoreceptor trigger zone as well as diminish the visceral nerve input that prevents vomiting^[23]. Recombinant human erythropoietin (rhEPO) increases the erythropoiesis in bone marrow^[24]. Carica papaya leaf extract increases the platelet count without any adverse effect and prevent complications aroused due to thrombocytopenia in the human patient who suffered from dengue fever^[25]. Silymarin maintains malondialdehyde level (MDA) which act as an antioxidant in liver and kidney^[26, 27, 28].

5. Conclusion

Canine babesiosis induces haemolytic anaemia, thrombocytopenia and hepato-renal disease can be successfully managed by combination therapy of Diminazene aceturate, Doxycycline and Clindamycin along with administration of erythropoietin hormone, haematinics and herbal therapy with *Carica papaya* leaf extract as a

thrombopoiesis.

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