Clinico-haematological alterations and therapeutic management of tick borne fever in cross bred cow

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Abstract A 5 years old crossbred cow was brought to the Veterinary Clinical Complex of Lala Lajpat Rai University of Veterinary and Animal Sciences Hisar with history of progressive weakness, pale mucous membrane, anorexia, high fever (105 °F), tachycardia, laboured breathing and coffee coloured urine. Analysis of haematological parameters revealed severe anaemia, leucocytopenia, marked poikilocytosis of erythrocytes. Blood smear examination showed presence of signet ring shaped *Theileria* organisms, *Babesia* piroplasms and condensed dot forms of *Anaplasma marginale* in the stained erythrocytes. Further animal was treated with buparvaquone @ 2.5 mg/kg b.wt deep I/M in neck region and long acting oxytetracycline at 25 mg/kg b. W. slow I/V daily in normal saline solution for 5 days. Berenil (Diminazene aceturate 5%) injection was also administered @ 1 ml/20 kg b.wt. I/M along with supportive therapy. Clinical signs started to subside 3 days post treatment. Complete recovery was achieved by 4 weeks post treatment however animal succumbed to death due to immunosuppression.

Keywords *Anaplasma marginale* · *Theileria* sp. · *Babesia* sp. · Anaemia · Coffee coloured urine

Tick-borne diseases are still closely related to huge economic losses due to mortality and morbidity. Babesiosis (tick fever), tropical theileriosis and anaplasmosis belong to the most important tick-transmitted diseases affecting cattle (Gupta et al. 2004). They are highly pathogenic haemoprotozoans of livestock. These tick borne diseases produce variable symptoms in cattle. Babesiosis caused by *Babesia bovis* and *Babesia bigemina* produce typical hemoglobinuria; whereas in case of *theileriosis* enlargement of superficial lymph nodes is characteristic feature (Kumar and Sangwan 2010). Anaplasmosis is characterised by high fever, severe anaemia with thinning of blood and icterus without hemoglobinuria. This case report describes the changes of haematological alterations in mixed infection of theileria, babesia and anaplasma in a crossbred cow.

Case history and observations

A 5 years old cow was brought to Veterinary Clinical Complex of Lala Lajpat Rai University of Veterinary and Animal Sciences, Hisar with clinical signs of progressive weakness, anorexia, high fever (105 °F), tachycardia, laboured breathing, yellowish mucous membrane and coffee coloured urine.

Blood sample of affected animal was collected in an ethylene diamine tetracetate (EDTA) containing vial. Thin blood smears were made immediately, fixed with methanol for 1 min and stained with Giemsa stain. Examination of blood smear revealed peculiar condensed dot forms of *Anaplasma marginale* at the margins of erythrocytes, signet ring shaped *Theileria* spp and *Babesia* piroplasms in paired form in erythrocytes (Fig. 1). Approximately 70% erythrocytes showed presence of parasite in one high power field. Alterations in hemogram are shown in Table 1.

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Fig. 1 Showing peculiar condensed dot forms of *Anaplasma marginale* (arrow head) at the margins of RBCs, signet ring shaped *Thelazia* (double arrow head) and *Babesia piroplasms* in paired form in RBCs (single arrow) Giemsa stain $\times 1000$

Morphology of RBCs was altered showing poikilocytosis, anisocytosis and presence of prominent echinocytes. Urine of affected animal was also collected and processed for complete urinalysis. Urine analysis revealed significant changes such as hemoglobinuria, bilirubinuria and presence of granular cast as depicted in Table 1 and Fig. 2a, b.

Treatment protocol

Animal was treated with buparvaquone (Butalex@ 2.5 mg/kg deep I/M in neck region and long acting oxytetracycline at 25 mg/kg body weight slow I/V daily in normal saline solution for 5 days. Berenil (Diminazene aceturate 5%) injection was also administered @ 1 ml/20 kg b.wt, I/M. Ascorbic acid 4 ml I/V daily for 5 consecutive days and methylcobalamine 3 ml I/M for 5 alternate days was also continued. Buparvaquone was repeated after 48 h. The clinical signs started to subside 3 days post treatment. Jaundice was completely reduced. However cow succumbed to other type of bacterial infection due to severe immunosuppression as a result of hemoprotozoan infestations and died as informed by owner.

Discussion

Severe parasitemia in the present case was an indication of an acute form of disease. The clinical signs may be due to the endogenous pyrogens liberated by *haemoprotozoans* causing the destruction of erythrocytes. Leucocytopenia with transient leucocytosis indicated stimulation of organs of lymphoid system due to parasite and its toxins. Haemogram of the infected animals revealed normocytic normochromic anaemia which reflects destruction of erythrocytes by parasite and activation of haemopoietic

Table 1 Hemogram and urine analysis of affected animal

Sr no	Hemogram			Urine analysis of affected animal	
	Parameter	Affected animal	Reference range		
				Physical examination	
1	Hb gm %	4.2	8–14	Colour	Coffee colour
2	TEC (millions/mm ³)	3.8	5–8	Turbidity	Cloudy
3	PCV %	12.4	26–42	Specific gravity	1.164
4	MCV fl	60.59	40–60	Reaction	Alkaline
5	MCH pg	18.75	11–17	Chemical examination	
6	MCHC %	33.27	30–36	Albumin	Present (++++)
7	TLC 1000/cumm	3.2	(4–12)	Glucose	Present (+)
8	Differential leucocyte count			Blood	lysed RBCs
	Neutrophil %	42	15–45	Bile pigments Bilirubin (++)	
	Lymphocyte %	54	48–75	Microscopic examination	
	Monocyte %	02	2–7	Granular cast	5–6/hpf
	Eosinophil %	02	2–15	RBC Cast	3–4/hpf
	Basophil %	–	0–2	Epithelial cells	Renal 2–3/hpf
Blood smear: <i>Anaplasma marginale</i> at the margins of RBCs, signet ring shaped <i>Theleria</i> spp and <i>Babesia</i> spp in paired form in RBCs					

Hb haemoglobin, *TEC* total erythrocyte count, *TLC* total leucocyte count, *PCV* packed cell volume, *MCV* mean corpuscular volume, *MCH* mean corpuscular haemoglobin, *MCHC* mean corpuscular haemoglobin concentration. Reduction in Hb, TEC and PCV indicates anemia. Reduction in the TLC indicates leucopenia

Fig. 2 **a** Showing coffee coloured urine and **b** granular cast (thin arrow) in microscopic examination of urine $\times 400$ wet film

system in response to erythrophagocytosis (Kumar and Sangwan 2010). Anaemia is considered to be a major component in tick borne fever which lead to thinning of blood and pale discoloration of conjunctival mucous membrane (Gupta et al. 2004). In later stages, the mucous membranes turned to yellowish resulting into jaundice as a result of erythrocytes destruction. Coffee coloured urine observed in present case may be due to immune mediated hemolysis of erythrocytes. Clumping of infected erythrocytes was also seen in blood smear (Bock et al. 2004). In the present case, animal responded to the treatment however marked immunosuppression led to death of the animal. The present case is unique as it describes the pathological effects mixed hemoprotozoan infection on animal health. Watchfulness and education is crucial for the government, farmers and veterinarians in endemic

areas. Tick borne diseases can be controlled by vector control, vaccination and chemoprophylaxis.

Compliance with ethical standard

Conflict of interest The authors declare that there is no conflict of interest.

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