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Therapeutic management of anaplasmosis in a dairy COW

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Abstract

A five-year-old crossbred Jersey cow was brought to Veterinary clinical complex, Tirunelveli with a history of anorexia, dullness, shivering, respiratory distress, severe tick infestation, decreased milk production for past three days. Upon clinical examination, the cow had a frothy salivation, emaciation, enlarged prescapular lymph nodes, scapular pulsation, abdominal aorta thudding, icteric conjunctival mucous membrane, pale and icteric vaginal mucous membrane. Vital signs like rectal temperature, heart rate and respiratory rates were found to be 39.8 °C, 112 beats per minute and 52 breath per minute respectively. On hematological examination, hemoglobin, PCV and total erythrocyte count were found to be very low i.e., 2.4 g/dl, 7.2% and $1.34 \times 10^6/\mu\text{l}$ respectively. Serum biochemistry revealed increased levels of AST, ALP, total bilirubin, direct bilirubin and decreased levels of total protein and albumin. Examination of a peripheral blood smear revealed the existence of *Anaplasma* sp. in the erythrocytes. The animal was treated with a dose of long acting oxytetracycline injection along with supportive treatment. Clinical improvement was noticed after five days of therapy. The cow had an unremarkable recovery.

Keywords: *Anaplasma*, icterus, anaemia, oxytetracycline, anaplasmosis

Introduction

Anaplasma is an obligate intracellular gram-negative bacteria which affects the blood cells of mammals (Rymaszewska and Grenda, 2008) [14]. Anaplasmosis stands out as one of the most significant tick-borne diseases in ruminants. It primarily affects cattle, but other ruminants such as buffalo, bison, and African antelopes can also be infected (Vatsya *et al.*, 2013) [18]. Among ruminants, five different *Anaplasma* species are identified, namely *Anaplasma marginale*, *Anaplasma centrale*, *Anaplasma bovis*, *Anaplasma phagocytophilum*, and *Anaplasma ovis* (Inokuma, 2007) [9]. Cattle of all ages can become susceptible to *A. marginale* infection, but the severity of clinical disease is age dependent. Once cattle of any age are infected with *A. marginale*, they continue to harbor the infection as persistent carriers throughout their lifetime (Aubry and Geale, 2011) [2]. The clinical signs of anaplasmosis are mostly characterized by emaciation, fever, anemia, pallor and jaundiced mucous membranes without hemoglobinuria (Constable *et al.*, 2017) [6]. The current study deals with therapeutic management of bovine anaplasmosis in a crossbred jersey cow.

History and Clinical Observations

A five years old female crossbred jersey cow was presented to Veterinary clinical complex, Tirunelveli for treatment with the history of anorexia, dullness, shivering, respiratory distress, severe tick infestation, decreased milk production for past three days. The clinical examination of a cow revealed that the animal had clinical signs of dullness, severe depression, emaciation, frothy salivation, enlarged prescapular lymph node, scapular pulse, severe abdominal aorta thudding, icteric conjunctival mucous membrane and pallor and icteric vaginal mucous membrane (Fig. 1). The cow had a rectal temperature of 39.8 °C, a respiration rate of 52 breaths per minute, a pulse rate of 112 beats per minute. Whole blood, serum and peripheral blood smear were collected before treatment and five days after treatment for hematological, serological and hemoprotozoan examination respectively. Hematological and biochemical parameters were evaluated using an automated analyzer, and the results were depicted in Table 1. Microscopic examination of the peripheral blood smear revealed presence of *Anaplasma* sp. organism in the RBCs (Fig. 2). Based on the anamnesis, clinical observations, and blood smear examination, the case was diagnosed as a bovine anaplasmosis.

Treatment and Discussion

The animal was treated with a dose inj. Oxytetracycline LA @ 20 mg/kg body weight deep IM along with supportive therapy. The supportive therapy consists of inj. Meloxicam @ 0.5 mg/kg body weight IM, inj. Chlorpheniramine maleate @ 0.5 mg/kg body weight, Inj. Tribivet (Vitamin B1, B6 and B12) @ 15 ml/day IM for five days, single dose of ivermectin @ 0.2 mg/kg body weight subcutaneously and advised livertonic syrup Livotas® 50 ml once a day and hematinic syrup aRBCe Rakkt® 50 ml once a day for ten days. After five days of treatment schedule, the animal showed clinical recovery, marked by the absence of *Anaplasma sp.* organisms in the peripheral blood smear and body temperature, appetite, mucous membranes color, heart rate and respiration rate were restored to normal level. Five days post-treatment, the hematological and biochemical values had returned to levels close to normal. This treatment in agreement with Gurjar *et al.*, 2019^[8]. Bovine anaplasmosis caused by *Anaplasma marginale* is the primary contributor to morbidity and mortality in tropical and subtropical regions, especially affecting exotic and crossbred cattle (Singh *et al.*, 2012)^[16].

Upon microscopic examination of the Giemsa-stained blood smear, *Anaplasma sp.* organisms were detected within the erythrocytes. Despite recent advancements in diagnosing anaplasmosis from clinical samples, the classical Giemsa-stained thin blood smear remains a gold standard test for its early, convenient, and cost-effective parasite detection (Brahma *et al.*, 2018)^[5].

In the current study, the initial clinical signs were emaciation, anorexia, rise in body temperature (39.8 °C), along with enlargement of the prescapular lymph node and a pallor mucous membrane. The swelling of lymph nodes and the occurrence of fever could be attributed to the developmental stages of the parasites, as suggested by Soulsby 1982^[17]; Radostits *et al.*, 2007^[13]; Mahadappa *et al.*, 2017^[10]; Priyanka *et al.*, 2017^[12]. The observed tachycardia (112 beats per minute), tachypnea, pale mucous membrane, severe jaundice, and decreased milk production in the current study could be attributed to anemia. These findings are in agreement with the findings of Birdane *et al.*, 2006^[4] and Bal *et al.*, 2017^[3].

On hematological examination, hemoglobin, PCV and total erythrocyte count were found to be very low i.e., 2.4 g/dl, 7.2% and $1.34 \times 10^6/\mu\text{l}$ respectively. The low hemoglobin level (2.8 g/dL) observed in this study in agreement with the findings of Vatsya *et al.*, 2013^[18]; Gurjar *et al.*, 2019^[8]; Sharma *et al.*, 2020^[15]. Serum biochemistry revealed elevated levels of total bilirubin, direct bilirubin, AST, ALP and decreased total protein and albumin similar to findings of

Ganguly *et al.*, 2022^[7]. Elevated bilirubin levels could be attributed to the excessive lysis of erythrocytes, and hepatic dysfunction, indicating possible indirect hepatocellular damage (Omer *et al.*, 2003)^[11]. Faster recovery observed in this case could be attributed to both early diagnosis and the administration of a higher dose of Oxytetracycline. This agreement with the findings of Ananda *et al.*, 2009^[1], Gurjar *et al.*, 2019^[8]. Oxytetracycline exhibits greater efficacy when administered at higher doses in cases of anaplasmosis (Ananda *et al.*, 2009; Brahma *et al.*, 2018)^[1,5].



Fig 1: Pale and icteric vaginal mucous membrane in anaplasmosis affected cow

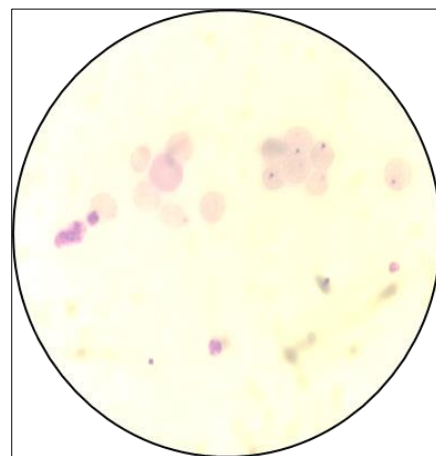


Fig 2: *Anaplasma sp.* in Giemsa-stained blood smear

Table 1: Hematobiochemical parameters

Parameter	Before treatment	Post treatment (5 days after treatment)	Reference range (Constable <i>et al.</i> , 2017) ^[6]
Haemoglobin (g/dl)	2.4	9.06	8.5-12.2
PCV (%)	7.2	27.2	22-33
RBC ($10^6/\mu\text{l}$)	1.34	2.96	5.1-7.6
WBC ($10^3/\mu\text{l}$)	4.8	11.8	4.9-12
BUN (mg/dl)	15.54	7.30	6-27
Creatinine (mg/dl)	1.05	0.99	1-2
Total protein (g/dl)	5.11	7.30	5.7-8.1
Albumin (g/dl)	2.0	3.18	2.1-3.6
AST (U/L)	178	64	78-132
ALP (U/L)	250	53	0-200
Total bilirubin (mg/dl)	0.68	0.34	0.01-0.5
Direct bilirubin (mg/dl)	0.49	0.13	0.04-0.44
Glucose (mg/dl)	64.6	60	45-75

Conclusion

In conclusion, bovine anaplasmosis in a crossbred Jersey cow was successfully managed with long acting oxytetracycline and supportive therapy. The results of the current investigation suggest a potential association between Anaplasma infection and hepatic damage. To effectively control bovine anaplasmosis, measures include proper management practices and the rotational use of acaricidal drugs.

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