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Blood transfusion therapy in a case of bovine babesiosis

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Abstract

Babesiosis due to *Babesia bigemina* in a four year old cross bred cow showed haemogram of Hb 2 g/dL, VPRC 7.3 percent, total RBC 1.41 millions/microliter and total WBC 5100/cmm. Serum biochemical values were total protein 5.531 gram percent, albumin 3.489 gram percent, globulin 2.042 gram percent, AST 68.89 IU/L, ALP 145.6 IU/L, total bilirubin 1.16 mg/dL, direct bilirubin 0.59 mg/dL, creatinine 1.364 mg/dL, calcium 10.35 mg/dL, phosphorus 5.885 mg/dL, magnesium 1.03 mg/dL and CPK 114.41 mg/dL. Serum iron was 0.061 mg/L and copper was 0.045 mg/L. Blood transfusion therapy was given using sterile polythene bag of 2 L capacity as collection bag and 3.85 per cent sodium citrate as anticoagulant @ 1 ml for 10 ml whole blood. The cow was treated with intravenous oxytetracycline (@ 20 mg/kg B.W), diminazene aceturate (@3.5 mg/kg), intravenous fluids and multivitamin injections. The animal died on 8th day of recumbency. Post mortem lesions and histopathological changes were studied.

Keywords: Babesiosis, blood transfusion, sterile polythene bag, sodium citrate, postmortem lesions, histopathology

1. Introduction

Babesiosis causes a febrile disease characterized by an extensive erythrocytic lysis leading to anaemia, icterus and hemoglobinuria and can be fatal. Blood transfusion is the first line therapy in the treatment of animal which is suffering from various types of haemorrhage or blood loss. Blood transfusion is the transfusion of the whole blood or its components (blood cells or plasma) obtained from a healthy animal (donor) to another animal (recipient) whose blood is deficient in quantity and quality. In animals, blood transfusion helps to restore the blood loss, recovery from anaemia, overcome the deficiencies of plasma proteins and clotting factors.

2. Materials and Methods

A crossbred cow aged 4 years was referred to the Teaching Veterinary Clinical Complex (TVCC) with a history of recumbency, anorexia and voiding reddish urine (Fig. 1). On examination, the vital signs were tachycardia, polypnoea, weak pulse, rectal temperature of 103^oF, icteric conjunctival and vaginal mucous membranes, hypogalactia, absence of rumination, coffee coloured urine (Hemoglobinuria) and tick infestation. The animal was treated by a field veterinarian for five days with intravenous oxytetracycline (@ 20 mg/kg B.W.), diminazene acetate (@ 3.5 mg/kg), intravenous fluids, multivitamin injections and was referred for blood transfusion therapy.

Haematological parameters were 2 g/dL Hb, 7.3 percent VPRC, 1.41 millions/microliter total RBC and 5100/ cmm total WBC. The differential leucocytes count exhibited 73.7 per cent granulocytes, 16.4 per cent lymphocytes and 9.9 per cent monocytes.

Serum biochemical values were 5.531 gram percent total protein, 3.489 gram percent albumin, 2.042 gram percent globulin, 68.89 IU/L AST, 145.6 IU/L ALP, 1.16 mg/dL total bilirubin, 0.59 mg/dL direct bilirubin, 1.364 mg/dL creatinine, 10.35 mg/dL calcium, 5.885 mg/dL phosphorus, 1.03 mg/dL magnesium, 114.41 mg/dL CPK. Serum Iron was 0.061 mg/L and Copper was 0.045 mg/L.



Fig 1: Recumbent cow

3. Results

3.1 Diagnosis and Treatment

Babesia bigemina were observed in the stained blood smear using Geimsa stain as pear-shaped bodies joined at an acute angle within the mature erythrocyte (Fig. 2). Anisocytosis, in which a greater number of echinocytes and acanthocytes were present. Blood transfusion therapy was given after performing a major cross match between recipient and healthy donor cow. The selected donor was a crossbred Holstein Friesian cow aged 5 years, weighing 300 kg having 9.3 g/dL Hb, 35.7 percent VPRC, 7.1 millions/microliter total RBC and 8900/cmm total WBC. Sterile polythene bags of two litre capacity were used as blood collection bag which was filled with 3.85 percent sodium citrate @ one ml for 10 ml whole blood. Using 16G needle, four litres of whole blood was collected aseptically from the jugular vein. The collected whole blood was transfused safely to the recumbent cow (Fig. 3). The entire transfusion was performed within two hours. Post transfusion reactions were absent. The percentage VPRC was increased to 16 and haemoglobin to 4.8 g/dL on the second day after transfusion. The cow succumbed on eighth day of recumbency. Samples were collected during post mortem examination and histology slides were examined. Probable cause of death was severe haemolytic anaemia secondary to *B. bigemina* infection.

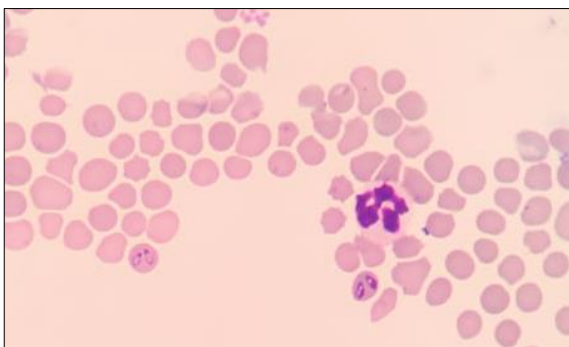


Fig 2: *Babesia bigemina* in blood smear



Fig 3: Blood transfusion

3.2 Postmortem Lesions

Conjunctival, oral and vulval mucous membranes and internal organs were pale and icteric (Fig. 4 and 5). Froth was present in trachea, bronchi and lungs (Fig. 6). Lung was diffusely congested and oedematous with frothy fluid oozing from the parenchyma on incision. Blood clots were present on the heart and engorged coronary vessels were observed. Multifocal pale-yellow areas were present on the liver. Gall bladder wall was thickened and was filled with bile which was dark greenish and thick. Hemorrhages and erosions with red base were present on the walls of reticulum and abomasum and in the kidney (Fig. 7). Coffee coloured urine was present in the urinary bladder.



Fig 4: Pale, icteric conjunctival, oral and vulval mucous membrane.



Fig 5: Icteric organs



Fig 6: Froth in lungs and trachea



Fig 7: Erosions in abomasum

3.3 Histopathological Findings

Abomasal epithelium showed erosion and necrosis that was stained with dark brown pigmentation (Fig. 8). Mononuclear infiltration observed in submucosa. Pinkish edema fluid was present in alveoli, bronchi and interstitium. Pulmonary vessels were congested and were filled with RBC. Infiltrations of inflammatory cells were present along with pulmonary hemorrhage (Fig. 9). Diffused hemorrhages observed in cortical area of lymph node along with congestion of all vessels (Fig. 10). Degenerative and necrotic changes along with severe multifocal congestions were observed in tubular epithelium of kidney (Fig. 11). Proteinaceous fluid and hemoglobin cast were observed in kidney tubules (Fig. 12).

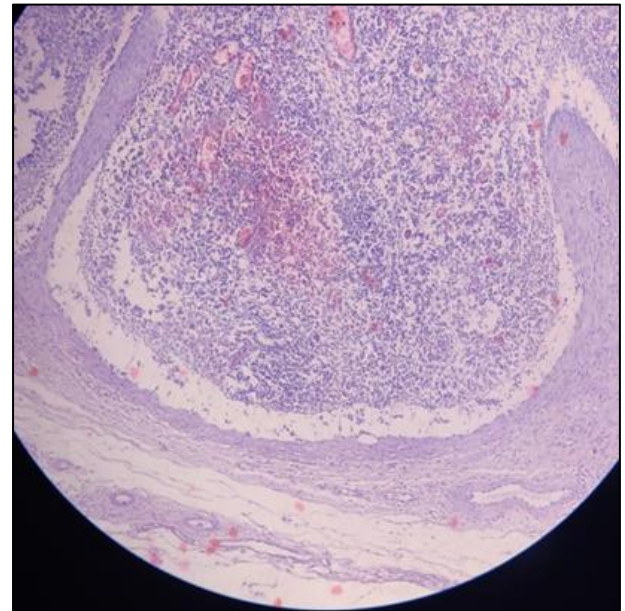


Fig 10: Lymph node cortex- capsular edema, hemorrhages, and congested vessels.

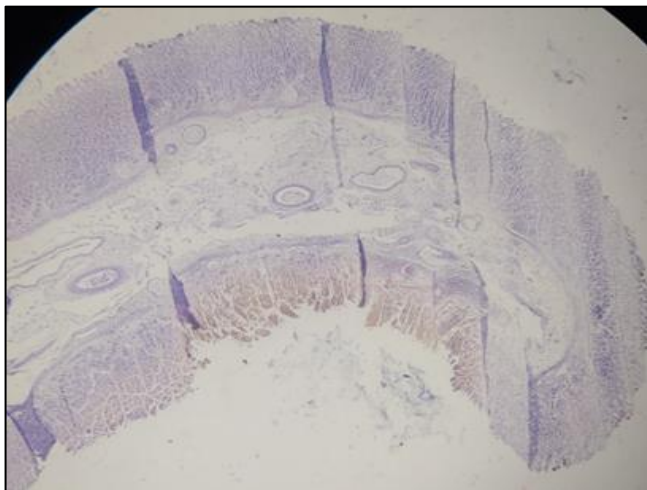


Fig 8: Necrosis and erosion of abomasal epithelium.

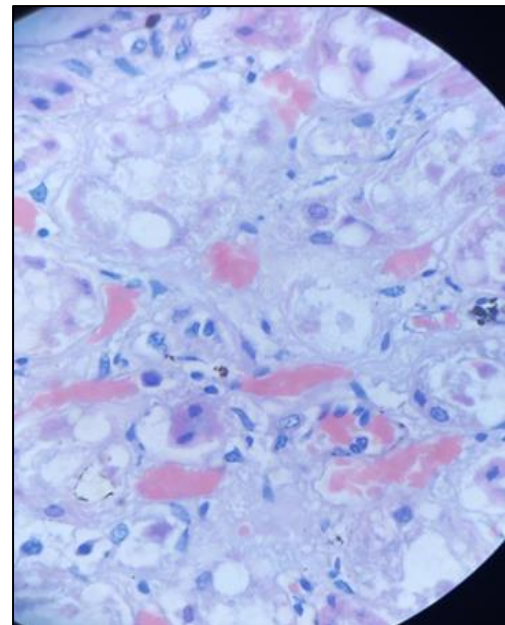


Fig 11: Degenerative and necrotic changes in tubular epithelium of kidney. Multifocal congestions

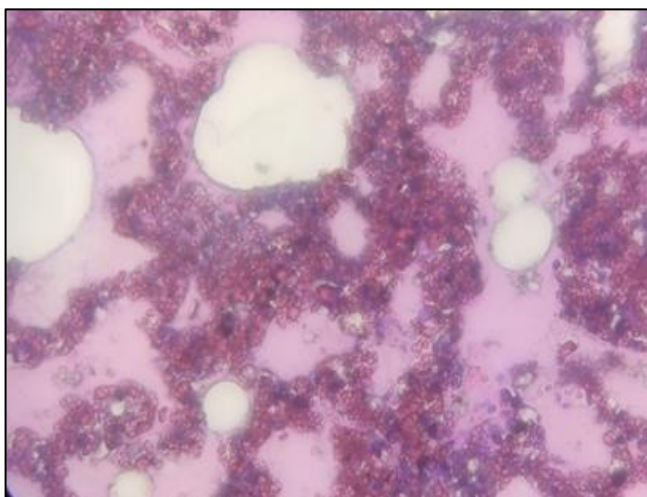


Fig 9: Pulmonary haemorrhage and oedema fluid.

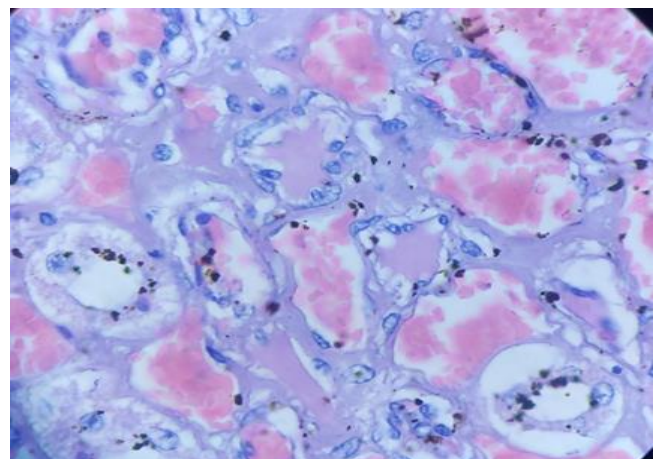


Fig 12: Haemoglobin casts in kidney

4. Discussion

The clinical signs observed in the present case were characteristic of bovine babesiosis (Salem *et al.*, 2016) [8]. Haemolytic anaemia, haemoglobinuria, anorexia and recumbency could become fatal in cross bred cow (Constable *et al.*, 2017) [4]. The haematological parameters and serum biochemical values observed in the present case were in agreement with the findings of Aziz *et al.*, 2020. Chandran *et al.* (2019) [1, 3] reported that haemogram of *Babesia* infected cattle revealed extremely low levels of Hb, VPRC, TEC and platelet counts and serum biochemistry revealed hyperbilirubinemia, moderate elevation of BUN and AST, and hypoproteinemia. Lotfollahzadeh *et al.* (2012) [7] concluded that serum iron concentration was low in animals infected with *Babesia bigemina* and it is evident in the present case.

Blood transfusion therapy is a lifesaving procedure in severe anaemic cows which should be given without much delay (Kuldeep *et al.*, 2019) [6]. Sterile polythene bags of two litre capacity could be used as blood collection bag and use of 3.85 percent sodium citrate @ one ml for 10 ml whole blood is a convenient anticoagulant for use in cows. A considerable improvement in haematology indices were recorded post transfusion. Blood transfusion can be done safely in cows after conducting a major cross match. The availability of healthy donor cows and the willingness of farmers poses constraints in bovine blood transfusion therapy.

Post mortem lesions observed in this case were supported by the findings of Fincher *et al.*, (2001) [6], Carter and Rools (2015) [2].

Haemolytic anaemia and multiorgan dysfunctions as sequelae of *Babesia bigemina* infection lead to the death of the affected recumbent cow.

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