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Concurrent anaplasmosis and polioencephalomalacia with myocardial injury in a pregnant goat

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Abstract

A 4.5-year-old non-descript pregnant doe in the last trimester of gestation was presented with a one-week history of anorexia, frequent bleating, hemoglobinuria and a characteristic stargazing posture. Clinical examination revealed depression, tachycardia, icteric conjunctival mucous membranes, and enlargement of the prescapular lymph node. Hematological evaluation demonstrated severe regenerative anemia, marked leukocytosis with neutrophilia, and lymphopenia. Serum biochemical analysis showed significant hyperbilirubinemia, elevated blood urea nitrogen and creatinine concentrations, and reduced total protein and albumin levels, indicating hemolytic anemia with hepatic and renal involvement. Microscopic examination of Giemsa-stained peripheral blood smears revealed basophilic inclusion bodies at the periphery of erythrocytes, confirming *Anaplasma* spp. infection. The presence of neurological manifestations, particularly the characteristic stargazing posture, suggested concurrent polioencephalomalacia. Based on the clinical presentation, hematobiochemical alterations, and blood smear findings, the case was diagnosed as concurrent anaplasmosis and polioencephalomalacia. The doe was successfully treated with oxytetracycline, thiamine hydrochloride and supportive therapy, resulting in marked clinical recovery. This report highlights the importance of recognizing concurrent infectious and metabolic neurological disorders in goats presenting with both hemolytic and neurological manifestations, enabling timely diagnosis and appropriate therapeutic intervention.

Keywords: Goat, anaplasmosis, polioencephalomalacia, anemia, stargazing.

Introduction

Anaplasmosis is an economically important tick-borne rickettsial disease of domestic and wild ruminants caused by intracellular bacteria of the genus *Anaplasma* (order Rickettsiales). In small ruminants, *Anaplasma ovis* is the principal etiological agent, infecting erythrocytes and causing extravascular hemolysis, which leads to anemia, icterus, reduced productivity, and systemic illness. The disease is transmitted primarily by ixodid ticks and, less frequently, through mechanical vectors such as biting flies or contaminated instruments. Clinically affected goats commonly present with fever, lethargy, anorexia, weight loss, pale or icteric mucous membranes, and hematological abnormalities, particularly reduced packed cell volume and hemoglobin concentration (Jalali *et al.*, 2016; Stuen, 2025) ^[4, 8].

Polioencephalomalacia (PEM) is an acute neurological disorder of ruminants characterized by cerebrocortical necrosis resulting from impaired cerebral energy metabolism. The condition is most commonly associated with thiamine (vitamin B₁) deficiency or excessive dietary sulfur intake, although ruminal dysbiosis, high-concentrate feeding, ruminal acidosis, and other nutritional imbalances are recognized predisposing factors in goats (Cebra *et al.*, 2015) ^[2]. Affected animals typically exhibit neurological signs including ataxia, circling, head pressing, cortical blindness, muscle tremors, opisthotonos, stargazing, seizures, and recumbency. Without prompt treatment, PEM may progress rapidly and become fatal; however, early administration of thiamine often results in rapid clinical recovery.

Although anaplasmosis and PEM are individually well recognized in goats, their concurrent occurrence has rarely been documented. The coexistence of infectious and metabolic neurological

disorders may obscure the clinical picture because of overlapping manifestations such as depression, weakness, anorexia, and recumbency, thereby delaying diagnosis and treatment. Awareness of such concurrent disease conditions is therefore essential for accurate clinical diagnosis and timely therapeutic intervention. The present case report describes the clinical presentation, hematobiochemical findings, diagnosis, treatment, and successful management of concurrent anaplasmosis and polioencephalomalacia in a pregnant goat.

Case history and observation

A 4.5-year-old non-descript pregnant doe in the last trimester of gestation was presented to the Large Animal Referral Clinic, Veterinary Clinical Complex, Veterinary College and Research Institute (VC & RI), Orathanadu, with a history of anorexia for one week, frequent bleating, hemoglobinuria, and a characteristic stargazing posture. The animal appeared dull and depressed on presentation (Fig. 1). Clinical examination revealed tachycardia with a heart rate of 186 beats/min, while the rectal temperature was within the normal range (38.3 °C). The conjunctival mucous membranes were congested and markedly icteric, and the prescapular lymph node was enlarged. The goat also passed melena-colored feces during examination. Neurological assessment revealed a persistent stargazing posture, suggestive of cerebral dysfunction.

Hematological analysis demonstrated severe anemia, with a hemoglobin concentration of 4.1 g/dL and an erythrocyte count of $1.05 \times 10^6/\text{mm}^3$. The leukogram revealed marked leukocytosis ($35.2 \times 10^3/\text{mm}^3$), characterized by neutrophilia (82%) and lymphopenia (7%), indicating an active inflammatory response. Cardiac biomarker evaluation showed a mildly increased cardiac troponin-I concentration (0.17 ng/mL), suggestive of myocardial involvement.

Serum biochemical analysis revealed marked metabolic derangements associated with systemic disease. Blood urea nitrogen (165 mg/dL) and creatinine (2.08 mg/dL) concentrations were elevated, indicating azotemia. Total bilirubin (27.67 mg/dL) and direct bilirubin (1.09 mg/dL) were markedly increased, consistent with severe hemolysis and hepatic dysfunction. Hypoproteinemia (total protein: 5.30 g/dL) and hypoalbuminemia (1.6 g/dL) were also evident. In addition, alanine aminotransferase (ALT) activity was elevated (53 U/L), suggesting hepatocellular injury. Collectively, the clinical, hematological, cardiac biomarker, and biochemical findings indicated severe hemolytic disease with multisystemic involvement, accompanied by neurological dysfunction.

Diagnosis and Treatment

Microscopic examination of peripheral blood smear revealed round to oval basophilic inclusion bodies located at the periphery of erythrocytes, consistent with *Anaplasma* spp. infection (Fig. 2). Clinically, the presence of icteric mucous membranes and hemolytic anemia together with the identification of inclusion bodies in erythrocytes confirmed the diagnosis of anaplasmosis. The presence of neurological signs, particularly stargazing posture suggested concurrent polioencephalomalacia (PEM). Based on the clinical findings, hematobiochemical alterations and microscopic examination, the case was diagnosed as concurrent anaplasmosis and polioencephalomalacia. The animal was treated with intravenous normal saline @100ml, oxytetracycline @22 mg/kg intravenously for 3 days and thiamine hydrochloride @10 mg/kg intravenously for 10 days to manage polioencephalomalacia. Supportive therapy included

meloxicam @0.5 mg/kg IV for anti-inflammatory action, chlorpheniramine maleate @0.5 mg/kg IM as antihistamine, Neurokind injection @2 ml IV as a neurotropic vitamin supplement and sodium acid phosphate @1.2 ml IM on alternate days. Additionally, ethno-veterinary supportive therapy consisting of a paste prepared from *Phyllanthus amarus*, *Sesbania grandiflora* and *Moringa oleifera* was administered.

Discussion

Anaplasmosis is an important tick-borne hemoparasitic disease of small ruminants caused by intracellular bacteria of the genus *Anaplasma*, which infect erythrocytes and result in hemolytic anemia. The disease is widely distributed in tropical and subtropical regions and affects cattle, sheep, and goats. In small ruminants, *Anaplasma ovis* is the predominant species and is associated with anemia, icterus, reduced productivity, and systemic illness (Berthelsson *et al.*, 2020)^[1]. In the present case, the goat exhibited classical clinical signs including anorexia, depression, icteric mucous membranes, hemoglobinuria, enlarged prescapular lymph node, and marked tachycardia. These findings are in agreement with previous reports describing hemolytic anemia and jaundice as the characteristic manifestations of caprine anaplasmosis (Liu *et al.*, 2012)^[5]. Destruction of erythrocytes reduces the oxygen-carrying capacity of blood, resulting in tissue hypoxia, compensatory tachycardia, and generalized weakness.

The marked hyperbilirubinemia observed in this case further supports extensive hemolysis associated with *Anaplasma* infection. Elevated blood urea nitrogen and creatinine concentrations may have resulted from dehydration, reduced renal perfusion, pigment nephropathy secondary to hemoglobinuria, or renal impairment associated with severe systemic illness (Constable *et al.*, 2017)^[3].

A noteworthy finding in the present case was the elevation of cardiac troponin-I (0.17 ng/mL), indicating myocardial injury. Cardiac troponin-I is a highly sensitive and specific biomarker of cardiomyocyte damage and has emerged as a valuable indicator of myocardial injury in veterinary medicine. Although *Anaplasma* organisms do not directly infect cardiac muscle, severe hemolytic anemia can produce systemic hypoxia, reducing myocardial oxygen delivery and predisposing to ischemic cardiomyocyte injury. In addition, systemic inflammation, oxidative stress, cytokine release, metabolic disturbances, and reduced coronary perfusion associated with severe anemia may further contribute to myocardial cell damage and leakage of cardiac troponin-I into the circulation. The concomitant tachycardia observed in this goat may also have increased myocardial oxygen demand, thereby exacerbating myocardial stress. Therefore, the increased cardiac troponin-I concentration in the present case most likely reflects secondary myocardial injury rather than primary cardiac disease. This finding suggests that assessment of cardiac biomarkers may provide valuable prognostic and diagnostic information in goats with severe anaplasmosis and multisystemic involvement.

In addition to hemoparasitic infection, the goat exhibited neurological signs, particularly the characteristic stargazing posture, indicating involvement of the central nervous system. These clinical manifestations are typical of polioencephalomalacia (PEM), a neurological disorder characterized by cerebrocortical necrosis resulting from impaired cerebral energy metabolism (Sivaraman *et al.*, 2016)^[7]. The concurrent occurrence of anaplasmosis and PEM in

this case was likely precipitated by severe systemic illness, prolonged anorexia, and ruminal dysfunction, which may have reduced microbial thiamine synthesis and predisposed the animal to thiamine deficiency. Similar neurological manifestations have been described in goats with thiamine-responsive polioencephalomalacia (Shafi *et al.*, 2022) [6].

The successful clinical recovery following administration of oxytetracycline, thiamine hydrochloride, and supportive therapy emphasizes the importance of early recognition and simultaneous treatment of both infectious and metabolic disorders. This case highlights that goats presenting with hemolytic anemia accompanied by neurological abnormalities should be thoroughly evaluated for concurrent disease conditions. Furthermore, the detection of elevated cardiac troponin-I suggests that myocardial injury may occur as a secondary complication of severe anaplasmosis and underscores the potential value of incorporating cardiac biomarker assessment into the clinical evaluation of critically ill small ruminants

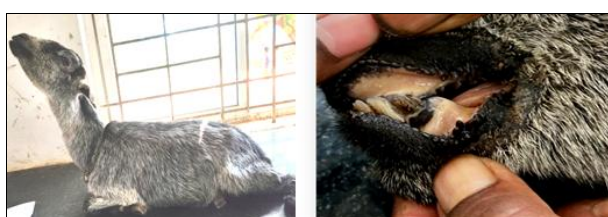


Fig 1: Stargazing posture with icteric mucous membranes in the affected goat.

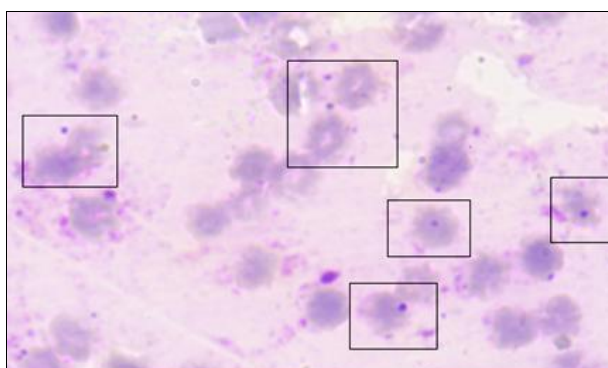


Fig 2: Round to oval basophilic inclusion bodies at the periphery of erythrocytes suggestive of *Anaplasma* spp. infection.

Conflict of Interest

Not available

Financial Support

Not available

References

- Berthelsson J, Ramabu SS, Lysholm S, *et al.* *Anaplasma ovis* infection in goat flocks around Gaborone, Botswana. *Comp Clin Pathol.* 2020;29:167-172. doi:10.1007/s00580-019-03044-4.
- Cebra C, Loneragan GH, Gould DH. Polioencephalomalacia (cerebrocortical necrosis). In: Smith BP, editor. *Large Animal Internal Medicine.* 5th ed. St. Louis: Elsevier Mosby; 2015. p. 954-956.
- Constable PD, Hinchcliff KW, Done SH, Grünberg W. *Veterinary Medicine: A Textbook of the Diseases of Cattle, Horses, Sheep, Pigs and Goats.* 11th ed. St. Louis: Elsevier; 2017.
- Jalali SM, Bahrami S, Rasooli A, Hasanvand S. Evaluation of oxidant/antioxidant status, trace mineral levels, and erythrocyte osmotic fragility in goats naturally infected with *Anaplasma ovis*. *Trop Anim Health Prod.* 2016;48(6):1175-1181. doi:10.1007/s11250-016-1071-0.
- Liu Z, Ma M, Wang Z, Wang J, Peng Y, Li Y, *et al.* Molecular survey and genetic identification of *Anaplasma* species in goats from central and southern China. *Appl Environ Microbiol.* 2012;78:464-470.
- Shafi TA, Siddiqui MF, Sakhare MP, Syed AM, Mane PM, Lingayat SS, *et al.* Thiamine responsive polioencephalomalacia in goats. *Acta Scientific Veterinary Sciences.* 2022;4(5):55-57.
- Sivaraman S, Vijayakumar G, Venkatesakumar E, Ponnuswamy KK. Clinical management of polioencephalomalacia in goats: A retrospective study of 18 cases. *Indian Veterinary Journal.* 2016;93(5):70-72.
- Stuen S. Tick-borne diseases in small ruminants. In: Simões J, editor. *Encyclopedia of Livestock Medicine for Large Animal and Poultry Production.* Cham: Springer; 2025. doi:10.1007/978-3-031-52133-1_228-1.

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