CASE REPORT

Pericardial effusion associated with ehrlichiosis in a dog

Efusão pericárdica associada à erliquiose em cão

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Abstract

This report describes a rare manifestation of canine ehrlichiosis presenting with pericardial effusion, emphasizing the clinical, diagnostic, and therapeutic aspects relevant to case management. A 7-month-old dog presented apathy, anorexia, and progressive lethargy, and was found to have anemia and marked thrombocytopenia. Physical examination revealed muffled heart sounds and weak femoral pulses. Hematological analysis confirmed non-regenerative anemia and severe thrombocytopenia, while serological and molecular testing supported infection with *Ehrlichia canis*. Thoracic imaging and echocardiography demonstrated a substantial pericardial effusion causing hemodynamic compromise, which necessitated immediate pericardiocentesis. Cytological evaluation of the pericardial fluid excluded neoplastic and purulent etiologies, reinforcing suspicion of an inflammatory origin secondary to tick-borne disease. The dog was treated with doxycycline, prednisolone, dipyrone, furosemide, and imidocarb dipropionate (Imizol®), resulting in progressive clinical improvement, normalization of hematological parameters, and complete resolution of the effusion on follow-up imaging. This case highlights that, although uncommon, cardiac involvement may occur as a complication of canine ehrlichiosis. Prompt recognition of this association, combined with a multidisciplinary therapeutic strategy, is crucial to preventing fatal outcomes and ensuring recovery in complex presentations involving cardiovascular compromise.

Keywords: Cardiac tamponade. Pericardial effusion. Vasculitis. *Rhipicephalus sanguineus*.

Resumo

Este relato descreve uma manifestação rara de erliquiose canina associada à efusão pericárdica, destacando os aspectos clínicos, diagnósticos e terapêuticos relevantes para a condução do caso. Um cão de 7 meses foi avaliado devido à apatia, anorexia e letargia progressiva, acompanhadas de anemia e trombocitopenia acentuada. O exame físico revelou bulhas cardíacas hipofonéticas e pulsos femorais fracos. A análise hematológica confirmou anemia não regenerativa e trombocitopenia grave, enquanto testes sorológicos e moleculares foram compatíveis com infecção por Ehrlichia canis*. Exames de imagem torácica e ecocardiografia evidenciaram volumosa efusão pericárdica com comprometimento hemodinâmico, exigindo pericardiocentese imediata. A avaliação citológica do líquido pericárdico excluiu etiologias neoplásicas e purulentas, reforçando a suspeita de origem inflamatória secundária*

à doença transmitida por carrapatos. O tratamento instituído com doxiciclina, prednisolona, dipirona, furosemida e dipropionato de imidocarb (Imizol®) resultou em melhora clínica progressiva, normalização dos parâmetros hematológicos e resolução completa da efusão em exames de imagem de acompanhamento. Este caso evidencia que, embora incomum, o acometimento cardíaco pode ocorrer como complicação da erliquiose canina. O reconhecimento precoce dessa associação, aliado a uma abordagem terapêutica multidisciplinar, é fundamental para prevenir desfechos fatais e garantir a recuperação em apresentações clínicas complexas com comprometimento cardiovascular.

Palavras-chave: *Tamponamento cardíaco. Derrame pericárdico. Vasculite*. Rhipicephalus sanguineus.

Introduction

Canine monocytic ehrlichiosis (CME) is a globally distributed infectious disease caused by *Ehrlichia canis*, an obligate intracellular Gram-negative bacterium of the genus *Ehrlichia* and family Anaplasmataceae (Franco-Zetina et al., 2019). Recent studies in Brazil have shown regional variation in CME prevalence, ranging from < 1 to over 70%, with particularly high rates in the Northeast and the detection of multiple *E. canis* genotypes (Taques et al., 2020). Transmission occurs via *Rhipicephalus sanguineus* ticks, which acquire the bacterium during blood feeding from infected hosts and transmit it during subsequent feedings (Sebastian et al., 2021). The pathogen primarily targets cells of the mononuclear phagocyte system and triggers immune-mediated mechanisms that compromise host immune defenses (Harrus, 2015).

CME typically progresses through three phases: acute, subclinical, and chronic (Irwin and Beadle, 2022). The acute phase is characterized by lethargy, fever, anorexia, reactive lymphadenopathy, and nasal discharge (Skotarczak et al., 2003). The subclinical phase, often asymptomatic, may persist for up to five years, whereas the chronic phase involves progressive clinical deterioration, including weight loss, hemorrhage, mononuclear cell infiltration of various organs, and, in severe cases, death (Mylonakis et al., 2019). Diagnosis relies on a combination of serological, parasitological, and molecular methods, and differential diagnosis is essential to distinguish CME from other vector-borne diseases such as *Babesia canis* and *Anaplasma platys* (Ybañez et al., 2018).

Pericardial effusion, a clinically significant condition in dogs, is defined as the pathological accumulation of fluid within the pericardial cavity, usually resulting from impaired fluid dynamics, including alterations in production, reabsorption, and hydrostatic or osmotic pressure balance (Lazaros et al., 2021). Common etiologies include neoplasia, infections, trauma, cardiovascular anomalies, metabolic disorders, and idiopathic causes (Carvajal et al., 2019). Infectious origins may involve bacterial and fungal agents, migrating foreign bodies, and viral infections (Ribas et al., 2015). *E. canis* has occasionally been implicated in myocardial injury and pericardial effusion (Tabar et al., 2018).

This case report describes the clinical and surgical management of pericardial effusion associated with monocytic ehrlichiosis in a dog, aiming to expand current knowledge and guide the treatment of this rare complication.

Case report

A 7-month-old mixed-breed male dog weighing 5 kg was presented to the Veterinary Hospital of the Federal University of Jataí (UFJ) with apathy, anorexia, and abdominal distension. According to the owner, the dog had decreased water intake, no contact with other animals, and no history of vaccination or deworming.

On physical examination, the patient exhibited hypothermia (36.9 °C), cyanotic mucous membranes, tachypnea, a heart rate of 160 beats per minute with muffled heart sounds, generalized lymphadenomegaly, and hepatomegaly on abdominal palpation.

Complementary diagnostic tests included a complete blood count, alanine aminotransferase (ALT), alkaline phosphatase (AP), creatinine, urea, thoracic radiography, and abdominal ultrasonography. An echocardiogram was recommended but could not be performed due to financial constraints. The erythrogram revealed mild normocytic, normochromic anemia, with decreased red blood cell count, hematocrit, hemoglobin concentration, and thrombocytopenia (Table 1). Leukocytosis, characterized by neutrophilia with a regenerative left shift and monocytosis, was identified in the leukogram (Table 2).

Table 1 - Erythrogram values of a dog with canine monocytic ehrlichiosis

Erythrogram	Results	References values
Red blood cells	3.9	6 - 7 (x10⁶/µL)
Hematocrit	26	40 - 47 (%)
Hemoglobin	8.6	14 - 17 (g/dL)
MCV[1]	67	65 - 78 (fL)
MCH[2]	22	21 - 25 (Pg)
MCHC[3]	33	30 - 35 (g/dL)
Plasma proteins	6.2	6.0 - 8.0 (d/dL)
Platelets	138.000	200.000 - 500.000 (µL)

Note: [1]Mean corpuscular volume; [2]Mean corpuscular hemoglobin; [3]Mean corpuscular hemoglobin concentration.

Biochemical analysis revealed marked elevations in ALT (220 U/L) and AP (283 U/L), while creatinine and urea concentrations remained within reference intervals. Thoracic radiography and ultrasonography confirmed pericardial effusion (Figure 1), characterized by an enlarged, globoid cardiac silhouette and the presence of pericardial fluid. Abdominal ultrasonography demonstrated hepatomegaly with poorly defined margins, rounded edges, reduced echogenicity, and dilation of the portal vasculature. The gallbladder exhibited wall thickening and signs of edema. The spleen was hypoechoic, with vascular narrowing and features suggestive of hypovolemia, consistent with microsplenia. No abnormalities were identified in other abdominal structures.

Table 2 - Leukogram values of a dog with canine mo-nocytic ehrlichiosis

Leukogram	Relative %	Absolute/µl	Reference relative %	Reference absolute/µl
Total Leukocytes	100	30 × 10³	100	8 -16 × 10³
Metamyelocytes	0	0	0	0
Rods	3	0,901 × 10³	0 - 1	0 - 0.16 × 10³
Segmented	75	22.5 × 10³	55 - 70	3.68 - 10.90 × 10³
Eosinophils	1	0,300 × 10³	1 - 6	0.08 - 0.80 × 10³
Basophils	0	0	0 - 1	0
Lymphocytes	12	3.61 × 10³	20 - 40	2.40 - 7.68 × 10³
Monocytes	9	2.00 × 10³	2 - 8	0.08 - 1.60 × 10³

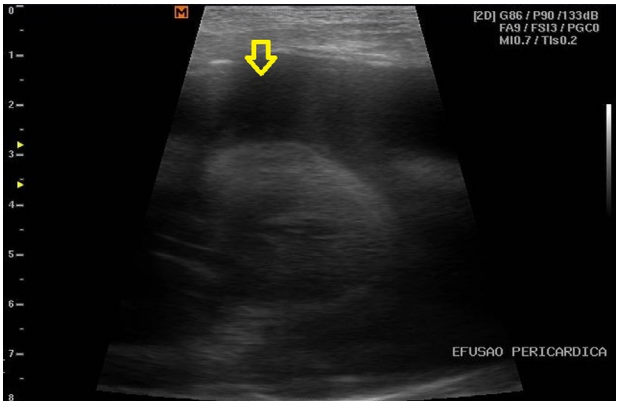

Figure 1 - Thoracic ultrasound showing pericardial effusion (yellow arrow).

Emergency pericardiocentesis was performed due to the patient's critical condition, yielding 170 mL of pericardial fluid under ultrasound and electrocardiographic guidance. Following stabilization and fluid removal, serological testing confirmed *E. canis*/*E. ewingii* infection, establishing the diagnosis of pericardial effusion secondary to hemoparasitosis. The pericardial fluid was not submitted for cytological or microbiological analysis due to the need for immediate stabilization of the patient's critical condition, combined with the unavailability of specialized laboratory resources at the time of the emergency procedure. This limitation precluded the classification of the effusion type (transudate, exudate, or hemorrhagic) and the identification of potential infectious agents through culture.

The therapeutic protocol included doxycycline (10 mg/kg, orally, once daily [SID], for 28 days), Erythros® (one tablet, orally, SID, for 30 days), prednisolone (1 mg/kg, orally, SID, for 7 days), dipyrone (500 mg/mL, orally, twice daily [BID], for 5 days), furosemide (2 mg/kg, orally, SID, for 5 days), and two subcutaneous

applications of Imizol® (5 mg/kg) administered 15 days apart, resulting in marked clinical improvement. At the two-week follow-up, physical examination and thoracic radiography revealed no abnormalities, indicating complete resolution of the pericardial effusion. The owner reported that the dog remained clinically stable.

Discussion

To the best of our knowledge, no previous case reports have documented an association between ehrlichiosis and pericardial effusion in dogs. The pathophysiological mechanisms underlying this rare presentation can be analyzed in light of the clinical, laboratory, and imaging findings observed in the present case.

The complex clinical presentation of CME, particularly during the acute phase, was evident in this patient. CME, caused by *E. canis* and transmitted by *R. sanguineus* ticks, is characterized by nonspecific signs such as fever, apathy, anorexia, petechiae, pale mucous membranes, and tachypnea (Lima et al., 2019). These clinical signs are frequently accompanied by systemic involvement, including hepatomegaly, splenomegaly, lymphadenopathy, ophthalmopathies, vasculitis, and myocarditis (Marcili et al., 2022). The multisystemic nature of the disease is explained by the pathogen's marked tropism for mononuclear phagocytic cells, particularly those in the spleen, lymph nodes, and liver (Harrus and Waner, 2011).

Thrombocytopenia, a common laboratory finding in CME, was present in this case and is plausibly explained by immune-mediated platelet destruction and splenic sequestration (Christodoulou et al., 2023). Leukocytosis with neutrophilia and a regenerative left shift, along with increased ALT and AP levels, suggested hepatocellular injury (Aziz et al., 2022). Vasculitis, central to CME pathogenesis, has been implicated in renal, respiratory, and cardiac complications. The inflammatory process is mediated by immune complex deposition and cytokine release, including TNF-α, IFN-γ, IL-1β, IL-6, IL-8, IL-12, and IL-18 (Cardoso et al., 2023; Tominello et al., 2019). Based on the clinical and laboratory findings, it is plausible that pericardial vasculitis in this patient increased vascular permeability, contributing to the development of pericardial effusion.

A concurrent reduction in colloid osmotic pressure may have played a secondary role, as plasma protein levels were near the lower limit of the reference interval (Whelchel et al., 2023; Darwish and Lui, 2023). Clinical signs such as weakness, abdominal distension, and tachypnea were consistent with cardiac tamponade, a condition characterized by impaired venous return, reduced ventricular filling, and decreased cardiac output (Krentz et al., 2017). Diagnosis was based on physical examination, laboratory results, and imaging findings from thoracic radiography and ultrasonography, as echocardiography could not be performed due to financial limitations (DeFrancesco and Ward, 2021).

Emergency pericardiocentesis was performed to alleviate cardiac compression and restore hemodynamic stability. Immediate improvement was achieved, and cytological evaluation of the drained fluid was recommended to assist in determining the underlying etiology (Michelotti et al., 2019). CME diagnosis was confirmed serologically via Snap® 4Dx Plus, as molecular testing was unavailable. Doxycycline was administered as first-line therapy, leading to clinical resolution.

Preventive measures for CME include the use of topical or systemic acaricides to inhibit tick infestation. An integrated prevention strategy should combine regular physical inspection, environmental control, and consistent acaricide application.

Conclusion

This case reinforces the rare but possible association between pericardial effusion and CME in dogs. Emergency intervention, accurate etiological diagnosis, and prompt initiation of doxycycline therapy were decisive for the successful outcome. From a clinical perspective, veterinarians should include CME in the differential diagnosis of pericardial effusion in young dogs presenting with systemic signs, particularly in regions where the disease is endemic. Early recognition and targeted treatment can be lifesaving in such cases.

Authors´contributions

ICGT: writing of the original draft, investigation

(case management), writing, review and editing. WFA: investigation (patient care). FSZ: writing of the original draft, data curation, formal analysis, and visualization (formatting). FLR: visualization (image preparation and formatting), writing, review and editing. CNS: writing, review and editing.

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