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Concurrent *Babesia species* infection with feline enteric coronavirus and giardiasis in two female cats

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ABSTRACT: The premunition stage of babesiosis poses a significant risk of relapse due to immune suppression. This report describes two cats that presented to a veterinary clinic with lethargy, anorexia of several days' duration, watery eyes, and loose stools. Both cats were unvaccinated and lived in an open environment shared with their owners. Initial clinical evaluation suggested feline coronavirus (FCoV) infection and giardiasis; however, subsequent peripheral blood smears revealed intracellular parasites consistent with Babesia sp. The initial treatment targeted viral and protozoal infections using antiprotozoal and antiviral agents for seven days, followed by a 21-day regimen of clindamycin and multivitamins to manage babesiosis. Hematological analysis and Giemsa-stained peripheral blood smears revealed anemia, thrombocytopenia, and persistent babesiosis. Clindamycin therapy effectively reduced parasitemia and alleviated clinical signs, including anemia, anorexia, and weakness, although complete clearance of Babesia sp. from the peripheral blood was not achieved at the administered dosage.

Keywords:
anemia, Babesia sp., clindamycin, parasitemia, thrombocytopenia

■ INTRODUCTION

Babesiosis is a parasitic disease of red blood cells caused by protozoa of the genus Babesia, which is transmitted mainly through tick vectors. Young cats, particularly those under three years of age, are more susceptible and often develop severe clinical manifestations, with *Babesia felis* being the most common etiological agent in domestic cats (Karasová *et al.* 2022; Kumar *et al.* 2008).

Feline enteric coronavirus (FCoV), an enveloped RNA virus of the family Coronaviridae, is an important pathogen in cats (Eldredge *et al.* 1995). Transmission occurs through close contact or exposure to infectious secretions (Aiello 2016). While most infections are subclinical or cause mild enteritis, less than 1% of exposed cats may develop fatal feline infectious peritonitis (FIP). Protozoal infections, such as giardiasis caused by Giardia spp., remain widespread and cause acute or chronic diarrhea, occasionally leading to malabsorption. Transmission occurs via the fecal–oral route through the ingestion of cysts, with factors such as overcrowding, stress, and humidity enhancing the spread (Aiello 2016).

The coexistence of babesiosis, FCoV, and giardiasis may worsen the clinical severity, complicate the diagnosis, and challenge the therapeutic management. This case report describes the clinical presentation, diagnostic findings, and treatment of feline babesiosis with concurrent FCoV and giardiasis.

■ CASE

Anamnesis and Signalment: Two domestic shorthair (DSH) cats were presented to a veterinary clinic by their owners. Cat 1, named Ncil, was a female aged over two years, and Cat 2, named Lala, was a female aged over five years of age (Figure 1). Both cats showed lethargy, anorexia lasting several days, watery eyes, and soft stool. Neither had ever been vaccinated, and both lived in an open environment in the same household. A previous history of ectoparasite (flea) infestation had been reported but had already been treated. **Physical Examination:** Both cats demonstrated prolonged skin turgor (>3 s), indicative of dehydration, pale mucous membranes, and mildly elevated body temperatures. In addition to excessive lacrimation, hypersalivation and sneezing were also observed. No ectoparasites were found on the body surface during the examination. Rapid diagnostic tests revealed positive results for feline coronavirus (FCoV) and giardiasis in both cats. Hemogram analysis and Giemsa (10%) staining of peripheral blood smears identified intraerythrocytic parasites consistent with Babesia spp.. The parasitemia level in Ncil was 2.42% (per 1,000 erythrocytes examined), whereas in Lala, it was 5.7%. **Diagnoses**: Concurrent FCoV infection, giardiasis, and babesiosis.

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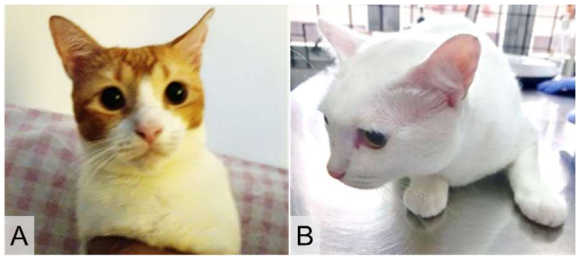

Figure 1. Clinical appearance of the two domestic shorthair cats: (A) Ncil and (B) Lala.

Treatment: Initiated with metronidazole to control Giardia sp. infection, along with supportive therapy consisting of intravenous electrolyte fluids, cefixime as a prophylactic antibiotic against secondary infection, and multivitamin supplementation for seven days. Subsequently, clindamycin (12.5 mg/kg body weight twice daily) combined with multivitamins was administered for 21 days. Follow-up blood smears revealed a reduction in parasitemia to 0.82% in Ncil and 0.95% in Lala groups. Clinically, both cats showed marked improvement after the treatment.

■ RESULTS AND DISCUSSION

Based on the clinical presentation and supporting examinations, both cats were diagnosed with concurrent FCoV, giardiasis, and babesiosis. The hematological findings are summarized in Table 1. In Ncil, thrombocytopenia was observed, with a platelet count of 73 × 10^3/µL compared to the normal range of 150–600 × 10^3/µL (Macintire *et al*. 2012). Thrombocytopenia in babesiosis is often attributed to abnormal platelet distribution (sequestration) associated with splenomegaly, which reduces the concentration of freely circulating platelets (Stockham & Scott 2008). In contrast, Lala did not present with thrombocytopenia. This is consistent with the observation by Hartmann *et al.* (2013), who noted that although thrombocytopenia is a common finding in babesiosis, it is not invariably present in cats.

Babesiosis also induces intravascular hemolysis through the direct destruction of infected erythrocytes, leading to hemolytic anemia (Ettinger *et al*. 2016; Nelson & Couto 2020). In Ncil, the red blood cell count was 10.87 × 10^6/µL, which was slightly above the normal range of 4.6–10.0 × 10^6/µL. Elevated mean corpuscular volume (MCV) suggests a compensatory response to anemia. However, hemoconcentration secondary to dehydration likely masked the true extent of anemia, as supported by elevated total protein (TP) and hematocrit (Hct) values and pale mucous membranes.

It was suspected that both cats were in the premunition stage of babesiosis following a previous flea infestation. The premunition stage represents a condition in which host immunity maintains a balance between the immune response and parasite replication, preventing overt disease while allowing persistence of infection. Animals in this stage are at risk of relapse and serve as potential reservoirs for tick-borne transmission (Karasová *et al.* 2022).

Table 1. Hematological findings of two domestic shorthair cats diagnosed with concurrent FCoV, giardiasis, and babesiosis.

Parameters	Cats		Normal value
	Ncil	Lala	
RBC (10^6/µL)	10.9	6.7	4.6 - 10.0
Hb (g/dL)	17.6	12.6	9.3 - 15.3
Hct (%)	**50.4**	39.7	28 - 49
MCV (fL)	50.4	**59.3**	39 - 52
MCH (pg)	16.1	18.7	30 - 38
MCHC (g/dL)	32.1	18.7	30 - 38
Platelet (10^3/µL)	**73**	205	150- 600
Total Protein (g/dL)	**8.5**	**8.1**	5.4 - 8.2
Parasitemia (%)	2.4	**5.7**	**0**

Note: RBC=Red Blood Count; Hb=Hemoglobin; Hct=Hematocrit; MCV=Mean Corpuscular Volume; MCH=Mean Corpuscular Hemoglobin; MCHC=Mean Corpuscular Hemoglobin Concentration;

Clindamycin effectively suppressed parasitemia, alleviating the clinical signs of Babesia sp. infection, including anemia, anorexia, and weakness. However, it did not eliminate parasites from the peripheral blood at the administered dosage. Both cats showed clinical improvement after treatment (Figure 1), which is consistent with Hartmann *et al*. (2013), reported that recovered cats often remain chronic carriers.

■ CONCLUSION

Babesiosis in Ncil and Lala was triggered by immune suppression due to FCoV and giardiasis. This immunosuppression reactivated the blood parasites, thereby enabling infection. Treatment with antiprotozoal agents has proven beneficial, although repeated management may be required.

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