

Canine granulocytic ehrlichiosis in a Bernese mountain dog in Indonesia: A rare case confirmed by neutrophilic morulae

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ABSTRACT: Canine ehrlichiosis is a tick-borne disease caused by intracellular bacteria belonging to the genus *Ehrlichia*. While *Ehrlichia canis* is the predominant species reported in Indonesia, this case describes a suspected infection by *Ehrlichia ewingii*, a species not previously reported in the country. A 7-year-old female Bernese mountain dog presented with generalized weakness, anorexia, cachexia, vomiting, hematuria, diarrhea, and melena. Clinical evaluation, hematological abnormalities, a history of tick exposure, and a positive serologic test supported the diagnosis of ehrlichiosis. Notably, cytological examination revealed morulae within neutrophils, an indicator suggestive of *E. ewingii* infection. The patient was treated with doxycycline, imidocarb dipropionate, and renal support for two weeks; however, follow-up was not completed. This case highlights the importance of cytological examination in ehrlichiosis diagnosis and raises the possibility of imported or emerging *E. ewingii* infections in Indonesia.

Keywords:

canine ehrlichiosis, *Ehrlichia canis*, *Ehrlichia ewingii*, Bernese mountain dog, Indonesia

■ INTRODUCTION

Canine ehrlichiosis is a tick-borne disease caused by *Ehrlichia* bacteria, with *E. canis* being the primary species affecting dogs in tropical regions, including Indonesia (Harrus & Waner 2011). The disease is transmitted by the brown dog tick *Rhipicephalus sanguineus*, manifesting as Canine Monocytic Ehrlichiosis (CME) with clinical signs including fever, lethargy, anorexia, bleeding disorders, and thrombocytopenia (Neer *et al.* 2002). *Ehrlichia ewingii*, which causes Canine Granulocytic Ehrlichiosis (CGE), is found mainly in the United States and is transmitted by *Amblyomma americanum* ticks (Anderson *et al.* 1992). CGE presents with polyarthritis, fever, and mild hematologic changes (Quroollo *et al.* 2019); however, its presence outside endemic areas remains undocumented. Diagnosis involves serological testing and microscopic identification of morulae in white blood cells. SNAP 4Dx Plus tests cannot distinguish between *E. canis* and *E. ewingii* because of cross-reactivity (Chandrashekhar *et al.* 2010), which requires consideration of clinical findings and travel history (Breitschwerdt *et al.* 1998). This case report describes a suspected *E. ewingii* infection in a Bernese mountain dog in Indonesia, raising questions about pathogen introduction.

■ CASE

Signalment: A 7-year-old, female Bernese mountain dog.

History and anamnesis: General weakness, anorexic and

cachexic, vomiting, hematuria, diarrhea, melena, severe dental calculi. The dog had been hospitalized in another clinic for two months before the presentation. **Clinical Findings:**

No ophthalmic signs were reported. The dog was anorexic with general weakness. The mucous membrane was pale, and the temperature was 38.2°C. Blood examination revealed lymphopenia, anemia, hemoglobinemia, and low hematocrit and platelet counts. Blood biochemistry revealed hyperamylasemia, high BUN and creatinine levels, hypercalcemia, hyperphosphatemia, and hypokalemia. A serological test using IDEXX SNAP 4Dx Plus was positive for *E. canis*/*E. ewingii* antibody. Microscopic examination of the blood smear showed morulae inside the neutrophils.

Treatment: Imidocarb injection 120 mg was given subcutaneously and doxycycline 10 mg/kg SID was prescribed for 28 days. Another imidocarb injection was scheduled for day 14 but the dog did not show up. Renate® (a food supplement for cats for the treatment of chronic renal failure) was also prescribed BID for two weeks.

■ RESULTS AND DISCUSSION

Given the endemicity of *Ehrlichia canis* and its vector in Indonesia, ehrlichiosis remains a key differential diagnosis in

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dogs with tick infestation and signs consistent with canine ehrlichiosis. According to the ACVIM guidelines (Neer *et al.* 2002), treatment should begin when clinical signs, clinico-pathological abnormalities, and serological positivity align. The gold standard for serological confirmation is the indirect fluorescence antibody (IFA) test (Harrus & Waner 2011). Studies between IFA, Western blot, and ELISA (SNAP 3Dx, IDEXX Laboratories Inc.) have shown strong concordance for medium- and high-titer sera (O'Connor *et al.* 2006).

Microscopic examination of blood smears revealed basophilic intracytoplasmic morulae within neutrophils (Figure 1), a pathognomonic feature of *Ehrlichia ewingii* infection (Anderson *et al.* 1992). This finding contrasts with that of *E. canis*, which forms morulae in monocytes (Harrus & Waner 2011).

The IDEXX SNAP 4Dx Plus test serves as a screening tool for ehrlichiosis but has limitations. However, serological tests cannot discriminate between active and prior infections (Harrus *et al.* 2012). Although our patient tested positive for antibodies against *Ehrlichia* spp., species differentiation requires cytological or molecular confirmation (Chandrashekhar *et al.* 2010).

Based on the neutrophilic morulae, a diagnosis of canine granulocytic ehrlichiosis (CGE) caused by *E. ewingii* was established. This represents an uncommon diagnosis in Indonesia, where *E. canis* is predominant. Since *E. ewingii* is primarily reported in the Americas (Neer *et al.* 2002), potential exposure routes were investigated. The owner reported an urban residence with frequent interactions with dogs of unknown origin.

Visualizing morulae in blood smears remains challenging (Harrus *et al.* 2012). *E. ewingii* is morphologically indistinguishable from *Anaplasma phagocytophilum*, a globally distributed pathogen (Cocayne *et al.* 2012). While serology ruled out *Anaplasma* spp., a positive *Ehrlichia* spp. result typically suggests *E. canis* in Indonesia. However, the patient's breed (Bernese Mountain Dog) suggested importation, supporting *E. ewingii* as the etiology. The absence of ocular signs, common in *E. canis* but not *E. ewingii* (Cocayne *et al.* 2012), further supported this hypothesis.

The hematological abnormalities, thrombocytopenia, and mild anemia, align with previous reports of CGE (Breitschwerdt *et al.* 1998). Polyarthritis and lameness, which are frequently associated with *E. ewingii*, were absent in this case.

■ CONCLUSION

This case underscores the need to consider non-endemic *Ehrlichia* species in dogs with a relevant travel history. Despite *E. canis* being endemic to Indonesia, clinical signs, serology, and neutrophil morulae suggest a possible *E. ewingii* infection.

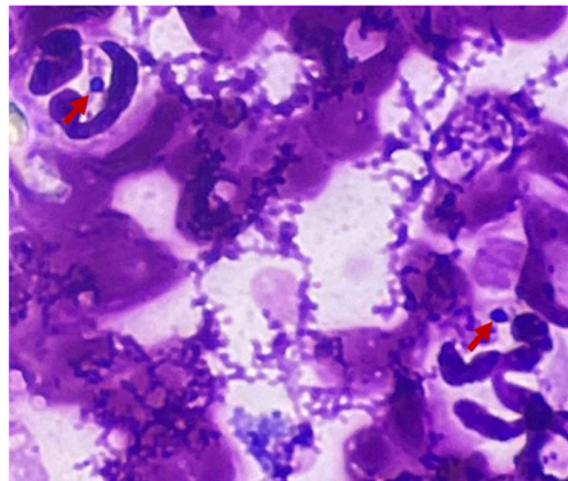


Figure 1. Blood smear with morulae (arrows) found in the neutrophils.

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