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MULTIPLE HEMOPARASITIC INFECTIONS IN A DOG: A CASE REPORT

Multiinfeksi Hemoparasit pada Anjing: Laporan Kasus

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Abstract

Tick-borne hemoparasitic infections are common health problems in dogs in tropical regions and may occur concurrently, resulting in clinical disorders and complex hematological changes. This case study aimed to describe the clinical findings, laboratory examination results, therapy, and recovery response in a dog with recurrent multi-infection involving *Anaplasma* spp., *Babesia* spp., and *Ehrlichia* spp. This study was conducted descriptively through case-based selection of a nine-year-old male Shih Tzu examined at Piara Pet Care. The examinations included physical evaluation, rapid test kit (A Pet Care), peripheral blood smear, and hematological analysis using an automatic hematology analyzer (Mindray BC-2800 Vet). The results showed positive reactions to *Anaplasma* spp. and *Ehrlichia* spp. and a weak positive result for *Babesia* spp., accompanied by normocytic hypochromic anemia and thrombocytopenia. Causative therapy in the form of doxycycline and imidocarb dipropionate was combined with supportive therapy (Asering, Hematodin, Cyproheptadine, Neuro Forte, Xepazym, Lacto B, and ursodeoxycholic acid) and administered for three weeks. At the end of therapy, the clinical condition and hematological parameters improved. The patient was clinically recovered in the third week, with a recommendation for follow-up parasitological examination to confirm the elimination of the hemoparasitic agents.

Keywords: *Anaplasma*, *Babesia*, *Ehrlichia*, normocytic hypochromic anemia, thrombocytopenia

Abstrak

Infeksi hemoparasit yang ditularkan caplak merupakan masalah kesehatan yang sering ditemukan pada anjing di wilayah tropis dan dapat terjadi secara bersamaan sehingga menimbulkan gangguan klinis serta perubahan hematologis kompleks. Studi kasus ini bertujuan menjelaskan gambaran klinis, hasil pemeriksaan laboratorium, terapi, dan respons kesembuhan pada anjing dengan rekurensi multiinfeksi yang melibatkan *Anaplasma* spp., *Babesia* spp., dan *Ehrlichia* spp. Penelitian dilakukan secara deskriptif klinis melalui case-based selection pada seekor anjing Shih-Tzu jantan berumur sembilan tahun yang diperiksa di

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Piara Pet Care. Pemeriksaan meliputi evaluasi fisik, rapid test kit (A Pet Care), apusan darah tepi, serta analisis hematologi menggunakan automatic hematology analyzer (Mindray BC-2800 Vet). Hasil pemeriksaan menunjukkan reaksi positif terhadap *Anaplasma* spp. dan *Ehrlichia* spp., serta positif lemah terhadap *Babesia* spp., disertai anemia normositik hipokromik dan trombositopenia. Terapi kausatif berupa doxycycline dan imidocarb dipropionate dikombinasikan dengan terapi suportif (Asering, Hematodin, Cyproheptadine, Neuro Forte, Xepazym, Lacto B, dan ursodeoxycholic acid) diberikan selama tiga minggu. Pada akhir terapi, kondisi klinis dan parameter hematologi membaik, sehingga kasus dinyatakan sembuh secara klinis pada minggu ketiga, dengan anjuran pemeriksaan ulang parasitologis untuk memastikan eliminasi agen hemoparasit.

Kata kunci: *Anaplasma*, anemia normositik hipokromik, *Babesia*, *Ehrlichia*, trombositopenia.

INTRODUCTION

Dogs are beloved pets kept by many people because of their loyal nature and ease of interaction with humans (Benz-Schwarzburg *et al.*, 2020). People keep dogs for guarding, entertainment, and as daily companions (Tóth *et al.*, 2023). Dog owners ensure their pets' health by conducting routine check-ups at veterinary clinics (Nur'aeni *et al.*, 2021). Dogs are susceptible to various vector-borne diseases transmitted by ectoparasites, such as ticks (Pandey *et al.*, 2025). Tick-borne diseases are infections transmitted by tick bites. These bites can affect all animals, particularly dogs (Bajer *et al.*, 2022). Ticks serve as the primary vectors for blood-borne diseases in dogs (Aziz *et al.*, 2023). Ticks of the genus *Rhipicephalus* transmit disease-causing agents, such as *Anaplasma* spp., *Babesia* spp., and *Ehrlichia* spp., through bites on a dog's skin (Eamudomkarn *et al.*, 2022).

These three vector-borne pathogens attack the circulatory system and cause hematological disorders (Zhang *et al.*, 2023). These infections cause symptoms, such as fever, pallor, lethargy, loss of appetite, and splenomegaly (Khatat *et al.*, 2021). *Anaplasma* infection directly reduces platelet counts and causes thrombocytopenia (Kusmayani *et al.*, 2024). *Babesia* infection damages red blood cells and causes hemolytic anemia (Bleik & Matubia, 2023). *Ehrlichia* infection targets white blood cells and leads to immune system dysfunction and chronic complications (Aziz *et al.*, 2023). These three pathogens can simultaneously infect dogs and exacerbate clinical conditions (Madani *et al.*, 2023). Cases of co-infection involving *Anaplasma* spp., *Babesia* spp., and *Ehrlichia* spp. can present with complex symptoms that are difficult to distinguish clinically (Wongtawan *et al.*, 2024). Most studies report that tick-borne diseases in dogs frequently present as single infections (Guimarães *et al.*, 2021). A retrospective study in Italy found that many dogs positive for *Anaplasma phagocytophilum*, *Anaplasma platys*, or *Ehrlichia canis* carried only one pathogen without any other co-infections (Facile *et al.*, 2024).

Other studies have shown that a single infection with *Babesia canis* can cause distinct hematological changes, such as thrombocytopenia and lymphopenia, in naturally infected dogs (Turna *et al.*, 2025). A single infection with *Anaplasma phagocytophilum* has also been reported to be the sole cause of thrombocytopenia and impaired innate immune function in dogs. These findings indicate that a single blood-borne parasite can produce distinct hematological abnormalities without concurrent infections (Gordon, 2022). Several reports indicate that hemoparasite co-infections occur in dogs, although they are less common than single infections (Oshanton *et al.*, 2025). Cases of hemoparasite coinfection outside Indonesia have been reported. Cases of *Ehrlichia*, *Babesia*, and *Hepatozoon* co-infections have been identified in Thailand using polymerase chain reaction (PCR) testing (Chamsai *et al.*, 2024). Cases of *Anaplasma*, *Babesia*, and *Dirofilaria* co-infections have also been reported in dogs in

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Poland (Gałęcka & Platt-Samoraj, 2025). Cases of hemoparasite coinfections have been reported in Indonesia. Co-infections with *Babesia vogeli* and *Ehrlichia canis* have been reported in dogs with hematological disorders in Bali (Wardana *et al.*, 2022). Co-infections involving hemoparasites and gastrointestinal protozoa in dogs have been previously reported in Indonesia (Putra *et al.*, 2025). Reports of hemoparasitic multi-infections in dogs in Indonesia remain limited; therefore, such information is urgently needed to enrich local data and support accurate diagnosis in the field. This case study aimed to describe the clinical presentation, laboratory findings, therapeutic management, and recovery outcomes of a dog with recurrent hemoparasitic multi-infections involving *Anaplasma* spp., *Babesia* spp., and *Ehrlichia* spp.

RESEARCH METHODS

Materials and Equipment

The equipment used in this study included a microscope, a hematology analyzer (Mindray BC-2800 VET) for routine hematological examinations, microscope slides and cover slips for preparing peripheral blood smears, and rapid test kits (A Pet Care) from China, manufactured by Jinan Babio Biotechnology Co., Ltd., for rapid antigen and antibody testing, as well as syringes and ethylenediaminetetraacetic acid (EDTA) tubes for blood collection. The materials used consisted of canine blood samples, and the peripheral blood smear staining method in this study employed the Diff-Quik method, a modification of the Romanowsky staining technique involving three staining steps: fixation with methanol, staining with eosin as an acid stain, and staining with methylene blue as a basic stain. This method is designed to provide rapid differentiation of blood components, such as erythrocytes, leukocytes, and platelets, with clear color contrast and time efficiency in peripheral blood smear examinations (Sathya *et al.*, 2025).

Clinical Signs and Medical History

Initial screening was conducted by assessing clinical signs, taking a medical history, and performing a physical examination. The physical examination was performed on the animal to evaluate vital signs, hydration status, mucosal condition, and the presence of ectoparasites (Wardana *et al.*, 2022). The examination results were recorded on an observation sheet as baseline data for the study (Putra *et al.*, 2024).

Blood Sample Collection

Blood samples were aseptically collected from the saphenous vein using a 1 mL sterile syringe (Ma'arif *et al.*, 2024). The collected blood was placed in tubes containing an anticoagulant or ethylenediaminetetraacetic acid (EDTA) to prevent clotting (Kusmayani *et al.*, 2024). Each tube was labeled with the animal's identification number to ensure data accuracy (Maghfiroh, 2020). The blood samples were then examined to obtain a hematological profile and detect the possible presence of blood parasite infections in the test animals (Perayadhista *et al.*, 2022). The methods used in this examination included rapid test kits, peripheral blood smear examinations, and routine hematological examinations (Purwitasari *et al.*, 2022).

Rapid Test Kit Examination

Serological testing was conducted using a rapid test kit to detect blood parasites such as *Anaplasma* spp., *Babesia* spp., and *Ehrlichia* spp. with a sensitivity of approximately 90% (Wardana *et al.*, 2022). Three drops of serum were dispensed into the test well using a pipette, followed by the addition of three to five drops of buffer solution (Ma'arif *et al.*, 2024). The reaction was allowed to proceed for five–ten minutes, after which the results were read according to the kit instructions (Aisyah *et al.*, 2025). The test result was considered positive if two colored lines appeared in the control (C) and test (T) areas, indicating the presence of antibodies against *Anaplasma* spp., *Babesia* spp., or *Ehrlichia* spp. in the serum sample. The

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result was considered negative if only one colored line appeared in the control area (C) without a line in the test area (T), indicating that antibodies against the tested blood parasites were not detected. This test is used to obtain rapid and practical results for detecting blood parasite infections (Ma'arif *et al.*, 2024).

Morphological Examination of Peripheral Blood Smears

A peripheral blood smear was prepared by placing a single drop of fresh blood on the edge of a microscope slide (Nurkarimah *et al.*, 2020). A second slide was placed at an angle of approximately 30°–45° and moved slowly to produce a thin, even layer of blood (Triyani *et al.*, 2023). The slide was fixed using methanol after the specimen dried and stained with eosin and methylene blue to provide clear contrast between the cytoplasm and cell nucleus (Wagut *et al.*, 2025). The stained specimen was then examined in a monolayer section using a microscope at 1000× magnification with immersion oil (Aini *et al.*, 2023). Based on these observations, the presence of parasites or characteristic intracellular inclusions of *Anaplasma*, *Babesia*, and *Ehrlichia* species was carefully identified (Wahyudi *et al.*, 2024).

Routine Hematology Testing

Blood samples collected in tubes containing ethylenediaminetetraacetic acid (EDTA) as an anticoagulant were analyzed using an automatic hematology analyzer (Mindray BC-2800 VET) (Hasanah & Hidayat, 2024). With this instrument, the counting of red blood cells, white blood cells, platelets, hemoglobin levels, hematocrit, and red blood cell indices Mean Corpuscular Volume (MCV), Mean Corpuscular Hemoglobin (MCH), and Mean Corpuscular Hemoglobin Concentration (MCHC)) is performed automatically (Hidayah *et al.*, 2024). The results are printed and stored as hematological examination data (Sinaga *et al.*, 2024).

Data Collection Methods

This study employed a case study method with a descriptive clinical approach. Case selection was conducted via case-based selection, which involved selecting dogs that presented at the clinic and exhibited clinical signs and laboratory results consistent with the criteria for hemoparasitic multi-infection (Torres-Duque *et al.*, 2020). Dogs that met the criteria were included as subjects without randomization.

Data Analysis

Research data were collected through clinical observations, medical history, physical examinations, and hematological analyses (Narendri *et al.*, 2023). All data were analyzed descriptively to examine the progression of symptoms, changes in blood profiles, and response to therapy during the observation period (Mahindra *et al.*, 2020). The data are presented in tabular form. The study was conducted at Piara Pet Care with the owners' consent.

RESULTS AND DISCUSSION

Clinical Presentation, History, and Physical Examination

The patient was a 9-year-old male Shih Tzu, weighing 6.6 kg. The patient had a history of loss of appetite, decreased water intake, and lethargy. The dog had a history of tick infestation and had gone missing for two weeks after treatment. Clinical examination revealed that the patient's body temperature was 39.7°C, the mucous membranes were pale pink, Capillary Refill Time (CRT) was < 2 seconds, pulse rate was normal, heart rate was 120 beats per minute with arrhythmia, and respiratory rate was 26 breaths per minute. A body temperature of 39.7°C constitutes febrile conditions in adult dogs. The normal range for a dog's body temperature is 38–39.5 °C (Zitzl, 2022). Pale pink mucous membranes indicate reduced blood perfusion or mild anemia due to possible blood parasite infection (Zygner *et al.*, 2023). A CRT value < 2 s

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falls within the normal range (Bruno *et al.*, 2024). The heart rate showed signs of arrhythmia. A heart rate of 120 beats/min indicates that the cardiopulmonary function remains within normal physiological limits. A respiratory rate of 26 breaths/min is considered normal (Sammito *et al.*, 2024).

Based on a Body Condition Score (BCS) of 3 on a scale of 1–5, this patient's body condition was classified as ideal—neither too thin nor too overweight (Harmayani *et al.*, 2023). The examination also revealed that the peripheral lymph nodes were not swollen or tender. This indicates the absence of a significant systemic inflammatory response (Saweng *et al.*, 2022). The dog appeared lethargic but was still able to stand on its four legs. This indicates reduced activity due to generalized weakness (Panyuwa *et al.*, 2025). The dog's coat is white with brownish tones, and the sole distinctive feature is that it has only one eye—the left one.

Rapid Test Kit Results

The results of the rapid test kit indicated positive results for *Ehrlichia* and *Anaplasma*, as well as weak positive results for *Babesia*, as indicated by the appearance of a very faint line in the test area (Figure 1). This test aims to detect specific antibodies against *Ehrlichia*, *Anaplasma*, and *Babesia*, which are the primary causative agents of blood-borne diseases in dogs (Madani *et al.*, 2023). The device operates using a lateral flow immunochromatographic assay method, which detects the interaction between antigens and antibodies on a nitrocellulose membrane (Suherman *et al.*, 2020). If antibodies against the tested parasites are present in the blood, an antigen–antibody complex is formed, producing a pink line in the test area (T), while the control line (C) indicates a valid result from the device (Ma'arif *et al.*, 2024). A weak positive result for the *Babesia* parameter indicates a mild infection or early stage with low antibody levels, necessitating further confirmation through blood smear or routine hematology examination (Agung *et al.*, 2022). The interpretation of these results forms the basis for establishing an initial diagnosis, planning antiparasitic treatment, and conducting further clinical evaluations to monitor the progression of the condition (Wardana *et al.*, 2022).

Results of Peripheral Blood Smear Morphological Examination

Microscopic examination of blood smears for *Anaplasma* spp. did not reveal any findings in the morphological examination of peripheral blood smears. Positive blood smears show the presence of small, round inclusions measuring approximately 0.2–1.0 µm within erythrocytes, which often form morula-like structures. In dogs, the most common species causing infection are *Anaplasma platys* and *Anaplasma phagocytophilum*, which indicate *Anaplasma* spp. infection. These parasites infect erythrocytes and platelets, leading to anemia and thrombocytopenia (Perayadhista *et al.*, 2022). This is evident from the pale mucous membranes and weakened physical condition in affected cases. *Anaplasma* spp. are known to cause cyclic thrombocytopenia; therefore, symptoms may appear and disappear over time (Kusmayani *et al.*, 2024). This infection is transmitted through the bite of the Rhipicephalus sanguineus tick and is often recurrent if the vector is not controlled. According to Pratiwi *et al.* (2022), *Anaplasma* causes fluctuations in hematological values and can persist in a dog's body without causing symptoms until stress or a decline in immunity occurs.

Microscopic examination of blood smears revealed the presence of small, round to ovoid (ring-shaped) intraerythrocytic parasites (Figure 2). Morphologically, these findings are consistent with the characteristics of small *Babesia*, such as *Babesia gibsoni*, which is generally round or small ring-shaped within erythrocytes (Wira *et al.*, 2020), unlike *Babesia canis*, which is paired and pear-shaped (pyriform). These parasites multiply within erythrocytes and cause red blood cell rupture, leading to hemolytic anemia and jaundice (Wira *et al.*, 2020). This infection is characterized by generalized weakness, a decrease in red blood cells, and a potential increase

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in liver enzymes due to hemolysis observed in patients infected with *Babesia*, which causes circulatory disturbances and oxidative stress, affecting liver and spleen function (Holifatullah *et al.*, 2024). Karasová *et al.* (2022) explained that *Babesia* infection can cause hemoglobinuria, splenomegaly, and a drastic decrease in hematocrit levels in severely infected dogs (Agung *et al.*, 2022).

Microscopic examination of blood smears also revealed the presence of intracytoplasmic inclusions in the form of morulae composed of aggregates of small, basophilic elementary bodies within large mononuclear leukocytes with unsegmented nuclei and relatively abundant cytoplasm, which morphologically correspond to monocytes. The morulae appeared round to irregular in shape and were clearly located within the cytoplasm of the host cell (Figure 3). Based on the characteristics of the infected cells, this finding is more consistent with *Ehrlichia canis* infection; therefore, the most likely species based on morphological evaluation is *Ehrlichia* canis (Pratiwi *et al.*, 2022). This parasite infects white blood cells and causes immune system dysfunction along with concurrent decreases in leukocytes, erythrocytes, and platelets. Chronic infection can lead to spontaneous bleeding, splenomegaly, and liver dysfunction (Wahyudi *et al.*, 2024). This condition is often accompanied by fever and lethargy due to systemic inflammatory reactions. A study by Putra *et al.* (2024) found that *Ehrlichia* can cause chronic monocytic infection, leading to pancytopenia and a reduced adaptive immune response in dogs.

Results of Routine Hematology Tests

The results of hematology tests in the first week (Table 1) showed decreased levels of eosinophils (EO), red blood cells (RBC), hemoglobin (Hb), and hematocrit (HCT) compared to the normal range, indicating anemia. Based on the erythrocyte indices, the mean corpuscular volume (MCV) remained within the normal range, whereas the mean corpuscular hemoglobin (MCH) and mean corpuscular hemoglobin concentration (MCHC) were decreased, suggesting normocytic and hypochromic anemia. Normocytic hypochromic anemia is characterized by a reduced red blood cell count with relatively normal cell size but decreased hemoglobin content, resulting in a reduced oxygen-carrying capacity (Silvia *et al.*, 2025). The decrease in platelet count (PLT) observed in the first week further supports the presence of a hematologic disorder frequently reported in dogs with hemoparasitic infections (Merthayasa *et al.*, 2021). This condition generally occurs due to iron deficiency or stress. Meanwhile, white blood cell (WBC) counts and differentials that remained within the normal range indicated the absence of a severe systemic inflammatory response in the early phase of examination (Mahindra *et al.*, 2020). The veterinarian diagnosed the dog with a recurrence of *Anaplasma*, *Babesia*, and *Ehrlichia* infections. This diagnosis was based on a review of the dog's previous medical records, test kit results, blood smear, and routine hematology tests. In hemoparasitic infections such as *Anaplasma* spp., *Babesia* spp., and *Ehrlichia* spp., this condition can result from erythrocyte hemolysis, a systemic inflammatory process that disrupts erythropoiesis, or secondary bleeding due to thrombocytopenia.

The results of the second-week hematology tests (Table 1) showed that eosinophil (EO), red blood cell (RBC), hemoglobin (Hb), and hematocrit (HCT) levels remained below the normal range, although they had improved compared to the first week. These changes indicate the body's adaptive response during the recovery phase (Kartika *et al.*, 2020). The mean corpuscular hemoglobin (MCH) and mean corpuscular hemoglobin concentration (MCHC) values were also low, indicating that hemoglobin synthesis was not fully optimized (Monica *et al.*, 2025). Meanwhile, the white blood cell (WBC) and neutrophil (NE) counts were within normal limits, and the platelet (PLT) count returned to the reference range. The increase in platelet count indicated a physiological response to tissue regeneration or healing (Alviona *et*

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al., 2024). The gradual improvement in these hematological parameters suggests a response to the therapy administered during the observation period, although anemia still requires further monitoring.

The results of the third-week hematological examination (Table 1) showed improvements in eosinophil (EO), red blood cell (RBC), hemoglobin (Hb), and hematocrit (HCT) levels, which returned to the normal range, indicating an improvement in erythropoiesis and a reduction in red blood cell destruction following the administration of therapy. This improvement is consistent with reports that the therapeutic response to hemoparasitic infections can be characterized by a gradual recovery of erythrocyte and hemoglobin levels, as hemolysis and systemic inflammation are controlled (Florensia *et al.*, 2023). The white blood cell (WBC) count and differential count were also within normal limits, indicating the absence of leukocyte abnormalities during the evaluation period. The mean corpuscular hemoglobin (MCH) value was within the normal range, whereas the mean corpuscular hemoglobin concentration (MCHC) remained slightly below the normal range, a finding commonly observed during the post-anemia recovery phase (Agung *et al.*, 2022). The platelet count increased above the normal range, which may be associated with a reactive response during recovery (Holifatullah *et al.*, 2024). In cases of hemoparasitic infection in dogs, this condition is generally reactive and occurs during the recovery phase following thrombocytopenia during the acute phase of infection. This mechanism is associated with increased stimulation of megakaryopoiesis in the bone marrow in response to inflammatory resolution and elevated thrombopoietin levels after controlled platelet destruction. Reactive thrombocytosis in dogs is generally transient and clinically acceptable as long as it is not accompanied by thrombotic manifestations or significant coagulation disorders (Zygner *et al.*, 2023). Thus, the increase in platelet count in the third week is more indicative of a physiological recovery-phase response than a primary myeloproliferative disorder. Overall, the results of the third week demonstrated an improvement in hematological parameters, indicating a condition approaching normal in dogs with multihemoparasitic infections during therapy.

Treatment and Health Response

Treatment administered to dogs is tailored to the results of clinical and laboratory diagnoses, indicating recurrent infections with *Anaplasma* spp., *Babesia* spp., and *Ehrlichia* spp. Causal therapy consisting of Doxycycline and Imidocarb dipropionate is combined with supportive therapy, including the administration of Asering, Hematodin, Cyproheptadine, Neuro Forte, Xepazym, Lacto B, and Ursodeoxycholic acid. This combination of medications is selected to address multi-pathogen infections while also addressing secondary organ dysfunction resulting from the prolonged disease process. The use of a combination of causative and supportive therapies aims to suppress intracellular infection, improve liver function, and maintain the body's physiological balance during the recovery period (Dharmawan *et al.*, 2024) (Table 2).

Asering is an isotonic crystalloid solution containing sodium chloride (NaCl), potassium chloride (KCl), calcium chloride ($CaCl_2$), and sodium acetate, with an electrolyte composition similar to that of the extracellular fluid. This solution is used as fluid therapy to maintain fluid and electrolyte balance, improve hydration status, and assist in correcting mild metabolic acidosis through lactate metabolism into bicarbonate in the liver. The administration of Asering aims to stabilize hemodynamic conditions and improve tissue perfusion during the management of systemic cases (Hermawan *et al.*, 2022). The administration of this fluid helps maintain blood pressure and facilitates the distribution of medications throughout the tissues (Adistya & Fitri, 2020). The healing process proceeds more rapidly, and vital organs can function optimally with adequate rehydration. Doxycycline is a broad-spectrum tetracycline-class antibiotic primarily administered to suppress infections caused by intracellular bacteria,

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Anaplasma spp. and *Ehrlichia* spp. (Putra *et al.*, 2023). This drug inhibits bacterial protein synthesis at the 30S ribosomal subunit, preventing bacteria from multiplying within host cells (Agung *et al.*, 2022). Doxycycline effectively suppresses bacterial growth and reduces fever and inflammatory symptoms in patients because it penetrates cell membranes (Nithaquin *et al.*, 2024).

Imidocarb dipropionate (Imidox) is a specific antiparasitic agent against *Babesia* spp. (Hamid *et al.*, 2022). The mechanism of action of this drug involves inhibition of the parasite's energy metabolism by disrupting the utilization of inositol and putrescine, which are essential for survival. This disruption causes the parasite to die within the blood cells, thereby reducing hemolysis and aiding in the gradual recovery of red blood cell levels (Pillco *et al.*, 2024). Hematodin is administered as a hematopoietic supplement to improve anemia caused by hemolysis during infections (Pemayun *et al.*, 2024). Iron, folic acid, and B-complex vitamins aid in the formation of new red blood cells and increase hemoglobin levels (Kurnia *et al.*, 2020). With an increase in red blood cells, oxygen circulation improves, and the animals appear more active during the recovery period.

The combination of cyproheptadine, neuroforte, and Xepazym is used as an adjunctive supportive therapy. Cyproheptadine contains cyproheptadine hydrochloride, which acts as an antagonist of histamine H1 and serotonin (5-HT2) receptors, thereby providing an orexigenic effect that helps increase appetite, stabilize metabolism, and improve nutritional status (Sibarani *et al.* 2021), while Neuro Forte contains vitamin B1 (thiamine), vitamin B6 (pyridoxine), and vitamin B12 (cyanocobalamin), which play a role in energy metabolism, neurotransmitter synthesis, and support hematopoiesis and nervous system function. Xepazym contains digestive enzymes, such as amylase, protease, and lipase, which enhance the hydrolysis and absorption of macronutrients, thereby helping to optimize nutrient utilization during the recovery period (Daffa *et al.* 2023). This combination improves the patient's overall condition and accelerates weight recovery. Lacto-B is used as a probiotic to maintain the balance of intestinal microflora during antibiotic administration. The *Lactobacillus* sp. and *Bifidobacterium* sp. content prevents digestive disorders, such as diarrhea, and helps maintain immunity (Setyawati *et al.* 2025). With a healthy digestive tract, the absorption of medications and nutrients becomes more efficient.

Ursodeoxycholic acid (UDCA) is administered as a hepatoprotective agent to support liver function during treatment (Aji & Noviana, 2020). This medication works by reducing levels of toxic bile acids and replacing them with a hydrophilic form that is safer for liver cells. UDCA also improves bile flow and prevents hepatocyte damage caused by the metabolism of antiparasitic drugs (Nurullah *et al.*, 2023). The combination of all these therapies showed positive results in dogs within three weeks. Clinical signs, such as appetite, activity, and hematological status, improved significantly (Table 2). This demonstrates that integrated therapy combining causative treatment, supportive care, and continuous monitoring can yield optimal outcomes for patients.

Factors Influencing Reinfection

Reinfection is the recurrence of an infection caused by the same pathogen after the previous infection has been declared cured, and it generally occurs as a result of new exposure from the environment. Reinfection with multiple blood parasites in dogs, such as *Anaplasma* spp., *Babesia* spp., and *Ehrlichia* spp., can be triggered by various factors, including environmental, vector-related, and animal health-related factors. Environmental factors, such as high temperature and humidity, support the development of the Rhipicephalus sanguineus tick, which serves as the primary vector for these three parasites (El-Dakhly *et al.*, 2021). Unsanitary

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kennel conditions, the presence of other infected animals, and inadequate ectoparasite control increase the likelihood of reinfection after treatment is completed (Tahun *et al.*, 2022). Dharmawan *et al.* (2024) explained that the tropical climate and close contact between dogs facilitate the spread of *Ehrlichia* spp. and *Anaplasma* spp. in urban environments.

An animal's immune system also plays a major role in triggering reinfection, in addition to environmental factors (Wardana *et al.*, 2022). Dogs with compromised immune systems due to stress, malnutrition, or other diseases are more susceptible to the reactivation of previously latent parasites (Wira *et al.*, 2020). This condition frequently occurs with infections caused by *Anaplasma* spp. and *Ehrlichia* spp., as both parasites can remain hidden within host cells for extended periods (Pratiwi *et al.*, 2022). According to a study by Bahtiar *et al.* (2024), the subclinical form of hemoparasitic infection can persist in a dog's body for months and will reemerge when immunity declines.

Recurrence refers to the reappearance of an infection due to the persistence of a pathogen that has not been completely eliminated from the host, causing the previous infection to reactivate. This recurrence occurs as a result of inappropriate or incomplete treatment. The use of antibiotics or antiparasitic drugs at incorrect dosage, duration, or in inappropriate combinations can allow some parasites to survive in body tissues (Putra *et al.*, 2023). For example, *Babesia* spp. has a dormant form within erythrocytes that is difficult to eliminate without complete treatment (Abel *et al.*, 2023). Wardhani *et al.* (2021) indicated that clinical recovery does not necessarily signify total parasite elimination, as *Babesia* spp. and *Ehrlichia* spp. can persist in the spleen and liver tissues for several weeks post-treatment.

CONCLUSIONS AND RECOMMENDATIONS

Conclusions

Based on the results of clinical and laboratory examinations, the dog was diagnosed with a multi-parasitic hemoparasitic reinfection involving *Anaplasma* spp., *Babesia* spp., and *Ehrlichia* spp., with primary symptoms including decreased appetite and thirst, lethargy, fever, and pale pink mucous membranes indicative of mild anemia, accompanied by hematological findings of normocytic hypochromic anemia and thrombocytopenia. Causal therapy using Doxycycline and Imidocarb dipropionate, combined with supportive therapy consisting of Asering, Hematodin, cyproheptadine, Neuro Forte, Xepazym, Lacto B, and ursodeoxycholic acid for three weeks showed a good response, marked by improvement in general condition, increased appetite and activity, normalization of mucosal color, and improvement in hematological parameters; thus, this case was declared clinically cured. However, to ensure the parasitological elimination of the hemoparasitic agent, follow-up examinations, such as blood smears or post-treatment PCR, are still required.

Recommendations

Follow-up monitoring after treatment is necessary to detect possible reinfection due to vector exposure or a decline in the immune status. Evaluation can be performed through blood smear tests and confirmation using the PCR method to ensure complete elimination of the infectious agent. Continuous monitoring of patients after treatment is required to ensure that reinfection does not occur because of the presence of vectors or a decline in immunity.

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REFERENCES

Abel, R. N., Soma, I. G., & Batan, I. W. (2023). *Demodicosis with ticks infestation and babesiosis in a mixed dog*. *Veterinary Science and Medicine Journal*, *5*(11), 360–370. https://doi.org/10.24843/vsmj.2023.v5.i11.p05

Adistya, E. R., & Fitri, A. D. (2020). Insidensi dan penanganan hernia diafragmatika di Rumah Sakit Hewan Pendidikan Fakultas Kedokteran Hewan IPB. *ARSHI Veterinary Letters*, *4*(1), 13–14. https://doi.org/10.29244/avl.4.1.13-14

Agung, N. P., Priyowidodo, D., Tjahajati, I., & Gunawan, L. (2022). *Diagnosis dan pengobatan babesiosis pada anjing shih-tzu di Klinik Lilipoet, Yogyakarta, Indonesia*. *Jurnal Sain Veteriner*, *40*(3), 290. https://doi.org/10.22146/jsv.74202

Aini, N., Khasanah, H., Husen, F., & Yuniati, N. I. (2023). *Pewarnaan sediaan apusan darah tepi (SADT) menggunakan infusa bunga telang (Clitoria ternatea)*. *Jurnal Bina Cipta Husada*, *19*(1), 67–76.

Aisyah, M., Sucahyo, I., & Haryatmi, D. (2025). Evaluation of the performance of rapid diagnostic test and microscopic examination for malaria detection in symptomatic patients in Sorong City, Southwest Papua. *Journal of Biological Tropics*, *25*(2), 2149–2154.

Aji, R. W., & Noviana, D. (2020). Evaluasi terapi gangguan kantung empedu pada anjing Pomeranian dengan diagnosis penunjang ultrasonografi. *ARSHI Veterinary Letters*, *4*(1), 5–6. https://doi.org/10.29244/avl.4.1.5-6

Alviona, Soma, I. G., & Jayanti, P. D. (2024). Asimptomatis anaplasmosis pada anjing berumur lima bulan di Kota Denpasar. *Veterinary Science and Medicine Journal*, *6*(6), 524–533. https://doi.org/10.24843/vsmj.2024.v6.i06.p03

Aziz, M. U., Hussain, S., Song, B., Ghauri, H. N., Zeb, J., & Sparagano, O. A. E. (2023). Ehrlichiosis in dogs: A comprehensive review about the pathogen and its vectors with emphasis on South and East Asian countries. *Veterinary Sciences*, *10*(1), 1–17. https://doi.org/10.3390/vetsci10010021

Bahtiar, A. S., Jayanti, P. D., & Suartha, I. N. (2024). Treatment of babesiosis and ectoparasitic infestation in terrier crossbreed dog. *Veterinary Science and Medicine Journal*, *6*(01), 34–42. https://doi.org/10.24843/vsmj.2024.v6.i01.p04

Bajer, A., Kowalec, M., Levytska, V. A., Mierzejewska, E. J., Alsarraf, M., Poliukhovych, V., Rodo, A., Wężyk, D., & Dwużnik-Szarek, D. (2022). Tick-borne pathogens, *Babesia* spp. and *Borrelia burgdorferi*, in sled and companion dogs from central and north-eastern Europe. *Pathogens*, *11*(5), 499. https://doi.org/10.3390/pathogens11050499

Benz-Schwarzburg, J., Monsó, S., & Huber, L. (2020). How dogs perceive humans and how humans should treat their pet dogs: Linking cognition with ethics. *Frontiers in Psychology*, *11*, 1–17. https://doi.org/10.3389/fpsyg.2020.584037

Bleik, P., & Matubia, V. (2023). Warm autoimmune hemolytic anemia secondary to *Babesia microti* infection: A case report. *Cureus*, *15*(12), 1–9. https://doi.org/10.7759/cureus.50294

Bruno, F., Castelli, G., Li, B., Reale, S., Carra, E., Vitale, F., Scibetta, S., Calzolari, M., Varani, S., Ortalli, M., *et al.* (2024). Genomic and epidemiological evidence for the emergence of a *Leishmania infantum/Leishmania donovani* hybrid with unusual epidemiology in northern Italy. *mBio*, *15*(7), 1–17. https://doi.org/10.1128/mbio.00995-24

Chamsai, T., Saechin, A., Mongkolphan, C., Sariya, L., & Tangsudjai, S. (2024). Tick-borne

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April 2026
https://doi.org/10.24843/bulvet.2026.v18.i02.p02

pathogens *Ehrlichia*, *Hepatozoon*, and *Babesia* co-infection in owned dogs in Central Thailand. *Frontiers in Veterinary Science*, *11*(2), 1–6.

Daffa, K. W., Pranoto, H., & Ahimsa, T. (2023). Modalitas laparoskopi untuk diagnostik appendisitis akut. *FLORONA*, *2*(2), 87–92.

Dharmawan, I. W. C., Putriningsih, P. A. S., & Erawan, I. G. M. K. (2024). Ehrlichiosis pada anjing ras domestik persilangan jantan berumur 1 tahun. *Veterinary Science and Medicine Journal*, *6*(2), 169–178. https://doi.org/10.24843/vsmj.2024.v6.i02.p07

Eamudomkarn, C., Pitaksakulrat, O., Boueroy, P., Thanasuwan, S., Watwiengkam, N., Artchayasawat, A., & Boonmars, T. (2022). Prevalence of *Ehrlichia*-, *Babesia*-, and *Hepatozoon*-infected brown dog ticks in Khon Kaen Province, Northeast Thailand. *Veterinary World*, *15*, 1699–1705.

El-Dakhly, K. M., Tawfik, M. M., Aboshinaf, A. S., Mahrous, L. N., & Arafa, W. M. (2021). Detection of anaplasmosis and ehrlichiosis in blood of owned dogs in Alexandria, Northern Egypt. *Advances in Animal and Veterinary Sciences*, *9*(9), 1383.

Elviyanti, J., Mihardi, A. P., Esfandiari, A., & Akbari, R. A. (2023). Studi kasus: Teknik diagnosa dan pengobatan koinfeksi dirofilariasis–ehrlichiosis pada seekor anjing lokal. *Jurnal Sain Veteriner*, *41*(2), 291–297. https://doi.org/10.22146/jsv.77271

Facile, V., Sabetti, M. C., Balboni, A., Urbani, L., Tirolo, A., Magliocca, M., Lunetta, F., Dondi, F., & Battilani, M. (2024). Detection of *Anaplasma* spp. and *Ehrlichia* spp. in dogs from a veterinary teaching hospital in Italy: A retrospective study 2012–2020. *Veterinary Research Communications*, *48*(1), 1727–1740. https://doi.org/10.1007/s11259-024-10358-4

Florensia, D., Batan, I. W., & Soma, I. G. (2023). Laporan kasus: Penanganan ehrlichiosis pada anjing akita dengan pemberian doksisiklin dan transfusi darah. *Indonesian Medical Veterinus*, *12*(1), 79–89. https://doi.org/10.19087/imv.2023.12.1.79

Gałęcka, I., & Platt-Samoraj, A. (2025). Case report of a triple vector-borne infection in a dog: Co-infection with *Anaplasma phagocytophilum*, *Babesia* spp., and *Dirofilaria repens* in North-Eastern Poland. *BMC Veterinary Research*, *21*(1), 441. https://doi.org/10.1186/s12917-025-04889-4

Gordon, P. B. (2022). The impact of dense breasts on the stage of breast cancer at diagnosis: A review and options for supplemental screening. *Current Oncology*, *29*(5), 3595–3636. https://doi.org/10.3390/curroncol29050291

Guimarães, M. D. C. N., Silva, P. T. D. A., Monteiro, T. R. M., Santos, C. C., Costa, J. C., Valente, K. V., Silva, B. W. L., Casseb, A. D., & Casseb, L. M. N. (2021). Occurrence of tick-borne diseases in domestic dogs in Belém, Pará, Brazil. *Acta Brasilica*, *15*(1), 323–329.

Hamid, P. H., Cahyadi, M., Wardhana, A. H., Sawitri, D. H., Setya, N. N. R., Insyariati, T., Kurnianto, H., & Hermosilla, C. R. (2022). First autochthonous report on cattle *Babesia naoakii* in Central Java, Indonesia, and identification of *Haemaphysalis bispinosa* ticks in the investigated area. *Pathogens*, *12*(59), 1–13. https://doi.org/10.3390/pathogens12010059

Harmayani, R., Alimuddin, & Azima, F. (2023). Hubungan body condition score dengan service per conception pada induk sapi Bali di Dusun Tempos, Desa Tempos, Kecamatan Gerung, Lombok Barat. *Jurnal Sains Teknologi Lingkungan*, *9*(2), 368–378.

Hasanah, A. N., & Hidayat, T. (2024). Perbedaan nilai hematokrit menggunakan metode mikrohematokrit dengan metode automatic hematology analyzer BC-2300. *Bakti Tunas Husada*, *24*(1), 21–26. https://doi.org/10.36465/jkbth.v24i1.1241

Volume 18 No. 2: 364-380
April 2026
https://doi.org/10.24843/bulvet.2026.v18.i02.p02

Hermawan, I. P., Kartikasari, D. A., & Pangaribuan, M. J. A. (2022). Studi kasus: Urolithiasis pada kucing milky di klinik DRD Veteriner. *Jurnal Vitek Bidang Kedokteran Hewan*, *12*(2), 59–62. https://doi.org/10.30742/jv.v12i2.114

Hidayah, N., Atifah, Y., Ahda, Y., & Cahyanti, N. (2024). Analisis kasus anemia pada pasien kucing berdasarkan indeks eritrosit melalui pemeriksaan hematologi lengkap di UPTD Rumah Sakit Hewan Sumatera Barat. *Bioeducation Journal*, *2*(1), 258–265.

Holifatullah, A. R., Widyastuti, S., & Jayanti, P. D. (2024). Migration larva *Toxocara canis* and infection with *Babesia* sp. in local dogs. *Buletin Veteriner Udayana*, *16*(5), 1394–1407.

Karasová, M., Tóthová, C., Grelová, S., & Fialkovicová, M. (2022). The etiology, incidence, pathogenesis, diagnostics, and treatment of canine babesiosis caused by *Babesia gibsoni* infection. *Animals*, *12*, 739, 1–15. https://doi.org/10.3390/ani12060739

Khatat, S. E. H., Daminet, S., Duchateau, L., Elhachimi, L., Kachani, M., & Sahibi, H. (2021). Epidemiological and clinicopathological features of *Anaplasma phagocytophilum* infection in dogs: A systematic review. *Frontiers in Veterinary Science*, *8*, 686644, 1–27. https://doi.org/10.3389/fvets.2021.686644

Kurnia, K., Anggoro, D., Budhi, S., & Priyowidodo, D. (2020). Perawatan ehrlichiosis pada kucing yang mengalami anemia dan indikasi gagal ginjal. *ARSHI Veterinary Letters*, *4*(2), 23–24. https://doi.org/10.29244/avl.4.2.23-24

Kusmayani, K. N., Soma, I. G., & Suartha, I. N. (2024). A case of anaplasmosis in dog. *Veterinary Science and Medicine Journal*, *6*(1), 61–71. https://doi.org/10.24843/vsmj.2024.v6.i01.p07

Ma'arif, M. F. A., Jayanti, P. D., & Soma, I. G. (2024). Ehrlichiosis dan demodicosis pada anjing lokal Bali. *Buletin Veteriner Udayana*, *16*(1), 101–112.

Madani, I., Batan, I. W., & Widyastuti, S. K. (2023). Laporan kasus: Koinfeksi anaplasmosis, ehrlichiosis, dan *Malassezia* pada anjing golden retriever. *Indonesian Medical Veterinus*, *12*(2), 273–284. https://doi.org/10.19087/imv.2023.12.2.273

Maghfiroh, L. (2020). Pendekatan one health dalam merespon dan mengendalikan penyakit yang berpotensi pandemi global. *Prosiding Seminar Nasional Kedokteran Hewan*, *1*, 1–180.

Mahindra, A. T., Batan, I. W., & Nindhia, T. S. (2020). Gambaran hematologi anjing peliharaan di Kota Denpasar. *Indonesian Medical Veterinus*, *9*(3), 314–324. https://doi.org/10.19087/imv.2020.9.3.314

Monica, W. S., Hidayat, E. P. N. A., Musdalifah, Suharto, R. H., Astuty, A. T. J. E., Ummah, R., Putrik, K. D. K., & Gunawan, I. W. N. F. (2025). Penanganan pyometra terbuka pada anjing ras mini pomeranian di Rumah Sakit Hewan Universitas Hasanuddin. *Buletin Veteriner Udayana*, *17*(3), 940–948. https://doi.org/10.24843/bulvet.2025.v17.i03.p40

Narendri, K. A. P., Suprabha, N. K. D., Ruslie, S. I., Akbar, M. W., & Batan, I. W. (2023). Kajian pustaka: Kasus megacolon pada anjing. *Indonesian Medical Veterinus*, *12*(2), 324–334. https://doi.org/10.19087/imv.2023.12.2.324

Nithaquin, A. D., Prasetyo, D., Widyaputri, T., & Noviatri, A. (2024). Studi literatur: Babesiosis pada anjing pada periode 2013–2023. *Journal of Applied Veterinary Science and Techology*, *5*(2), 188–193. https://doi.org/10.20473/javest.v5.i2.2024.188-193

Nur'aeni, W., Sembiring, F., & Erfina, A. (2021). Implementasi TOGAF pada perancangan sistem informasi reservasi berbasis progressive web application. *JUTISI: Jurnal Ilmiah Teknik*

Volume 18 No. 2: 364-380
April 2026
https://doi.org/10.24843/bulvet.2026.v18.i02.p02

Informatika dan Sistem Informasi, *10*(2), 283. https://doi.org/10.35889/jutisi.v10i2.667

Nurkarimah, A. B., Mufasirin, Damayanti, R., Suwanti, L. T., Setiawan, B., & Suprihati, E. (2020). Identification of protozoa in the blood and digestive tract of water monitor lizard (*Varanus salvator*). *Journal of Parasitology Science*, *4*(1), 31–36.

Nurullah, J. F. R., Murtiningrum, F. S., Rahmiati, D. U., Manalu, W., & Noviana, D. (2023). Studi kasus gallbladder mucocele disertai ehrlichiosis pada anjing beagle. *Acta Veterinaria Indonesiana*, *11*(3), 250–260.

Pandey, M., Clark, J. A., Piedmonte, N. P., Zolnik, C. P., Pool, J. R., Daniels, T. J., & Hekkala, E. (2025). Changes in the prevalence of three disease-causing pathogens in bird-borne blacklegged ticks: *Borrelia burgdorferi* sensu stricto, *Anaplasma phagocytophilum*, and *Babesia microti*. *Ticks and Tick-Borne Diseases*, *16*(5), 102537. https://doi.org/10.1016/j.ttbdis.2025.102537

Pemayun, T. I. A. P. D., Widyastuti, S. K., Suartha, I. N., & Asih, N. P. T. (2024). Haemobartonellosis pada kucing domestic short hair. *Veterinary Science and Medicine Journal*, *6*(4), 364–377. https://doi.org/10.24843/vsmj.2024.v06.i04.p05

Perayadhista, N. M. D., Suratma, N. A., & Dharmawan, N. S. (2022). Deteksi infeksi *Anaplasma* sp., *Borrelia burgdorferi*, dan *Ehrlichia* sp. pada anjing yang terinfestasi caplak di Kota Denpasar. *Buletin Veteriner Udayana*, *14*(5), 558–571. https://doi.org/10.24843/bulvet.2022.v14.i05.p16

Pillco, P., Calderon-Ruiz, S. W., Pinares, R., & Pizarro, D. M. (2024). Comparative evaluation of four drugs on hematology and recovery time of canine monocytic ehrlichiosis. *Iraqi Journal of Veterinary Sciences*, *39*(2), 253–260.

Pratiwi, D. A., Widyastuti, S. K., & Suartha, I. N. (2022). Laporan kasus: Infeksi anaplasmosis dan ehrlichiosis yang kambuh bersifat fatal pada anjing pomeranian. *Indonesian Medical Veterinus*, *11*(4), 555–565. https://doi.org/10.19087/imv.2022.11.4.555

Purwitasari, M. S., Soma, I. G., & Batan, I. W. (2022). Laporan kasus: Kesembuhan enteritis hemoragika pada anak anjing kacang yang terinfeksi canine parvovirus. *Jurnal Kajian Veteriner*, *10*(1), 67–81. https://doi.org/10.35508/jkv.v10i1.6290

Putra, H. Y., Maulana, N. H., Bahtiar, N. I. A., Pratiwi, E., Vadya, D., & Mayori, G. (2023). Evaluasi terapi doxycycline kasus infeksi *Haemobartonella felis* pada kucing. *ARSHI Veterinary Letters*, *7*(2), 31–32. https://doi.org/10.29244/avl.7.2.31-32

Putra, I. P. C., Utami, Y. M., & Widyasanti, N. W. H. (2025). Case report: Multiple tick-borne diseases and gastrointestinal protozoal infection in a young poodle dog. *Media Kedokteran Hewan*, 36(3), 304–318. https://doi.org/10.20473/mkh.v36i3.2025.304-318

Putra, P. D. P., Soma, I. G., & Batan, I. W. (2024). Laporan kasus: Canine monocytic ehrlichiosis pada anjing pomeranian disertai dengan pansitopenia. *Indonesian Medical Veterinus*, *13*(3), 249–260. https://doi.org/10.19087/imv.2024.13.3.249

Sammito, S., Thielmann, B., Klussmann, A., Deußen, A., Braumann, K. M., & Böckelmann, I. (2024). Guideline for the application of heart rate and heart rate variability in occupational medicine and occupational health science. *Journal of Occupational Medicine and Toxicology*, *9*(15), 1–29. https://doi.org/10.1186/s1995-024-00414-9

Sathya, P., Yogalakshmi, & Narayanan, R. S. (2025). Pewarnaan diferensial Diff-Quik yang dipercepat vs. protokol pewarnaan Leishman tradisional rutin: Analisis komparatif. *TPM – Pengujian, Psikometri, Metodologi dalam Psikologi Terapan*, *32*(S1), 951–957.

Volume 18 No. 2: 364-380
April 2026
https://doi.org/10.24843/bulvet.2026.v18.i02.p02

Saweng, C. F. I. J., Suartha, I. N., & Antara, I. M. S. (2022). Laporan kasus: Infeksi canine parvovirus pada anjing chihuahua yang tidak dibooster. *Indonesian Medical Veterinus*, *11*(4), 594–605. https://doi.org/10.19087/imv.2022.11.4.594

Setyawati, K. V. D., Widyastuti, S. K., & Jayanti, P. D. (2025). Penanganan kasus toxocariasis pada kucing betina domestik. *Buletin Veteriner Udayana*, *17*(3), 783–792. https://doi.org/10.24843/bulvet.2025.v17.i03.p24

Sibarani, O. H., Suartha, I. N., & Erawan, I. G. M. K. (2021). Laporan kasus: Penanganan demodekosis general pada anjing kacang. *Indonesian Medical Veterinus*, *10*(5), 794–803. https://doi.org/10.19087/imv.2021.10.5.794

Sinaga, M. D. R. E., Nurhayati, B., Durachim, A., & Marliana, N. (2024). Perbandingan hasil pemeriksaan hematologi rutin menggunakan tabung vacutainer dan microtainer K3EDTA. *Jurnal Kesehatan Siliwangi*, *4*(3), 1208–1214. https://doi.org/10.34011/jks.v4i3.1208

Suherman, Damayanti, R., & Indrawati, A. (2020). Aeromonas *hydrophila*. *Acta Veterinaria Indonesiana*, *8*(3), 31–39.

Tahun, K. E., Winarso, A., & Almet, J. (2022). Identifikasi dan prevalensi *Babesia* sp. pada anjing lokal di Kecamatan Kelapa Lima dan Kecamatan Maulafa, Kota Kupang. *Journal of Veterinary Nusantara*, *5*(22), 1–11.

Tilley, L. P., & Smith, F. W. K. (2015). *Blackwell's five-minute veterinary consult: Canine and feline* (6th ed.). Ames, IA: Wiley-Blackwell.

Torres-Duque, C. A., Patino, C. M., & Ferreira, J. C. (2020). Case series: An essential study design to build knowledge and pose hypotheses for rare and new diseases. *Jornal Brasileiro de Pneumologia*, *46*(4), e20200389. https://doi.org/10.36416/1806-3756/e20200389

Tóth, S., Kinczel, A., Lengyel, A., Pálinkás, R., Molnár, A., Kiss, A. L., Zidek, P., & Müller, A. (2023). The role of dogs in maintaining health and quality of life. *GeoSport for Society*, *19*(2), 76–84. https://doi.org/10.30892/gss.1904-098

Triyani, P. (2023). Pengaruh variasi waktu fiksasi sediaan apusan darah tepi pada pewarnaan Giemsa terhadap morfologi sel darah merah. *Health Informatics Jurnal Penelitian*, *15*(3), 1–7.

Turna, H., Vichova, B., Miterpakova, M., Szarkova, A., Baneth, G., & Svoboda, M. (2025). Clinical and hematologic findings in *Babesia canis* infection in Eastern Slovakia. *Acta Parasitologica*, *67*(1), 1329–1334. https://doi.org/10.1007/s11686-022-00584-8

Wagut, P. A. D., Suwiti, N. K., Widyastuti, S. K., Dharmawan, N. K., Setiasih, N. L. K., & Karadena, I. M. (2025). Gambaran histologi sel darah putih granulosit dan nilai platelet distribution width pada anjing penderita dermatitis. *Buletin Veteriner Udayana*, *17*(3), 890–901.

Wahyudi, Arjentinia, I. P. G. Y., & Widyastuti, S. K. (2024). Penanganan *ehrlichiosis* pada anjing lokal. *Jurnal Ilmu dan Kesehatan Hewan*, *6*(06), 578–587.

Wardana, R. R. A. A., Widyastuti, S. K., & Antara, M. S. (2022). Laporan kasus: Babesiosis dan ehrlichiosis pada anjing kacang umur 11 tahun yang terinfeksi caplak *Rhipicephalus sanguineus*. *Indonesian Medical Veterinus*, *11*(4), 566–578. https://doi.org/10.19087/imv.2022.11.4.566

Wardhani, H. C. P., Desiandura, K., & Permatasari, I. (2021). Kadar platelet dan mean platelet volume pada kucing domestik dengan sistem pemeliharaan indoor life dan outdoor life di Surabaya. *Jurnal Kajian Veteriner*, *9*(2), 110–116.

Volume 18 No. 2: 364-380
April 2026
https://doi.org/10.24843/bulvet.2026.v18.i02.p02

Wira, A., Batan, I. W., Widyastuti, S. K., & Sukoco, H. (2020). Studi kasus: Babesiosis (piroplasmosis) disertai infestasi caplak yang berat pada anjing gembala Jerman. *Jurnal Sains dan Teknologi Peternakan*, *1*(2), 30–35. https://doi.org/10.31605/jstp.v1i2.593

Wongtawan, T., Sontigun, N., Boonchuay, K., Chiawwit, P., Wongtawan, O., Hayakijkosol, O., & Boonhoh, W. (2024). Improvements in blood profiles of canines naturally infected with triple blood pathogens (*Babesia vogeli*, *Ehrlichia canis*, and *Anaplasma platys*) subsequent to doxycycline monotherapy. *Animals*, *14*(24), 1–13. https://doi.org/10.3390/ani14243714

Zhang, L., Wei, Z., Ding, L., Hou, J., Zhang, J., Zhang, B., Ma, J., Song, M., & Liu, Q. (2023). Molecular characterization of *Anaplasma*, *Ehrlichia*, *Babesia*, and *Borrelia* in ticks from Guangdong Province of Southern China. *Zoonoses (Ireland)*, *3*(1), 1–19. https://doi.org/10.15212/ZOONOSES-2023-0017

Zitzl, J., Dyckers, J., Güssow, A., Lehmann, H., & Hazuchova, K. (2022). Survival in canine tetanus – retrospective analysis of 42 cases (2006–2020). *Frontiers in Veterinary Science*, *9*, 1015569, 1–14. https://doi.org/10.3389/fvets.2022.1015569

Zygner, W., Olga, G., & Norbury, L. J. (2023). Pathogenesis of anemia in canine babesiosis: Possible contribution of pro-inflammatory cytokines and chemokines — a review. *Pathogens*, *12*(166), 1–32. https://doi.org/10.3390/pathogens12020166

Tables

Table 1. Hematological examination results over three weeks

Parameter	Week 1	Week 2	Week 3	Reference Range**
WBC (10^9/L)	9.3	13.5	16.2	6–17
Lymphocytes (10^9/L)	2.3	3.7	4.1	1–4.8
Monocytes (10^9/L)	0.4	0.8	1.0	0.2–1.35
Neutrophils (10^9/L)	6.6	9.0	11.1	3–11.5
LY (%)	24.7	27.2	25.0	12–30
MO (%)	4.7	5.8	6.6	3–10
NE (%)	70.6	67.0	68.4	60–77
EO (%)	1.7 ↓	1.6 ↓	4.8	2–10
RBC (10^{12}/L)	4.40 ↓	4.75 ↓	6.23	5.5–8.5
Hemoglobin (g/dL)	8.5 ↓	9.0 ↓	12.2	12–18
Hematocrit (%)	29.1 ↓	31.6 ↓	43.4	37–55
MCV (fL)	66.2	66.6	69.8	60–77
MCH (pg)	19.3 ↓	18.9 ↓	19.5	19.5–24.5
MCHC (g/dL)	29.2 ↓	28.4 ↓	28.1 ↓	32–36
PLT (10'9/L)	14 ↓	254 ↓	900 ↑	200–500
MPV (fL)	8.0	8.7	7.8	3.9–11.1

Descriptions: WBC: White Blood Cell; LY: Lymphocyte; MO: Monocyte; NE: Neutrophil; LY%: Lymphocyte Percentage; MO%: Monocyte Percentage; NE%: Neutrophil Percentage; EO%: Eosinophil Percentage; RBC: Red Blood Cell; HGB: Hemoglobin; HCT: Hematocrit; MCV: Mean Corpuscular Volume; MCH: Mean Corpuscular Hemoglobin; MCHC: Mean Corpuscular Hemoglobin Concentration; PLT: Platelet; MPV: Mean Platelet Volume. *Examination using Mindray BC-2800 VET. *Reference: Tilley & Smith (2015).

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Table 2. Therapy administered

Week	Dose and Therapy Administered	Route and Frequency of Administration	Observed Clinical Response
1	Asering 500 cc, Doxycycline 100 mg tablet at a dose of 10 mg/kg BW/day, Imidox 120 mg/mL at a dose of 5 mg/kg BW, Hematodin 1 mL, Cyproheptadine 4 mg tablet at a dose of 0.25 mg/kg BW/day, Neuro Forte 1/10 tablet, Xepazym 1/10 tablet, Lacto B (1/2 sachet/day)	Asering s.c. s.i.d. Doxycycline p.o. s.i.d. p.c., for 7 days (for 28 days) Imidox, s.c. s.i.d., initially administered only once (repeated after 14 days) Hematodin s.c. s.i.d. (Cyproheptadine + Neuro Forte + Xepazym) p.o. b.i.d. p.c. Lacto B mixed with food, 1/2 sachet mixed with feed	Decreased appetite, hand-fed, weakness, pale mucosa, fluctuating body temperature
2	Doxycycline 100 mg tablet at a dose of 10 mg/kg BW/day, Cyproheptadine 4 mg tablet at a dose of 0.25 mg/kg BW/day, Neuro Forte 1/10 tablet, Xepazym 1/10 tablet	Doxycycline p.o. s.i.d. p.c., for 7 days Hematodin s.c. s.i.d. (Cyproheptadine + Neuro Forte + Xepazym) p.o. b.i.d. p.c.	Condition began to stabilize, vomiting decreased, appetite increased, hydration improved, normal body temperature, increased activity
3	Doxycycline 100 mg at a dose of 10 mg/kg BW/day, Imidox 120 mg/mL at a dose of 5 mg/kg BW, Hematodin 1 mL, Cyproheptadine 4 mg tablet at a dose of 0.25 mg/kg/day, Neuro Forte 1/10 tablet, Xepazym 1/10 tablet, Ursodeoxycholic acid (UDCA) 250 mg tablet at a dose of 10 mg/kg BW/day	Doxycycline p.o. s.i.d. p.c., for 7 days Imidox, s.c. s.i.d., initially administered only once (day 14) Hematodin s.c. s.i.d. (Cyproheptadine + Neuro Forte + Xepazym) p.o. b.i.d. p.c. Ursodeoxycholic acid (UDCA) p.o. s.i.d. p.c.	Normal appetite, increased activity, bright mucosa, stable body temperature, without recurrent vomiting or fever
4	Follow-up control	Physical and blood examinations were performed every two weeks post-therapy	

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Figures

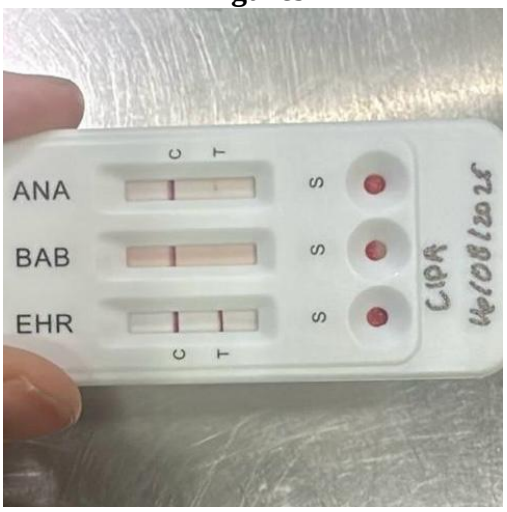

Figure 1. Results of the rapid test kit examination

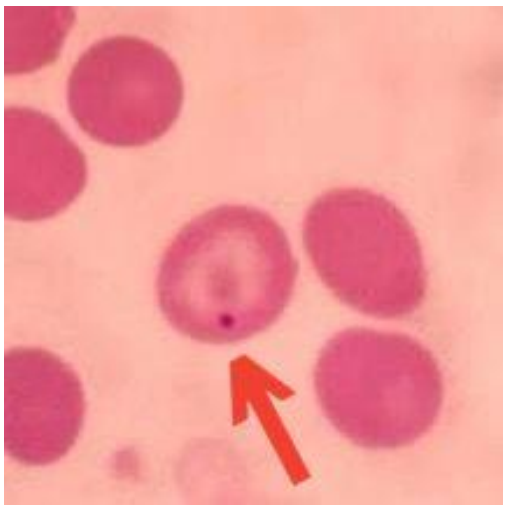

Figure 3. Morphological findings of *Babesia* spp. on blood smear examination

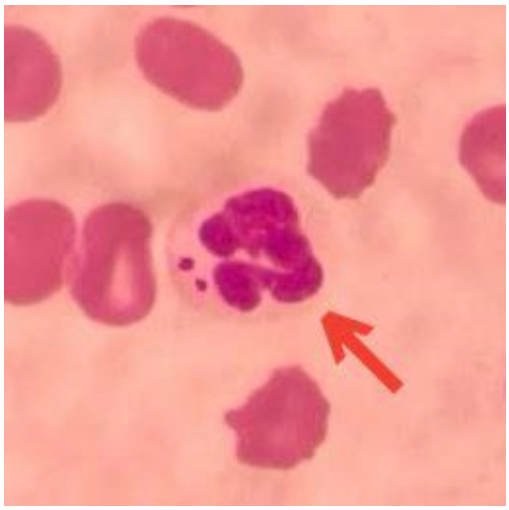

Figure 4. Morphological findings of *Ehrlichia* spp. on blood smear examination

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