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Diagnosis and Treatment of Canine Babesiosis in a Female German Shepherd in Tandojam, Pakistan

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ABSTRACT

A 2.5-year-old female German shepherd weighing 30 kg was received at the Department of Veterinary Medicine at the Sindh Agriculture University in Tandojam, Pakistan. Clinically Anamnesis indicated that the patient had anorexia for ten days, along with two episodes of emesis, dark urine, increased water consumption, and sporadic lethargy. Bitch seemed physically thin, with a lifeless covering of hair. A clinical examination revealed pale conjunctiva and mucous membranes, elevated CRT, and increased skin tent twisting time. The temperature, heart rate, and respiration rate were also elevated, measuring 103.8 ^{o}F, 128/min, and 56/min, respectively. Complete blood counts (CBCs) and microscopic analysis of stained thin blood smears were used in the diagnosing process. The CBC report and blood test confirmed the presence of canine babesiosis, which was treated with metronidazole for 1 week, doxycycline monohydrate for three weeks, and a single dose of imidocarb diprionate. Up to appropriate feed intake, supportive treatment was also administered. After the three weeks of therapy, Bitch was fully healed.

Keywords: German Shepherd, Bitch, Babesiosis, Tandojam, Pakistan

INTRODUCTION

Tick-borne babesiosis is an intraerythrocytic parasite disease that affects dogs, animals, horses, and rodents and is economically significant [1]. Babesia canis, Babesia gibsoni, and Babesia annae are three of the more than 100 species of Babesia known to cause disease in various animal species [2]. In Pakistan, B. canis is around four times more common than B. gibsoni [3]. Babesia has been assigned to the genus Babesidae, family Piroplasmida, and order Aconoidasida. This disease has possible zoonotic implications in addition to its veterinary significance. Humans are mostly infected by B. microti and B. divergens species [1]. The primary vectors of disease transmission are ticks belonging to the Rhipicephalus species; however, Babesia gibsoni is transmitted by Dermacentor reticularis, Babesia canis by Haemaphysalis bispinosa, and Babesia gibsoni by Haemaphysalis longicornis. The two primary clinical signs of babesiosis in dogs are anemia and fever, which are caused by intra and extravascular

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hemolysis [4]. The overall frequency of canine babesiosis in Tandojam, Pakistan, was determined to be 12.49% in 2004 and 13.97% in 2005 [3].

According to reports, male dogs in certain age groups (less than 2 years) and cross-bred dogs are more likely to have babesiosis than dogs in other age groups [5]. Tick repellents, clean surroundings, and educating dog owners about prevention techniques can all help to control disease. Compared to other seasons, the summer is hyper-endemic for disease [3]. This increased prevalence in summer is related to the increased tick population in this season. Due to the hot and humid weather of Pakistan, the occurrence of babesiosis is being increased. In this report, the diagnosis and treatment regime for the canine babesiosis case have been described.

CASE PRESENTATION

A 2.5-year-old female German shepherd weighing 30 kg was received at the Department of Veterinary Medicine at the Sindh Agriculture University in Tandojam, Pakistan with a history of anorexia for 10 days, 2 episodes of emesis, brown urine, and excessive water intake. On investigation, the owner told about the depression of the patient intermittently. Regular vaccination and deworming schedule were being followed. Dog food and boiled chicken were being fed to bitch before anorexic condition. Visually, bitch was emaciated with a dull coat. Clinical examination revealed increased temperature, heart rate, and respiration rate of 103.8 oF, 128/min, and 56/min, respectively along with pale conjunctiva and mucous membrane, increased CRT, and skin tent twisting time. Based on this examination, bitch was found to be anemic and dehydrated. Lymph nodes were normal in size. The fecal sample collected for examination of GIT parasites showed the absence of ova. Blood was collected from the ear vein to form a thin film smear and from the cephalic vein for Complete Blood Count (CBC).

A thin blood smear was stained with field stain and examined less than 100X of compound microscope which revealed an erythrocytic parasite. Complete Blood Count (CBC) report showed anemia with decreased erythrocytic count, Hematocrit, and Hemoglobin level of 3.7x1012/L, 23.4%, and 8.2g/dL, respectively. Thrombocytopenia (which occurs due to destruction and sequestration in the spleen) with a platelet count of 53x109 and lymphocytosis with 88.4% lymphocytes were present. [Normal reference values of CBC for the dog are RBC's count= 4.95-7.87x1012/L, PCV/Hematocrit=35-57%, Hb=11.9-18.9g/dL, platelets=211-621x109/L and lymphocytes=8-21% of total White blood cells. Based on history, clinical examination, CBC report, and blood smear examination, the disease was diagnosed as Canine babesiosis. Babesiosis should be differentially diagnosed from conditions that cause hemolysis, anemia, icterus, and fever. Ehrlichiosis, Acute anemia, Lyme disease, Q-fever, and typhoid fever can confuse while diagnosing babesiosis but examination of stained blood smear and ELISA are confirmatory for canine babesiosis.

CLINICAL FINDINGS

It is important to note that the clinical findings in infected dogs vary based on the Babesia species causing the infection and the host's susceptibility. In general, hemolytic anemia and the systemic inflammatory response syndrome leading to multiple-organ dysfunction syndrome are responsible for most of the clinical signs observed in canine babesiosis. Hemolysis may result in hemoglobinemia, hemoglobinuria, bilirubinemia, and bilirubinuria [17].

Thrombocytopenia is a consistent hematological finding in babesiosis and may be caused by immune mechanisms, splenic sequestration, or coagulatory consumption of platelets from hemolytic or vascular injury [17]. Tissue hypoxia is found in severe cases of canine babesiosis. It is caused by anemia, hypotensive shock, and vascular stasis by sludging of erythrocytes, excessive endogenous production of carbon dioxide, and consumption of hemoglobin by the parasite.

The central nervous system, kidney, and muscle are affected by hypoxia. Tissue hypoxia, hypertensive shock, multiple organ dysfunction, and potential mortality have been documented mostly in B. rossi and B. canis infections. Severe disease with B. vogeli infection is found in young pups and immunocompromised adult dogs, such as dogs with hyperadrenocorticism or treated with immunosuppressive therapy.

The spleen has an important role in controlling babesiosis. Experimentally infected splenectomized dogs rapidly develop parasitemia and clinical disease. Splenectomy has also been associated with fatal outcomes in both human and canine babesiosis [14].

DIFFERENTIAL DIAGNOSIS

The main differential diagnosis for canine babesiosis is primary immune-mediated hemolytic anemia (IMHA) [21]. Other differential diagnoses include causes of hemolytic anemia in dogs such as zinc poisoning, ingestion of onion, naphthalene, and certain neoplasia which cause the shearing of erythrocytes with microangiopathic hemolytic anemia such as hemangiosarcoma.

Babesiosis should be ruled out in cases of IMHA without a clear reason [19]. In addition, babesiosis can in some cases be accompanied by non-regenerative anemia, and it should not be ruled out in these cases.

TREATMENT

This case of bitch infected with Babesiosis was treated with a single shot of IMIDOCARB DIPROPIONATE @ 5mg/kg subcutaneous route, Doxycycline Monohydrate 100mg/day P.O for 21 days and metronidazole 200mg/day for 7 days to minimize the damage produced by Babesia because no drug can eliminate it. To resuscitate dehydration and maintain energy level, an infusion of 5% Dextrose and Lactated Ringer (Ringolact-d, Otsuka Pakistan Ltd.) 400ml/day for 4 days was administered through the IV route. Infusions are advantageous in this case if administered accurately. To overcome the adverse reactions of Imidocarb, 1ml (1mg) atropine sulfate and 1ml (4mg) dexamethasone sodium phosphate was given 10 minutes before, intramuscularly.

RESULT

The bitch showed a very good response to the treatment prescribed and recovered completely. After 21 days of medication, bitch became healthy with normal hematological values. In Pakistan, diagnosis of canine babesiosis can be made based on examination of a stained blood smear, and hematological values as mentioned in this case. In such instances of Canine babesiosis, the drugs mentioned above are a very good choice.

DISCUSSION

Babesia species are transmitted to canine hosts through tick bites. While the infected ticks feed on the dog, Babesia sporozoites are injected with saliva into the host's skin. The parasites invade the red blood cells, and form ring-shaped trophozoites. World-wide distributed protozoal disease of Babesiosis is caused by Babesia, victimizes multiple species of animals. This disease is most economically important for the cattle industry [6] but Canine babesiosis is becoming more prevalent and a major problem in dogs. The disease is transmitted by ticks. In Pakistan, the most prevalent vector for transmission of the disease is Rhipicephalus [5]. Disease burden is related to the density of ticks in an area, so the disease is more prevalent in the summer season, due to a hot and humid environment that is favorable for ticks. Other modes of transmission for Babesiosis include blood transfusion and dog bite [7]. Transplacental transmission from dam to offspring has also been reported [8]. In such cases, the disease is seen at a very young age.

Pathogenesis of Canine Babesiosis in different regions differs [9]. Ticks feeding on infected blood take up parasites and sexual parasite development of Babesia takes place in the tick gut and is followed by sporogony in its tissues. Parasites reach the tick's salivary glands or its oocytes from which transmission occurs. Babesia spp. are transmitted transstadially from one stage in the tick life cycle to another, and also transovarially in some Babesia spp. through the tick eggs. The transmission of babesiae occurs through the bite of a vector tick. In addition to that, B. gibsoni infection has also been demonstrated to be transmitted via blood transfusion, bite wounds, and transplacentally.

In general, Babesia is transmitted by ticks after 3 days of bite and enters into blood. In blood, attach with RBCs and enter RBCs through endocytosis. Intravascular and extravascular hemolysis leads to hemolytic anemia and hypotensive shock. Clinically Babesiosis is manifested with anorexia fever, tachycardia, tachypnoea haemoglobinurea, pale mucous membrane, and splenomegaly. Paraplegia is also a rarely reported sign of Canine Babesiosis [10]. Proteinuria with concentrated urine is also seen in canine babesiosis [11]. The disease is not fatal if diagnosed and treated in the early stage of the disease; prognosis becomes poor if case becomes complicated. Blood parasitism is considered when fever persists even after giving an antipyretic. The more replication of babesia and RBCs lysis is, the more severe the disease is. Immunosuppression and splenectomy are also conditions that can be risk factors for Canine Babesiosis.

Diagnosis of Babesiosis in dogs is based on symptoms observed, examination of diff quick stained blood smear under 100X lens of compound microscope when the case is no more complicated while PCR and serological detection are tools to diagnose complicated/ chronic cases [22]. Clinical signs have been described earlier, for smear formation blood is collected from peripheral veins e.g. ear or tail veins [21]. The percentage of affected RBCs examined varies and can reach up to 10% [12]. Acute phase protein level in serum increases whenever there is inflammation or body damage. The level of acute phase proteins including C-reactive protein CRP and ceruloplasmin is intensified while that of haptoglobin is reduced in Babesia canis [13]. This is another way to diagnose and check the severity of the disease but for that, there is a need to develop simple tests for the detection of acute phase protein levels in serum. Serological testing with ELISA can differentiate between B. canis and B. gibsoni [14]. Prevalence of ticks and disease in an area and season are contributory factors for diagnosis of Babesia specifically in countries like Pakistan where advanced testing is not affordable.

Different types of drugs are available and used as a treatment for babesiosis. Imidocarb dipropionate, diminazine aceturate (antiprotozoal drugs) are mostly prescribed with antibiotics Doxycycline or Enrofloxacin [14]. Metronidazole is another choice. Atovaquone and azithromycin combination has also been proven effective against Babesia gibsoni, but Asian genotypes of B. gibsoni are thought to be resistant to this combination of atovaquone and azithromycin [15]. There is

no drug available that can eliminate the disease pathogen [2]. Supportive therapy with blood or electrolytes is also crucial in the case of Babesiosis. In Pakistan, single shot imidocarb dipropionate 3.5-5mg/kg injectable along with oral doxycycline is prescribed. Supportive therapy with Ringer lactate and vitamin B complex (Neurobion®) are also prescribed. No drug can eliminate the parasite from an infected patient and even if recovered, relapse is also seen.

For the control of every disease, knowing the paths of transmission of pathogens is very crucial. The main culprit for the transmission of babesiosis is ticks. Controlling ticks is controlling Babesiosis [16]. Dipping, spraying, and tick collars are ways to control ticks [20]. The owner should be advised to check their pets for ticks daily and provide them with hygienic conditions. Fipronil spray (Frontline ®) is easily available in Pakistan for the control of ticks on dogs [17]. Dog bites and blood transfusion are also sources of spread so dog fights should be strictly prohibited and the blood of the donor should be tested for haemoparasites before transfusion [18].

PREVENTION

Prevention of canine babesiosis relies mostly on the avoidance of infectious tick bites. Topical and environmental acaricidal treatments are aimed at reducing the exposure to vector ticks and pathogen transmission to the dog. Babesiosis should be suspected in cases of hemolytic anemia and clinical findings associated with a hemolytic process [19]. A vaccine against B. canis infection is commercially available in some countries in Europe. The vaccine contains inactivated B. canis soluble antigens obtained from culture medium and is adjuvanted with saponin.

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