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Treatment Leptospira Infection In Dog At Pet Vet Clinic, Central Jakarta

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ABSTRACT

Leptospirosis is a disease caused by Leptospira spp., zoonotic gram-negative bacteria. This study aimed to determine the handling of a case of leptospirosis in a dog at the Pet Vet Clinic, Jakarta. Handling began with anamnesis and was continued by examining the patient's physical condition, followed by serological, microscopic, and polymerase chain reaction examinations. Examination revealed that the dog had leptospirosis. Crystalline procaine and penicillin-G antibiotics were administered. Supportive treatment included hepatoprotective, lipotropic, and diuretic supplements. Ringer's lactate was used for fluid therapy. The treatment administered showed positive, progressive results in the patient.

Keyword: Leptospirosis, *Leptospira* spp., dog.

INTRODUCTION

Dogs are the most popular animals, and are widely used as pets. Owners who choose dogs as their favorite pet report feeling closer to their pets than those around them. However, it is likely that pain, particularly disease-related pain, will always be present and can affect dogs. Dogs are susceptible to various diseases including leptospirosis. Leptospirosis is a disease caused by the bacteria *Leptospira* sp., which can be transmitted from animals to humans or vice versa (acute zoonoses) and can result in death. Leptospirosis occurs worldwide (Altheimer *et al*., 2020). Although Leptospirosis occurs worldwide, it is more common in tropical and subtropical regions. It is estimated that more than one million cases occur worldwide each year,

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including nearly 60,000 deaths (Mukadi Kakoni *et al*., 2021). The number of leptospirosis cases in DKI Jakarta in 2018 and 2019 reached 31 and 37, respectively, in 2020 contributed 208 cases, and 2021-2022, 16 cases (Subdin Kemas, 2022). This is because it experiences high rainfall and frequent flooding, which are conducive to the spread of *Leptospira*. Leptospira can survive for weeks or months in air and soil contaminated with urine (Mursalim and Hatta, 2018). Infection can occur through direct contact with urine or reproductive fluids of infected animals, contact with urine-contaminated water (floodwater, rivers, ditches, sewage), wet soil, or consumption of food or water contaminated with urine or urine contaminated with water. Transmission occurs through mucous membranes, conjunctiva, and cuts or abrasions on the skin (Ningsih and Wahid, 2022). In the early stages in humans, symptoms include high fever, severe headache, muscle aches, chills, red eyes, abdominal pain, jaundice, bleeding of the skin and mucous membranes, vomiting, diarrhea, and skin rash (Zhao *et al*., 2022).

Leptospirosis is an infectious disease that affects pets and wild animals, such as rats, livestock, pigs, horses, cats, and dogs. Leptospirosis has existed in Indonesia since the Dutch East Indies era, and epidemiologically, it has been reported in several places in Indonesia, affecting the economic condition of livestock and public health (Ningsih and Wahid, 2022). Leptospirosis is zoonotic and has a wide geographical distribution, especially in tropical areas, such as Indonesia. Dogs are especially susceptible to infection by many leptospiral serovars, with clinical signs of leptospirosis ranging from mild subclinical infection to acute kidney injury, liver failure, respiratory disease, or death (de Oliveira *et al*., 2022). Leptospirosis poses a risk to pets; therefore, it is important to understand how to detect and treat it in dogs, allowing pets to receive prompt treatment if infected with *Leptospira*.

MATERIAL AND METHOD

On Tuesday, June 28, 2022, a 9-year-old male crossbred dog with a body weight of 7.5 kg and a body temperature of 39.3 °C named Smarty was brought to the Pet Vet Clinic in Central Jakarta. The anamnesis experienced vomiting three times, and a yellowish liquid was observed. Physical examination was performed via inspection and palpation. Smarty had been admitted to the same clinic with *a Leptospira* sp. diagnosis based on Microscopic Agglutination Test (+) results but had improved and was declared negative (-) two weeks before returning for a check-up. Nonetheless, he was declared negative

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for *Leptospira*. After two weeks, Smarty's condition worsened again, and the last vaccine was three years ago. Blood samples were used for routine blood tests, such as complete blood count (CBC) and blood chemistry to confirm the diagnosis. The results were observed ten days later and descriptively analyzed based on data that included clinical symptoms, laboratory tests, and supportive therapy. Urine samples were collected for polymerase chain reaction tests performed before and after discharge to confirm the absence of *Leptospira* using the primers *Lep_G1* and *Lep_G2* (Vincent *et al*., 2019).

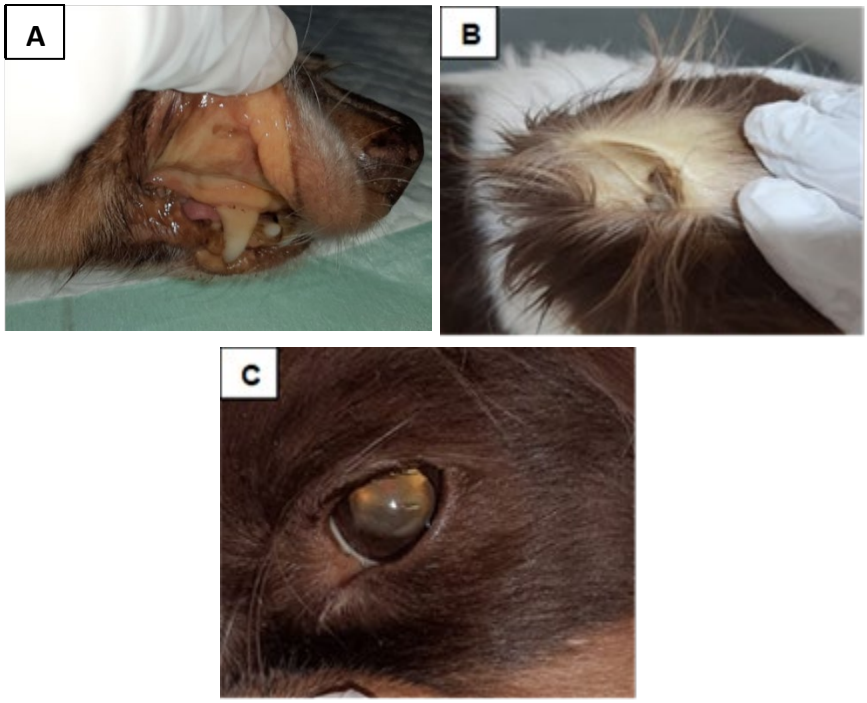

Figure 1. Clinical findings jaundice in (A) the Oral mucosa of the patient; (B) the ears of the patient; and (C) in the eyes of the patient.

RESULTS

Examination results revealed anorexia, weakness, turgor > 3 s, and jaundice almost all over the body of the patient (Figure 1). Dog blood hematological examinations are presented in Table 1. The results showed that the patient had anemia, which can occur in animals owing to a bacterial or parasitic infection. According to Kartika (2014), erythrocytes and red blood cells carry hemoglobin throughout the body to meet the oxygen demand of the body's

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tissues. The inspection results of The erythrocyte concentration (2.55) was lower than the standard limit (5.50). Smarty's routine blood tests for most dogs showed leukocytosis, with a white blood cell (WBC) count of up to 60.11 from the standard limit (6.00-17.00). Kohn *et al*. (2010) reported that a leukemoid reaction could occur with a WBC count >80 during leptospirosis. Leukopenia may be encountered during the leptospiremic phase. Differential cell counts often reveal neutrophilia, lymphopenia, and monocytosis. Bacterial and parasitic infections can increase neutrophilia.

Blood tests on smarty patients showed increased neutrophils, monocytes, and lymphocytes. Compared to eosinophils and basophils, neutrophils comprise the majority of leukocytes in the granulocyte group. While a decrease in lymphocytes (LYM) indicates that the patient is susceptible to infection, especially viral infections, prompting urgent action to protect patients from disease, an increase in neutrophils can determine the severity of the infection. In this case, it appears that his lymphocytes increased, indicating that the body is trying to fight infections that occur in the body. Examination of the mean corpuscular hemoglobin (MCH) levels in the blood can be used to identify the occurrence of anemia. MCH measures the amount of hemoglobin in red blood cells and determines the color of the cells (hypochromic, hyperchromic, or normochromic). Severe infection occurs when the growth of neutrophils exceeds that of total erythrocytes (Raffray *et al*., 2016).

Urine examination using the molecular method showed positive results for the presence of Leptospira before treatment and negative results after treatment, indicating acute kidney injury in the patient (Figure 2).

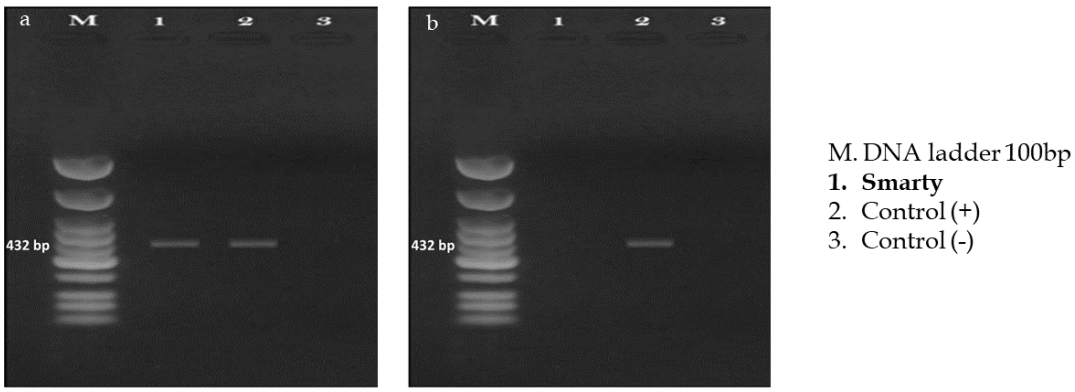

Figure 2. Polymerase chain reaction results showed a.positive *Leptospira* before treatment and, b. negative *Leptospira* after treatment.

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Table 1. Smarty Patient Blood Examination Results

Laboratory test	Normal Range	Patient (Smarty)	Description
White blood cell count	6.00-17.00	60.11	Increase
Lymphocytes	1.00-4.80	5.11	Increase
Red blood cell	5.50 – 8.50	2.55	Decrease
Hemoglobin	12.00-18.00	7.4	Decrease
Hematocrit	37.00- 55.00	19.13	Decrease
Mean Corpuscular Hemoglobin	19.5- 24.5	29.2	Normal
Mean Corpuscular Hemoglobin Concentration	31.00-39.00	38.9	Normal
Red cell distribution width count	14.00-20.00	22	Increase
Platelet	165-500	28	Decrease
Neutrophil	0.0- 100.0	49.67	Increase
Eosinophil	3.00-12.00	0.07	Normal
Monosit	0.20-1.50	5.25	Increase
Mean Corpuscular Volume	60-77	75	Normal
Basofil	0.00- 0.40	0.00	Normal
Mean platelet volume	3.9-11.1	9.6	Normal

Table 2. Results of Smarty Patient Blood Chemistry Examination

Laboratory test	Normal range	Patient (Smarty)	Description
ALB	2.5 – 4.4	ICT	Normal
ALP	20 -150	956	Increase
ALT	10 – 118	145	Increase
AMY	200 – 1200	2045	Increase
TBIL	0.1 – 0.6	16,7	Increase
BUN	7 – 25	85	Increase
CA	8.6 – 11.8	9,5	Normal
PHOS	2.9 – 6.6	4,2	Normal
CRE	0.3 – 1.4	ICT	Increase
GLU	60 – 110	70	Normal
Na+	138–160	142	Normal
K+	3.7 – 5.8	3,1	Decrease
TP	5.4 – 8.2	ICT	Decrease
GLOB	2.3 – 5.2	---	Zero

Abbreviations: ALB, albumin; ALP, alkaline phosphatase; ALT, alanine aminotransferase; AMY, amylase; TBIL, total bilirubin; BUN, blood urea nitrogen; CA, calcium; PHOS, phosphorus; CRE, creatinine; Glu, glucose; NA^+, sodium; K^+, potassium; TP, total protein; GLOB, globulin, ICT, icterus.

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The most common biochemical abnormalities are shown in Table 2. Blood urea and creatinine concentrations were increased in most dogs infected with leptospirosis. In addition, liver injury, as evidenced by the increased activity of serum alanine aminotransferase (ALT), aspartate aminotransferase (AST), alkaline phosphatase (ALP), and hyperbilirubinemia, almost exclusively occurs together with azotemia (Prasetyo and Pamungkas, 2018; Goldstein, 2010). Elevated serum ALP and total bilirubin levels are more common than increased serum ALT levels. Electrolyte abnormalities such as hypo- and hyperkalemia, hyper- and hypophosphatemia, hyponatremia, and hypochloremia are common in canine leptospirosis. The results of the blood chemistry examination in Table 2 show increases in ALT, ALP, amylase, AMY, TBIL, urea nitrogen (BUN), and creatinine (CRE). Increased levels in the panel indicated accumulation *of Leptospira* in the body, which causes damage to the kidneys and liver. When *Leptospira* is present in the blood, these bacteria spread to many body tissues, especially the kidneys and the liver.

Hypokalemia may result from renal or gastrointestinal dysfunction and potassium wasting due to leptospiral-induced inhibition of Na+/K+ -ATPase. Elevated creatine kinase (and AST) and troponin I activities were reported in 44% and 69% of dogs with leptospirosis, indicating skeletal and myocardial injuries, respectively. Increased amylase and lipase activity can be caused by pancreatitis or enteritis, but can also reflect decreased excretion of these enzymes by the kidneys (Chancharoenthana *et al*., 2022). Various hemostatic parameter abnormalities have been reported in dogs with acute leptospirosis, indicating that hypercoagulable and hypercoagulable states may occur (Francey *et al*., 2013). In one study, 14% of dogs presented with thrombocytopenia along with prolonged prothrombin time (PT) and activated partial thromboplastin time (aPTT), leading to suspicion of disseminated intravascular coagulation (DIC) (Kohn *et al*., 2010).

Based on the examination conducted on the patient, the doctor diagnosed suspected *Leptospira* sp. kidney and hepatic problems. The effective treatment of canine leptospirosis consists of appropriate antimicrobial therapy and supportive care for the various organ systems involved (Ellies, 2015). The antibiotics used in the treatment were beta-lactam antibiotics of the penicillin group, which contained procaine benzylpenicillin with three million units per vial and 1.5 ml twice a day subcutaneously (SC) for 11 days of treatment. According to Plumb (2011), procaine is a local anesthetic drug, where the combination of procaine and benzylpenicillin reduces pain when administered via intra-subcutaneous (SC) injection, whereas procaine-benzylpenicillin is an antibiotic used to

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treat infections caused by bacteria that are sensitive to it. To treat dehydration, fluid therapy was administered in the form of Ringer's lactate solution, 350 ml intravenously (IV) per day, with the addition of vitamin B12 to the infusion. The main goals of fluid therapy are to treat dehydration, restore circulating blood volume in hypovolemia or shock, and restore and maintain electrolytes in the blood (K+ and Na+) and acid-base balance in the body to normal (Griebsch *et al*., 2022).

Meanwhile, providing B vitamins maintains nerve function and optimizes cognitive and brain function. Vitamin B12 increases energy, helps heals, and restores hair growth in dogs (van de Lagemaat *et al*., 2019). Supportive therapy is also needed to help maximize treatment in smart cases by administering Ornipural® injections of 2 ml (SC) SID, Troy Cyanocobalamin Vet® Injections of 0.5 ml (IV) EOD, Fu Fang Ejiao Jiang® 4 ml (Po) twice a day (BID), and AminaVast® 1 ml (Po) BID. Ornipural® is a unique commercial formulation that contains many substances with liver- and kidney-protective properties. In the case of smarty, the blood test results indicated damage to the liver and kidneys. AminaVast® is an excellent supplement for maintaining normal kidney health, supporting normal kidney cell structure, maintaining low natural levels of oxidative stress, and supporting overall health and vitality. In this case, anemia was treated by administering supportive drugs such as Troy Cyanocobalamin Vet® and Fu Fang Ejiao Jiang®. Troy Cyanocobalamin Vet® injection is a drug used for anemia due to Vitamin B12 deficiency in dogs, cats, horses, and cattle (Mahindra *et al*., 2020). Fu Fang Ejiao Jiang® is a Chinese herbal medicine that maintains body stamina by acting as a blood-boosting agent, making it suitable for anemia conditions such as dengue fever (lack of platelets).

Efforts to prevent the occurrence of leptospirosis are carried out by vaccination, using routine disinfection in the cage environment, and preventing direct contact with dog reservoir animals, such as rats. If the dog vomited more than once per day, along with a decreased appetite and fever, it was taken to the vet immediately. Vomiting indicates the presence of certain diseases in the body of animals.

CONCLUSION

Based on the indications, anamnesis, physical and clinical examination, and laboratory examinations, the dog (Smarty) was diagnosed with leptospirosis, and treatment given in this study as causative therapy indicated a positive and progressive change.

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allowed the author to do an internship and take this case to be made into the final project.

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