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Clinical Article

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Therapeutic management of leptospirosis in hospitalized dogs at Teaching Veterinary Hospital, Chattogram Veterinary and Animal Sciences University

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Abstract

Leptospirosis is an infection of bacterial spirochetes in dogs. It has zoonotic significance too. Five dogs were brought to the Teaching Veterinary Hospital (TVH), Chattogram Veterinary and Animal Sciences University (CVASU), Bangladesh with a history of anorexia, passing melena, lethargy, vomiting, unable to walk and chronic weight loss. Clinical examination revealed the sign of dehydration with the shrunken eyeball, icteric conjunctival mucus membrane of the eye, gum, penis and the skin of the ventral abdomen. Based on the clinical signs, the dogs were suspected of leptospirosis. Then blood sample was collected for the estimation of haematological and biochemical parameters. Urine samples were subjected to various tests to determine different parameters such as glucose, protein etc. Decreased level of PCV, Hb, TLC, Lymphocytes, TP as well as increased level of ALT, AST, specific gravity, proteinuria, bilirubinuria confirmed that dogs were affected with leptospirosis. Antibiotic, antiemetic, multivitamin and fluid therapies were administered. The dogs were followed for the next two months. The dogs had an uneventful recovery without further complication.

Keywords: Biochemical analysis, Dog, Leptospira spp., Management.

INTRODUCTION

Leptospirosis is a common and widespread zoonotic disease, with reservoirs in domestic and wild animals (Virginia *et al.*, 1992) and it is caused by *Leptospira interrogans*. Leptospira are thin, flexible, motile, filamentous spirochete bacteria *Leptospira interrogans*. *L. interrogans* is distributed worldwide in approximately 160 mammalian hosts. More than 200 serovars *of L. interrogans* have been identified of which eight serovars are the most important to dogs. Specific serovars are maintained in nature by several subclinically infected wild and domestic reservoir hosts acting as serve sources of exposure and illness for dogs, humans, and other incidental hosts. When incidental hosts are infected, they can develop severe clinical illness and shed organisms for shorter periods than the reservoir host (Greene *et al.*, 1998). Wohl (1996) stated canicola, icterohaemorrhagiae, pomona, bratislava, and grippotyphosa as the most incriminated serovars. Bivalent vaccines available are serovar-specific for only canicola and icterohaemorrhagiae, which has resulted in a decreased prevalence of disease associated with those serovars. However, increased awareness of infections with serovars pomona, bratislava, and grippotyphosa has become apparent in the past 15 to 20 years (Brown *et al.*, 1996).

Leptospira are transmitted in animals through direct contact (i.e., infected urine, venereal secretions, animal bites, ingestion of infected tissue) and indirect contact (i.e., contaminated water, soil, food, bedding) (Greene *et al.*, 1998). Stagnant or slow-moving warm water provides a suitable habitat for spirochetes. Outbreaks

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of human and canine leptospirosis have been associated with periods of heavy rainfall and flooding (Wohl, 1996). Ward (2002) found a strong correlation between clinical cases of leptospirosis and the average rain fall and reported late summer to early fall as prime time for the seasonal occurrence of the disease. Pathogenic Leptospira can penetrate host's mucous membranes or abraded skin after the host has been directly exposed to contaminated urine, water, or infected animal tissues (Greene *et al.*, 1998). Leptospira can invade pruned or wrinkled intact skin if exposure is prolonged in contaminated water. Diagnosis of leptospirosis is made by using history, clinical findings and laboratory findings. The first line of treatment of leptospirosis is to provide the dogs with the penicillin class of antibiotics along with fluid therapy giving to as supportive care (Adin und Cowgill, 2000). This study represents the diagnosis and successful management of leptospirosis in the clinically affected dog presented at TVH, CVASU.

MATERIALS AND METHODS

History and Clinical Examination

Five dogs were brought to the SAQTVH with a history of anorexia, weakness, melena, lethargy, vomiting and chronic emaciation. On clinical examination, the animals revealed dehydration with the shrunken eyeball, icteric conjunctival mucus membrane of the eye (Figure 1), the skin of the ventral abdomen (Figure 2), ear pinnae (Figure 3) and gum (Figure 4). The dogs had 102°F body temperature. The dogs were on lateral recumbency and unable to bear the weight on hind limbs. Based on the clinical signs, the animals were suspected of leptospirosis.

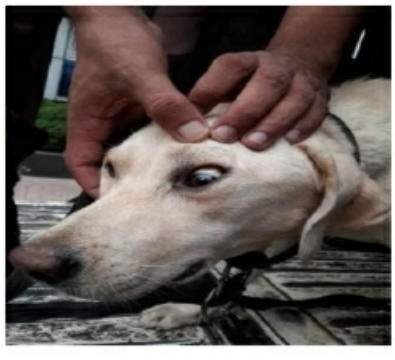

Figure 1: Icteric mucous membrane of eye

Figure 2: Icteric abdominal skin

Figure 3: Icteric skin of ear pinnae

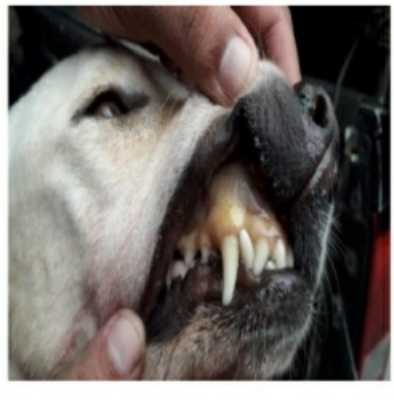

Figure 4: Icteric skin of gum

Laboratory diagnosis

The blood sample was collected into two vacuum containers with anticoagulant and without anticoagulant for haematological and biochemical examinations respectively. Haematological examination was performed to estimate the estimation of haemoglobin (Hb%), Erythrocyte Sedimentation Rate (ESR), the total count of Red Blood Cell (RBC), the total count of White Blood Cell (WBC), Packed cell volume (PCV), total erythro-

cyte count (TEC) and total leukocyte count (TLC). Biochemical analysis of blood was performed to know total protein (TP), aspartate aminotransferase (AST), alanine aminotransferase (ALT).

The urine sample was also collected in a sterilized glass vial by catheterization for urine analysis. Biochemical analysis of Urine samples was performed to estimate protein, specific gravity, bilirubin, and glucose.

Treatment and management

The animals were treated with Oxytetracycline-100 @20mg/kg BW. Other supportive therapy such as 5% DNS, Tab. Bumecard (Incepta, Bangladesh) @2mg/kg BW orally to check infection in kidney, Inj. Hemovit (Renata, Bangladesh) and Inj. Amizid (Sanofi Aventis, BD, Ltd) 2ml/IM to check SGOT, SGPT etc. The dogs were followed for the next two months. The dogs had an uneventful recovery without further complication.

RESULTS and DISCUSSION

The physical examination of the dogs showed severely icteric (Figure 1-4), moderately dehydrated. The present findings supported the observations of earlier researchers in induced leptospirosis in Wistar rats (Khan *et al.*, 2009).

Results of haematological, biochemical analysis of blood and urine are presented in Table 1, Table 2 and Table 3. The haematological analysis revealed a decreased haemoglobin level in all dogs and decreased PCV percentage in three dogs than normal value. However, ESR and the percentage of monocytes were increased in all animals, where WBC count and percentage of neutrophils and lymphocytes decreased in three dogs.

Table 1: Hematology of blood of affected dogs

Parameters	**Dogs**					
	1	**2**	**3**	**4**	**5**	**Reference Value**
Hb (g/dl)	10.2	7.2	8.0	7.6	10.7	11.9-18.9
PCV (%)	30	35	32	60	28	35-57
ESR (mm in 1st hr)	38	40	35	38	32	2-12
WBC (thousand/cumm)	4.4	10	6	2.7	4.5	5-10
Neutrophils (%)	59.7	38.5	35	102	50	58-85
Lymphocytes (%)	29.9	49.1	32.4	50	25	45-75
Monocytes (%)	10.4	12.4	14	15	12	2-10

Table 2: Biochemical analysis of blood of affected dogs

Parameters	**Dogs**					
	1	**2**	**3**	**4**	**5**	**Reference Value**
Glucose (mg/dl)	114.3	117.1	45.4	63.7	79	76-120
Total protein (g/dl)	5.01	4.05	88.3	100.78	85.1	5.4-7.5
ALT (U/l)	66.75	200.8	78	47.9	269.4	10-109
AST (U/l)	87.30	99.52	39.4	47.6	130.1	13-15

The biochemical analysis revealed that SGPT increased in two dogs, and SGOT showed higher in all dogs than normal value and it might be due to damage caused by leptospiral organism on the liver and kidney. Leptospiral endotoxins may cause fibrosis and alter circulation in the liver leading to chronic active hepatitis,

Table 3: Urine analysis of affected dogs

Parameters	Dogs					Reference Value
	1	2	3	4	5	
Specific gravity	2.83	2.5	2.3	3.5	3	1.015-1.045
Proteinuria	14	12	9	8.5	8	negative
Bilirubin	7	10	12	8	5	Negative to trace
Glucose	70	66	50	48	50	negative

particularly with *L. grippotyphosa* infections as found by Greene *et al.* (1998). The decreased haemoglobin and decreased PCV and TLC counts can be attributed to toxins released by leptospiral organisms, which cause damage to RBCs. The increased levels of total bilirubin, ALT, and AST in bovine (Millar *et al.*, 1977) increased ALP, ALT, urea, and creatinine in dogs (Kiem *et al.*, 1995); increased ALP, ALT, total bilirubin, direct bilirubin, and creatinine in equine (Govindarajan *et al.*, 2011); increased ALP, ALT, urea, and creatinine in Wistar rats (Goldstein *et al.*, 2006); increased BUN, creatinine, cholesterol, ALT, AST, and bilirubin in goats (Govindarajan *et al.*, 2011) have been reported in different studies in the past. Contrary to this, Millar *et al.* (1977) could not find any alteration function in sheep. It is reported that AST activity is non-specific. However, ALT activity is a good indicator of liver damage among ruminants. Similarly, higher total bilirubin level occurs in liver damage (Tonin *et al.*, 2012).

The report of biochemical parameters studied presently in a limited way was suggestive of hepatic damage and supported the consensus that the hepatic damage does occur in leptospirosis. This result supports the report of Yang *et al.* (2001), who noted that renal and hepatic damage used to occur in leptospirosis. However, in this study, various biochemical parameters did not support kidney damage possibly because kidneys continue to function apparently in a usual way for a long time due to the excess reserve of kidney tissue provided by nature till it reaches to the point of no return. Hypoproteinemia could be due to several non-specific factors such as parasitism, the low protein level in feed, anaemia, and hepatic alignment. In urine analysis, higher specific gravity, proteinuria, glucosuria and bilirubinuria was observed in all dogs, which correspond with the finding of Virginia *et al.* (1992). Birnbaum (1998) reported microscopic agglutination test (MAT) as the "gold standard" diagnostic test for leptospirosis. On the other hand, O'Keefe (2002) reported that dark-field microscopy is a useful screening tool for urine. In the present case, dogs showed considerable improvement after the treatment assigned. This finding is in agreement with Greene *et al.* (1998) and Virginia *et al.* (1992), who founded Penicillin and its derivative was the drug of choice for leptospiremia.

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