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Therapeutic Management of Right Side Congestive Heart Failure in a Dachshund Bitch

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Congestive Heart Failure (CHF) is a term that refers to the heart's inability to pump adequate blood to the body. There are many causes of CHF in dogs *viz.* mitral valve insufficiency (MVI) or a leaky mitral valve, dilated cardiomyopathy (Haggstrom, 2010) and chronic heartworm disease. Clinical signs vary depending on whether the dog has left- or right-sided heart failure. Right-sided congestive heart failure (RS-CHF) causes poor venous return to the heart, accumulation of fluid in the peritoneum leading to ascites. Fluid also leaks from the veins in the limbs, causing oedema of the peripheral region.

In animals, Right-sided congestive heart failure (RS-CHF) has previously been described in dogs (McIntosh and McEntee, 1995), cats and also in ferret (Haggstrom, 2010). The reported canine cases were among young to middle-aged male dogs (Bull mastiff, Siberian husky and dachshund), with acute-onset congestive right-sided heart failure or syncope as the presenting complaints. The present case was diagnosed as right side heart failure in a six years old female Dachshund dog with pleural effusion.

Case History and Clinical Examination

A six years old female Dachshund bitch was presented to the Teaching Veterinary Clinical Complex of the College of Veterinary Sciences and Animal Husbandry, CAU, Selesih, Mizoram, India with the history of exercise intolerance, labored breathing and coughing since two weeks. History regarding deworming and vaccination were obscure.

Close clinical examination revealed respiratory distress, enlarged thoracic, prominent rib cage and heart murmurs which were detected by auscultation. There was increased heart rate (160 beats per minute); other clinical parameters were found within the normal range. For confirmatory diagnosis, the dog was subjected to radiography, electrocardiography and ultrasonography and haemato-biochemical study. Blood and faecal samples were collected for evaluation of haemato-biochemical changes and to rule out the heart worm as well as endoparasitic infestation.

Treatment and Management

Based on the findings, the bitch was diagnosed for right side heart failure with pleural effusion.

The condition was treated with antibiotic (amoxacillin and cloxacillin) @ 11 mg/kg b. Wt. im, antihistaminic (chlorphineramine maleate) 1 ml im, ACEI (enalpril) @ 0.4 mg/kg b. Wt. b.i.d. 7 days orally, glucocorticoid (dexamethasone) 0.3 ml im, digitalis (digoxin) 0.006 mg/kg b.Wt., PO, twice per day, diuretics (furosemide) @ 2 mg/kg b.Wt., PO twice daily, Vitamin-B complex injection @ 2 ml im at every alternate day for seven days. A salt restricted diet was recommended.

Results and Discussion

Modified Knot techniques and SNAP 4DX showed negative result for heart worm infestation and faecal sample also revealed negative result for endoparasitic infestation.

The thoracic radiographs revealed a massive cardiac enlargement. Increased cardiac sternal contact with a cranial cardiac wall bulge in combination with a greater increase in cranio-caudal cardiac diameter as compared to apicobasilar diameter; suggested severe right ventricular enlargement. The cardiac apex was displaced to the left which could be attributed to right ventricular enlargement with pleural effusion. The massive right-sided cardiomegaly with pulmonary congestion which might have led to marked elevation of the intra-thoracic trachea cranial to its bifurcation (Kumar and Srikala, 2014). Congestive right-sided heart failure was reflected by a modified transudate ascites, pleural effusion, and distended jugular veins and caudal vena cava (Borgarelli and Haggstrom, 2010) corroborating the findings of the present study.

The electrocardiographic (ECG) findings revealed low R wave amplitude 0.04 mv (normal range 0.05- 1.00 mv), increased P wave duration 0.06 sec (normal 0.04 sec) while wave amplitude decreased 0.35 mv (normal 0.4 mv), PR interval increased 0.14 sec (normal range 0.06 - 0.13 sec), prominent S waves and a normal QRS complex duration. Electrocardiographic features of cardiac failure include decreased left ventricular FS (systolic dysfunction) with resultant left ventricular and atrial dilation, and possibly secondary right heart dilation (Borgarelli and Haggstrom, 2010; Kumar and Srikala, 2014). Electrocardiographic recording in the present case consistent with incomplete right bundle branch block or right ventricular enlargement with abnormally low R wave amplitudes, increased P wave duration with decreased wave amplitude, PR interval increased, prominent S waves and a normal QRS complex duration indicating right-sided cardiac failure.

Abdominal ultrasonography revealed hyper echogenicity of liver, focal and echogenic area in one lobe of lung (right) with presence of ascitic fluid.

The haematological findings (Table 1) showed decreased percentage of granulocyte and the increased percentage of lymphocyte which denotes lymphocytic leukocytosis with marked neutropenia which might be due to pulmonary congestion, stress. The biochemical findings showed moderately decreased level of total protein, albumin and increased alanine amino transferase (ALT) and alkaline phosphatase (ALP) concentration. Further, slightly increased levels of CKMB (U/L) and lactate dehydrogenase (LDH) were noticed (Table 1).The decreased percentage of granulocyte and the increased percentage of lymphocyte denotes lymphocytic leukocytosis with marked neutropenia,. The haemato- biochemical findings were suggestive for heart failure associated ascites. Decreased total protein and albumin level in present case might be due to anorexia as well as involvement of hepatic enlargement. Elevated ALT values in present case were also reported by Olsen *et al.* (2010) who indicated that such increase is due to hepatic congestion. The value of cardiac markers i.e. CK-MB and LDH was increased in the present case study which might be due to myocardiopathy. This was also in agreement with Bakrel and Gunes (2009) and Tarn and Lapworth, (2010).

After seven days of post therapy, the heart rate become normal (100 beats/minute), with markedly decrease in abdominal effusion and improved haemato-biochemical parameters (Table 1). The signs of right heart failure with abdominal and pleural effusion might be alleviated with diuretics (Antran and Schwarz, 2005). The diuretics are the single most effective agents used to decrease circulating blood volume and reduce signs referable to edema and effusion in animals in heart failure (Atkins et al., 2009).

TABLE 1. HAEMATO-BIOCHEMICAL CHANGES OF RIGHT SIDE CONGESTIVE HEART FAILURE IN A DACHSHUND BITCH

Parameters	Pretreatment (day 0)	Post treatment (Day 7)	Reference (Bakrel and Gunes, 2009)
Hb (gm/dl)	12.5	16.2	12-18
WBC ($x10^3$cells/µl)	11.06	22.34	06-17
LYM (%)	76.9	42.5	08-38
MON (%)	6.8	7.9	01-09
GRA (%)	16.3	22.6	60-75
RBC ($x10^6$cells/µl)	6.95	7.07	5.6-8.7
HCT (%)	50.5	53.8	41-58
MCV (%)	72.8	76.1	58-79
Platelate ($x10^5$cells/µl)	2	2.5	2-5 lakh
MCH (pg)	23.3	17.6	19-28
MCHC (g/dl)	32.0	23.2	30-38
Total protein (g/dL)	4.01	6.01	5-7
Albumin (g/dL)	3.02	3.8	2.5-4.0
ALT (U/L)	76.60	40.0	25-92
ALP (U/L)	124	55.2	10-150
Creatine Kinase, CKMB (U/L)	74.4	56.7	59-895
LDH (U/L)	340.84	210.5	20-273

Fluid retention in the body cavities of dog in present case might be due to reduce pumping efficiency of heart. The ACEI (Enalpril) has the capacity to improve lung oedema because of having venous vasodilator and diuretic effects (Kittleson, 1998).

Digoxin is used in dogs that have moderate to severe heart failure and very fast heart rates secondary to abnormal rhythms, such as atrial fibrillation (Antran and Schwarz, 2005). It reduces the pressure against which the heart must pump (after load), allowing an increased cardiac output with the same force of myocardial contraction.

Conclusion

Right side CHF could be one of the probable causes for cardiomegaly, pulmonary congestion and ascites in dogs (as the condition is manifested by pleural, pericardial and abdominal effusion) that requires special attention and the suspicion never be ignored. Aldosterone blockers (diuretics) along with angiotensin receptor blockers and hepato-protectives can be considered as effective therapeutic strategy to treat right side congestive heart failure in dogs.

Conflict of Interest: All authors declare no conflict of interest.

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