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Ascites due to hepatic origin in two dogs

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Abstract
A four years old male non-descript dog and two years old male spitz cross dog were presented to Veterinary Clinical Complex, Tirunelveli with history of distended abdomen and reduced feed intake for the past one week. Clinical examination of the animal revealed congested conjunctival mucous membrane, elevated temperature, dyspnoea and pot-bellied appearance. Hematology revealed leukocytosis, neutrophilia, anemia and hemoconcentration. Serum biochemistry revealed azotemia, elevated ALP, glucose, sodium, potassium and decreased albumin, total proteins and cholesterol. Ultrasonography revealed fluid accumulation in abdomen. Electrocardiography of spitz dog revealed left ventricular enlargement. Abdominocentesis revealed clear, transparent, yellow fluid free of clots. Cytology of fluid revealed alkaline pH, elevated Glucose, protein & absence of cells in sediments. Urinalysis revealed proteinuria and few oxalate crystals in sediments. The case was diagnosed as Ascites of hepatic origin. The case was treated with fluids, antibiotics, diuretics and the same was advised as oral medication along with liver supplements. The details of the case will be discussed.

Keywords: Ascites, pot-bellied, diuretics, hepatoprotective

Introduction
Ascites, the accumulation of fluid in peritoneal cavity is only a clinical manifestation of underlying disease condition and not a disease in real sense. It is often diagnosed in dogs between ages of 5 and 7 years [1]. The most common causes of ascites in small animals include chronic liver failure, congestive heart failure, nephritic syndrome, malnutrition, ancylostomiasis and protein-losing enteropathy in dogs, high parasitism and abdominal neoplasia of various origins [2]. The most common cause of ascites due to hepatic origin is attributed to portal hypertension, hypoalbuminemia and increased renal sodium and water retention [3].

History and clinical observations
A four years old male non-descript dog and two years old male spitz cross dog were presented to Small Animal Medicine Unit of Veterinary Clinical Complex, Veterinary College and Research Institute, Tirunelveli with history of distended abdomen (Fig. 1) (Fig. 2) and reduced feed intake for the past one week. Clinical examination of the animals revealed congested conjunctival mucous membrane, elevated temperature, dyspnoea and pot-bellied appearance. Hematology of non-descript dog revealed elevated leukocyte count (22900 /cmm) and neutrophils (82%) whereas elevated Hemoglobin (19 g/dl), PCV (57.2%), RBC (9.22 m/cmm), Leukocyte count (13500 /cmm) and neutrophil ((72%) were observed in spitz cross dog. Serum biochemistry of non-descript dog revealed elevated Blood Urea Nitrogen (45.14 mg/dl), ALP (438 IU/dl) and decreased total proteins (5.2 g/dl), albumin (2.0 g/dl), cholesterol (63 mg/dl) whereas spitz cross dog exhibited elevated BUN (209.85 mg/dl), creatinine (4.7 mg/dl), ALP (316 IU/dl), Glucose (422 mg/dl), Sodium (167.38 mmol/dl), potassium (98.88 mmol/dl) and decreased total proteins (3.4 g/dl) and albumin (1.8 g/dl). Ultrasonography revealed anechoic effusion with floating abdominal viscera in abdominal cavity (Fig. 7). Electrocardiography of spitz cross dog revealed R waves of 3.0 mV (Fig. 6). Abdominocentesis (Fig. 4) was done aseptically as per standard procedure (Four quadrant abdominocentesis) to relieve distress and discomfort of the animals and to obtain samples for cytological and biochemical analysis. The animals were restrained properly and gently placed in left lateral recumbency. The ventral abdomen was prepared aseptically and four sites were chosen for needle placement as reported by Daniel D Smeak viz.

Right cranial quadrant, Left cranial quadrant, Right caudal quadrant, Left caudal quadrant with umbilicus as centre. Carefully avoiding the vessels, a 20 gauge winged needle was inserted in the abdominal wall and relieved 1.6 litres (Fig. 3) and 2.5 litres (Fig. 5) of clear, transparent, yellow fluid, free of clots in non-descript and spitz cross dog respectively. Cytology of fluid revealed pH of 8.0, specific gravity of 1.020, glucose +1 (5.5 mmol/L), protein (1.0 g/L) & absence of cells in sediments in non-descript dog whereas in spitz cross dog, a pH of 7.5, specific gravity of 1.020, glucose +1 (2.8 mmol/L), protein (3.5 g/L) & absence of cells in sediments was recorded. Urinalysis of non-descript dog revealed yellow coloured urine with a pH 5.5, specific gravity of 1.020 & few oxalate crystals in sediments whereas yellow coloured urine with a pH 7.0, Specific gravity of 1.015 presence of leukocytes (++), absence of protein, glucose, bilirubin, ketone bodies, RBCs, Bile pigment, urobilinogen & numerous calcium oxalate crystals in sediments could be observed in spitz cross dog. Based on physical and clinical examination, complete blood count, serum biochemistry values, radiography, ultrasonography, abdominocentesis and fluid analysis, the case was diagnosed as ascites of hepatic origin.

Treatment and discussion

The cases were treated with Inj. Dextrose Normal Saline @ 10 ml/kg b.wt, Inj. Amoxicillin & Cloxacillin @ 20 mg /kg b.wt, Inj. Furosemide @ 2 mg/ kg b.wt, Inj. Chlorpheniramine maleate @ 0.5 mg/kg b.wt and advised Syrup. Tefroliv forte twice daily along with restricted salt diet. Ten days post-treatment, the non-descript dog succumbed to death whereas spitz cross showed recovery with reduction of abdominal distention and normal feeding habit without relapse.

Ascites is usually characterized by abdominal swelling, respiratory distress, lethargy, anorexia, vomiting, weakness, discomfort [3]. Samad M.A. 2019., reported that dyspnoea in ascites cases might be due to excessive fluid accumulation which exerts pressure on diaphragm resulting in its restricted movement [6]. Saravanan M *et al.* 2014, reported that the increase in total leukocyte count and neutrophil in both the cases may be due to granulomatous hepatitis, hepatic cirrhosis, hepatic abscess and hepatic neoplasia [5]. The elevated level of BUN in the two cases and elevated creatinine in spitz dog might be due to hepato-renal syndrome in cirrhosis or immune complex mediated glomerulonephritis which was in concordance with Sushila Maida *et al.* 2022, who also observed similar biochemical alterations in ascites associated with hepatic disorders. These alterations might be due to renal abnormalities due to urinary tract obstruction leading to urinary retention [2]. The rise in ALP in both cases indicates hepatocellular injury as reported by Saravanan M *et al.* 2014 [5]. The decrease in albumin and total proteins in both the cases might be attributed to the fact that since the liver is damaged, its major role of plasma protein synthesis, degradation and synthesis of other proteins might have been affected [5]. The low serum albumin concentration in this case might be due to any liver pathologies and according to Sushila Maida *et al.* 2022, the decreased osmotic pressure in hypoalbuminemia conditions, results in increased hydrostatic pressure causing fluid to escape from the vasculature into the body cavity [2]. Sushila Maida *et al.* 2022, also observed hypocholesterolemia in ascites with hepatic disorders in dogs which might be due to decrease in absorption from gut, excessive conversion of cholesterol into bile acids, liver disease, malabsorption and malnutrition [2]. In the present case, Electrocardiography revealed R waves of 3.0 mV indicating left ventricular enlargement which is in concordance with Swagat *et al.*, 2022, who also observed that in ECG, R waves greater than 2.5 mV indicates left ventricular hypertrophy which might be a compensatory mechanism of the heart during chronic hypertension [7]. The clear, straw coloured fluid obtained on abdominocentesis is indicative of right sided heart failure or hepatic pathology as observed by Samad M.A.2019 [6].

Treatment of ascites mainly depends on identifying the underlying etiology. Abdominocentesis was done to relieve distress as observed by Samad. M.A 2014 who also observed relieving of abdominal tension and enhanced normal respiration after centesis procedure [6]. The cases were treated with Inj. Furosemide @ 2 mg/kg b.wt as Rosemary *et al.* 2019, reported that Furosemide is the first line of choice in treating Ascites [1] and Samad. M.A, 2019 who reported that if ascites is due to cardiac origin, treatment with diuretics and digitalis may settle the condition as cardiac function will be improved [6]. As W. Michael Reden *et al.*, 1982, stated that antibiotics should be administered to minimize bacterial infection, Inj. Amoxicillin @ Cloxacillin was given @ 20 mg/kg b.wt. [4].

Fig 1: Non descript dog with distended abdomen

Fig 2: Spitz cross dog with distended abdomen

Fig 3: Straw coloured fluid obtained after abdominocentesis in non-descript dog

Fig 4: Abdominocentesis in spitz cross dog done at ventral abdomen (*Linea alba*)

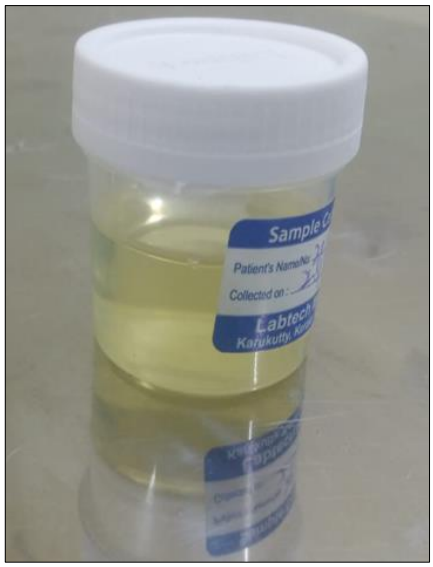

Fig 5: Clear transparent fluid obtained after abdominocentesis in spitz cross dog.

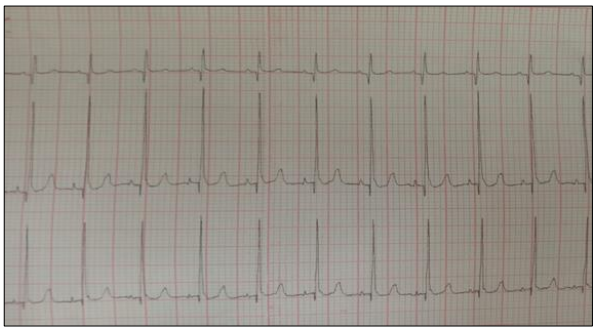

Fig 6: Electrocardiography revealing Tall R waves indicating left ventricular enlargement due to hypertension.

Fig 7: Ultrasonography revealing anechoic effusion in abdomen.

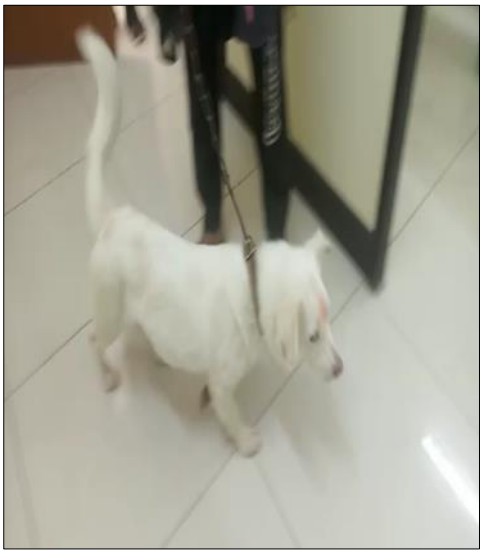

Fig 8: Ten days post treatment, abdominal distention was reduced.

Conclusion

Ascites is a multifactorial syndrome and its majorly due to hepatic or cardiac origin. Identifying the etiology through standard physical and clinical examination, complete blood picture, serum biochemistry values, radiography, ultrasonography, diagnostic abdominocentesis and cytology of effusion is essential. Diuretics with hepatoprotective and proper diet may render the ascitic cases with good prognosis.

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