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Diagnosis and management of cardiac tamponade due to pericardial effusion secondary to aortic body tumor in a Spitz

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Abstract

Pericardial effusion is defined as the abnormal accumulation fluid inside the pericardial sac. It is a life threatening complication which needs immediate intervention. A seven year old female Spitz was presented to the Teaching Veterinary Clinical Complex, Mannuthy with the history of abdominal distension, difficulty in respiration, anorexia and weakness since last five days. Clinical examination revealed pale mucous membranes, distension of jugular vein, oedema of limbs, weak pulse, tachycardia and fluid thrill on ballottement of abdomen. Muffled heart sounds were heard on auscultation. On lateral thoracic radiograph the cardiac silhouette was globoid and masked with fluid. Electrocardiography had low voltage QRS complexes. Echocardiography showed severe pericardial effusion with diastolic collapse of right atrium and ventricle, which is suggestive of cardiac tamponade. A hypoechoic mass of about 1.85cm was visualised at the base of the aorta. Pericardiocentesis was performed, around 90ml of pericardial fluid was removed. Cytology of the pericardial fluid showed the presence of red blood cells, cluster of mesothelial cells and lymphocytes. Cultural examination of pericardial fluid did not reveal any bacterial growth.

Keywords: Pericardial effusion, cardiac tamponade, echocardiography, radiography

Introduction

An abnormal accumulation of fluid inside the pericardial cavity is called as pericardial effusion. Accumulation of excessive fluid inside the pericardium further increases the intrapericardial pressure over right atrium and ventricle leads to functional impairment by collapse of right ventricle. Tumours are common cause of pericardial effusion in dogs. Middle to old age dogs are commonly affected with an unknown etiology (Idiopathic). In consequence, the case reported here, which involve a seven year old dog was unusual and merits documentation.

History and clinical signs

A seven year old female Spitz was presented to the Teaching Veterinary Clinical Complex, Mannuthy with the history of abdominal distension, difficulty in respiration, anorexia and weakness since last five days (Figure 1.). Clinical examination revealed pale mucous membranes, distension of jugular vein, oedema of limbs, weak pulse, prolonged capillary refill time, sinus tachycardia and fluid thrill on the ballottement of abdomen. The rectal temperature was 101.8°F.



Fig 1: Animal in lateral recumbency with distended abdomen

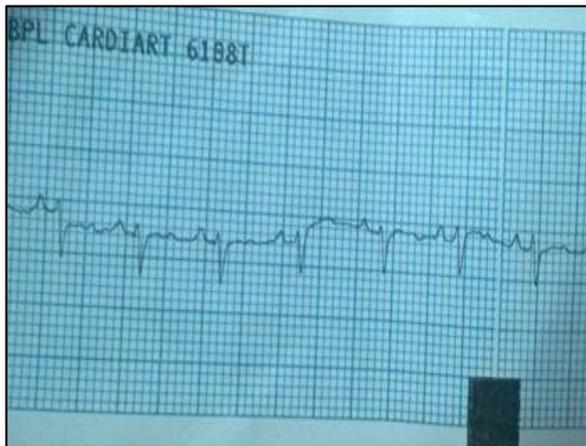


Fig 2: Low amplitude QRS complexes in Lead II ECG



Fig 5: Left cranial view mass in the base of the aorta

Diagnosis and treatment

Auscultation revealed muffled heart sound and rales over lungs area. On lateral thoracic radiograph the cardiac silhouette was globoid and masked with fluid (Figure 3.). Electrocardiography showed low voltage QRS complexes (Figure 2.).



Fig 3: Globoid heart masked with fluid, Right lateral Radiography



Fig 6: Left cranial view mass in the base of the aorta with blood circulation



Fig 4: Cardiac tamponade with severe pericardial effusion

Two dimensional (2D) echocardiography, in right parasternal long axis view revealed anechoic area below the left ventricular posterior wall, which is suggested extensive pericardial effusion with diastolic collapse of right atrium and ventricle and cardiac tamponade (Figure 4). Left atrial enlargement was evidenced. A hypochoic mass of about 1.85cm was visualised at the base of the aorta (Figure 5 & 6.).

M-mode echocardiographic indices were RVIDd-13.4mm, LVIDd-35.8mm, LVIDs-20.6mm, FS- 43 percent, IVSd-7mm, IVSs-7.2mm, LVPWd-10mm, LVPWs-15.3mm, EDV-53.9ml, ESV-13.6ml, EF-75 percent.

Hyperdynamic movements of interventricular septum (IVS) and left ventricular posterior wall (LVPw) observed (Figure 7.). Pulsed wave Doppler at the level of tricuspid valve showed reversal of early diastolic (E) and late systolic (A) wave (atrial contraction) suggestive of delayed relaxation (Figure. 8.). Pericardiocentesis is the only treatment option to relieve diastolic collapse of right ventricle.

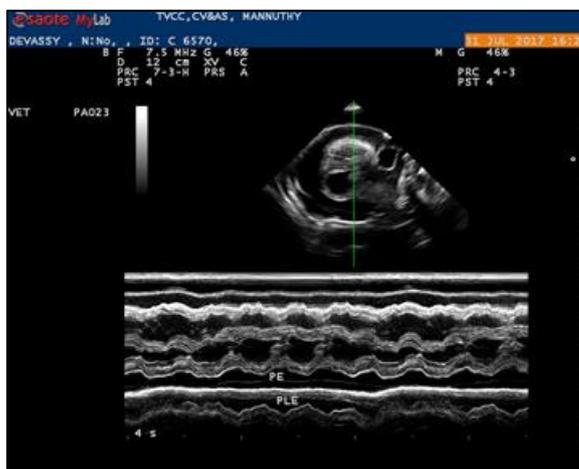


Fig 7: Motion mode (hyperdynamic movement of IVS and LVPw)

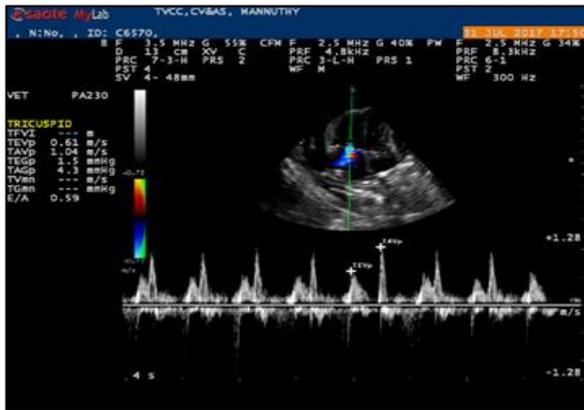


Fig 8: Pulsed wave Doppler at tricuspid valve level (A>E-Diastolic dysfunction)



Fig 11: Left apical view after pericardiocentesis

Pericardiocentesis was performed as per the standard procedure and around 90ml of pericardial fluid was removed (Figure 9.). Cytology of the pericardial fluid showed the presence of red blood cells, cluster of mesothelial cells and lymphocytes. Cultural examination of pericardial fluid did not reveal any bacterial growth. Normal improved diastolic function of right atrium and ventricle was observed after pericardiocentesis (Figure 10 & 11).



Fig 9: Pericardial fluid removed by Pericardiocentesis

Fluid splashing sound on percussion over abdomen suggested of ascites. Pink coloured serosanguinous inflammatory exudate was removed by abdominocentesis.

The animal was treated with systemic antibiotic amoxicillin and sulbactam @ 20 mg/kg IV for five days, diuretic furosemide @ 2mg/kg IV followed by PO q12h and angiotensin converting enzyme inhibitor Enalapril @ 0.5mg/kg PO BID for lifetime.



Fig 10: Right parasternal four chamber view after pericardiocentesis

Discussion

Common neoplasms reported in dogs were hemangiosarcoma, heart base tumors and mesothelioma. Hemangiosarcoma is a malignant neoplasm of vascular endothelium most commonly reported in dogs followed by heart base tumors (aortic body and main pulmonary artery). Diffuse neoplasm of pericardium and other serosal surfaces were called as mesothelioma. Pericardial effusion caused by haematoma also reported. (Tilley *et al.* 2008; Lee *et al.* 2015) [3]. Breeds at higher risk of developing hemangiosarcoma were Golden retriever, German shepherd dogs, Afghan hounds, Cocker spaniels, English setters and Labrador retriever. This tumour mostly located in right atrium and auricle and occasionally in left ventricle and interventricular septum or at the heart base.

Tumors from body of aorta or carotid body chemoreceptor organs and were collectively termed heart-base tumors or chemodectomas. These type of tumours were reported more commonly in brachycephalic breeds. Heart base tumours tend to be locally invasive around the aortic root and its surroundings structures. Most of the heart base tumours were usually ends up with pericardial effusion and cardiac tamponade.

Pericardial effusion was reported in the median age of 6 to 7 years and young age of 3 years in some animals and the most commonly reported in the age group of 9-11 years. Most common cause of pericardial effusions were idiopathic haemorrhagic pericarditis, congestive heart failure (dilated cardiomyopathy and mitral valvular disease), cardiac neoplasia, trauma, infectious agents and left atrial rupture.

Depression, muffled heart sounds, weak femoral pulse, abdominal distension and jugular distension were commonly reported physical examination findings in pericardial effusion. Thoracic radiographic features that support the diagnosis of pericardial effusion were globoid cardiac silhouette with widening of caudal vena cava and tracheal elevation. However, these typical radiographic findings were consistent with chronic cases of pericardial effusion. These typical changes were not observed with mild effusions (Tilley *et al.* 2008).

Most of the cases of pericardial effusions were showed normal sinus rhythm. Sinus tachycardia, supraventricular arrhythmias, low voltage QRS complexes and electrical alternans were reported in some cases of pericardial effusion. Echocardiography is a non-invasive technique used for confirmatory diagnosis, which provide more information over radiography. It is a highly sensitive method for the diagnosis of pericardial effusion even with the minimal fluid in the pericardial sac (Gugjoo *et al.* 2014) [2]. Pericardiocentesis is an ideal method for draining of excess fluid in pericardial

cavity. It might be guided with ultrasonography (Adeyanju *et al.* 2012) ^[1]. The right thorax is most commonly preferred over left thorax due to presence of cardiac notch. The site commonly used for pericardiocentesis was fifth or sixth intercostal space at the level of costochondral junction. Electrocardiography is advised during pericardiocentesis for monitoring ventricular arrhythmias.

Conclusion

It was concluded that major pericardial neoplasms in dogs were hemangiosarcoma followed by aortic body tumor. The prominent physical examination findings were pale mucous membranes, distension of jugular vein, oedema of limbs, weak pulse, prolonged capillary refill time, sinus tachycardia and fluid thrill on the percussion of abdomen. Radiography acts as an important aid in assessing pericardial effusion and cardiac silhouette is globoid in nature. Although electrocardiography was not effective in diagnosing pericardial effusion, it aids in the diagnosis of arrhythmias. In echocardiography two dimensional view revealed anechoic area around the heart is confirmative diagnosis of pericardial effusion. A hypoechoic mass of about 1.85cm was visualised at the base of the aorta with blood circulation suggestive of aortic body tumour.

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