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Pericardial Effusion in a Labrador Retriever Dog

M.B. Gugjoo, A.C. Saxena, M. Hoque, K. Mahendran and M.M.S. Zama
Indian Veterinary Research Institute, Izatnagar, India

Corresponding Author: M.B. Gugjoo, Indian Veterinary Research Institute, Izatnagar, India Tel: +918899146482

ABSTRACT

The present study was aimed to report the diagnostic features of Pericardial effusion (PE), observed in commonly employed cardiac diagnostic modalities viz., radiography, electrocardiography and echocardiography. A 9-year-old, female Labrador Retriever dog (24 kg) was brought to the Referral Veterinary Polyclinic, Indian Veterinary Research Institute-Izatnagar with the complaint of exercise intolerance, listlessness, lethargy, generalized weakness and inappetence. Physical examination revealed tachypnoea, distended abdomen and on auscultation muffled heart sounds were observed. Based on physical examination findings, animal was put on other cardiac diagnostic techniques to arrive at final diagnosis. Diagnostic features characteristic to pericardial effusion, an abnormal accumulation of fluid inside the pericardium, were observed. Globoid heart appearance and large Vertebral Heart Score (VHS) was observed on lateral thoracic radiograph. Electrocardiography (Lead II) revealed decreased R wave amplitude (decreased left ventricular contraction). On echocardiographic examination an echo free space between epicardium and pericardium was observed. All these findings were indicative of pericardial effusion, however, without an exact aetiology. This article reports the successful diagnosis of pericardial effusion in Labrador Retriever. However, to confirm the aetiology other diagnostic tests like haematology, pericardial fluid analysis and histopathology need to done.

Key words: Echocardiography, electrocardiography, Labrador Retriever, pericardial effusion, radiography

INTRODUCTION

Pericardial effusion (PE) is an abnormal accumulation of fluid inside the pericardium, a thin layer of tissue which encloses the heart like a sack. The pericardium does not easily stretch and hence a sudden effusion causes high pressure inside the pericardium, constricting the heart leading to cardiac tamponade, an impairment of ventricular filling as a consequence of increased intrapericardial pressure caused by the accumulation of fluid within the pericardial cavity. This impairment in ventricular filling leads to reduction in the amount of blood pumped around the body (Gugjoo *et al.*, 2013b). Pericardial effusion usually occurs without any underlying cause (idiopathic pericardial effusion) in middle-aged, older large dog breeds. Tumours are also common causes of pericardial effusions in dogs (Campbell, 2006). Aetiology of PE in dogs cannot be detected solely on the basis of physical examination (Miller and Sisson, 2000; Stepien *et al.*, 2000) but may be identified based on the results of different diagnostic modalities viz., radiography (Tobias and McNeil, 2007), electrocardiography, haematological and pericardial fluid examination (Sisson and Thomas, 1999; Tobias and McNeil, 2007), histopathology (Stepien *et al.*, 2000) and echocardiography (Cobb and Brownlie, 1992; Tobias and McNeil, 2007). The present study reports

the role of radiography, electrocardiography and echocardiography in the diagnosis of PE in dogs and the insufficiency of such modalities to arrive at the aetiology.

HISTORY AND CLINICAL SIGNS

A 9-year-old, female Labrador Retriever dog (24 kg) was brought to the Referral Veterinary Polyclinic, Indian Veterinary Research Institute-Izatnagar, with the complaint of exercise intolerance, listlessness, lethargy, generalized weakness, inappetence and assume a sternal or standing position, with its elbows abducted. Physical examination revealed a distended abdomen, tachypnea (60 breaths min⁻¹) with both respiratory and abdominal breathing. Mucous membranes were pale, capillary refill time was prolonged and rectal temperature was 101.2 F. Auscultation revealed muffled heart sounds but with no murmurs or arrhythmias. Femoral Pulse was weak. As cardiac involvement was suspected, patient was put to further cardiac diagnostic modalities viz., thoracic radiography, electrocardiography (ECG) and echocardiography. On radiography done in lateral recumbency, pleural effusion and a globoid heart structure with cardiac silhouette slightly merged with the diaphragm was observed. Vertebral Heart Score (VHS) calculated was 11.0 (Fig. 1). On electrocardiography, a normal sinus rhythm was observed. However, the amplitude of QRS complex, an indicator of ventricular depolarization was significantly reduced. In particular, the mean amplitude of the R waves in lead II was 0.7 mV (Fig. 2). Variations in R wave amplitude could be detected though non-specific to electrical alternans. Thoracic ultrasonography showed the presence of pleural effusion and on echocardiography pericardial effusion was evident in the form

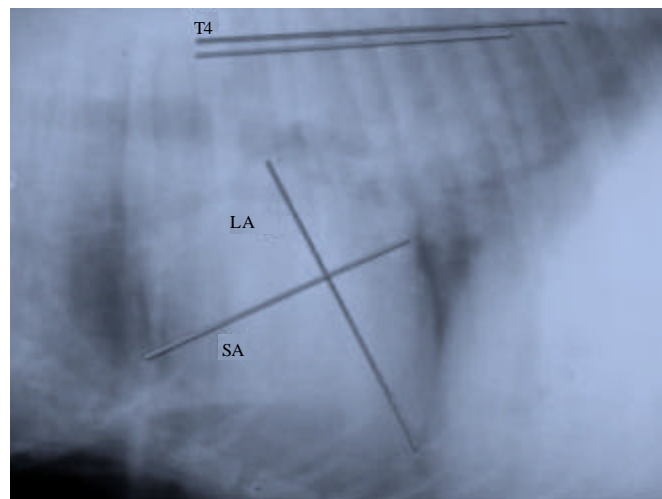


Fig. 1: Globoid heart on lateral thoracic radiograph (LA and SA shows long axis and short axis of heart for VHS calculation)

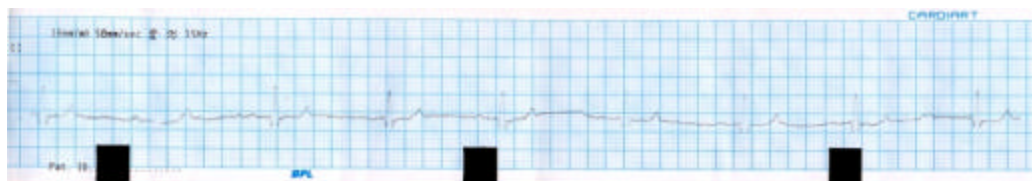


Fig. 2: Electrocardiogram showing small QRS complexes in Lead II

of an echo-free space between epicardium and pericardium without any tumorous mass. Animal was diagnosed to be suffering from pericardial effusion; however exact aetiology could not be determined.

DISCUSSION

The present study was aimed to report the features of different cardiac diagnostic modalities viz., radiography, electrocardiography and echocardiography in case of pericardial effusion and also to show whether these modalities are sufficient to arrive at aetiology of the case. The present case was diagnosed as pericardial effusion although the exact aetiology was not confirmed. PE can result from number of causes like haemorrhage or exudation from neoplasm, exudates from infection, or can be idiopathic. In the present study, the tumour mass though not visible on echocardiography or radiography but cannot be ruled out (Johnson *et al.*, 2004; Stepien *et al.*, 2000). The insensitivity of echocardiography to diagnose the pericardial effusion due to tumour mass may be due to the diffuse nature of the masses like mesothelioma (Stepien *et al.*, 2000), inability to distinguish between fibrinous pericardial thickening and pericardial mass lesions (Sanfilippo and Weyman, 1994) or to the timing of echocardiographic examination in the course of disease process (Cobb and Brownlie, 1992). However, fibrinous pericardial thickening was also not observed. The term idiopathic pericardial effusion is given to the condition in which there is no evidence of neoplasia and no confirmed infectious source in the accumulated fluid is detected (Dunning, 2002). The infectious and neoplastic causes can be detected by cytology or culturing of pericardial fluid and histopathological findings, respectively.

Decreased cardiac output and stroke volume leads to pale mucus membranes and prolonged capillary refill time as preload is decreased in cases of pericardial effusion leading to decreased cardiac output. Muffled heart sounds result from the dampening of sounds in the fluid between heart and thoracic wall. Globoid cardiac silhouette and higher VHS on lateral radiograph signifies the cardiac enlargement which may be due to the actual enlargement of heart or due to pericardial effusion. VHS in the present study was found to be 11.0 which was quite higher compared to the normal value (10.3) given for Labrador Retriever (Gugjoo *et al.*, 2013a). R wave amplitude in Lead II was significantly decreased (Gugjoo *et al.*, 2014). This decrease in R wave amplitude can result due to number of reasons and in relation to the present study, the likely cause might be an increase in the fluid within the pericardial sac leading to, electrical current short circuiting (Badiger *et al.*, 2012), increase in distance of potential generator from recording electrodes (Rokey *et al.*, 1991) and decrease in cardiac chamber size and volume (Karatay *et al.*, 1993). Variations in R wave amplitude not characteristic of electrical alternans were observed as beat to beat changes were not found but changes were found to occur after 3-4 beats (Fig. 2). The variations in this study suggest that perhaps the motion of this dog's heart within the pericardial fluid was not rhythmic or regular, unlike that of electrical alternans wherein it is rhythmic (Campbell, 2006). Echocardiography, a non-invasive technique that can provide much more information than radiography as it can distinguish the pericardium, pericardial fluid and heart structures that are indistinguishable on a radiograph. Echocardiography is quite a sensitive and specific method as it can detect even a small amount of pericardial effusion (Miller and Sisson, 2000). Echocardiography is quite a sensitive and specific method as it can detect even a small amount of pericardial effusion (Smith and Rush, 1999). This clinical article reports diagnosis of pericardial effusion in Labrador Retriever using cardiac diagnostic modalities viz., radiography, electrocardiography and echocardiography, however without an exact aetiology.

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