

M-mode Echocardiographic Evaluation of Rare Cases of Non-Traumatic Pericarditis in Goats: A Case Report

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Abstract

Pericarditis refers to the inflammation of the pericardial sac. Two goats, 3.5 years and 2.5 years age were presented to the Large Animal Medicine OPD, GADVASU, Ludhiana with history of progressive ventral edema, anorexia and open-mouth breathing in one case and ascites in the other. Clinically, the body condition of both the animals was poor. Both had tachycardia with muffling of heart sounds. Radiography showed a non-appreciable cardiac silhouette along with a fluid column covering the heart. Radiography did not reveal the presence of any foreign body, excluding foreign body penetration as a cause of pericarditis. Two-dimensional ultrasonography of the thorax revealed pericardial fluid column along with pleural effusions. M-mode echocardiography revealed reduced ejection fraction percentage and fractional shortening percentage. Based upon the findings, the cases were diagnosed for non-traumatic pericarditis. The case demonstrates the value of ultrasonography and echocardiography in identifying cardiothoracic disorders in goats presented with chronic oedema or respiratory distress.

Keywords: Echocardiography, Goats, M-Mode, Pericarditis, Ultrasonography.

Introduction

Cardiac failure is characterized by ventricular dysfunction leading to inability to maintain an adequate blood output after the cardiac reserve fails to cope with circulatory demands (Sidhu *et al.*, 2019a). The caprine heart is constituted of three major structures i.e. pericardium, myocardium, endocardium and conductive tissue. Pericarditis remains a serious and most common problem faced by bovine producers in the developing countries (Sidhu *et al.*, 2024).

The diseases of pericardium are commonly reported in bovines and are infrequent in other species (Sidhu, 2019). Scattered researches are available in the literature that report pericarditis in goats (mostly traumatic) (Cevik *et al.*, 2010, Naik *et al.*, 2021, Akkoc, 2007, Nagarjuna *et al.*, 2024). Pericarditis mostly leads to right-sided heart failure which is attributable to cardiac tamponade that hinders proper cardiac functioning (Sidhu *et al.*, 2024). Most of the reports available in literature have given the diagnosis on the basis of post mortem findings. Ultrasonography as compared to other diagnostic techniques is cost effective and has evolved as a valuable imaging tool in almost all species of animals (Sidhu, 2019). To the authors' knowledge, only one study by Nagarjuna *et al.* (2024) has reported the ultrasonographic diagnosis of pericarditis in goats. A number of thoraco-abdominal affections can be diagnosed through ultrasonography like per-reticular abscess, diaphragmatic hernia, peritonitis, pericarditis (Sidhu *et al.*, 2024), pleural effusion and lung cyst (Sidhu *et al.*, 2025) etc. No study could be cited from the literature that reports echocardiographic diagnosis of pericarditis in goats with special reference to M-mode echocardiographic parameters that clearly describe the cardiovascular functioning. These cases highlight the diagnostic utility of thoracic ultrasonography and M-mode echocardiography for pericarditis in goats, a condition for which only limited and isolated reports are available in the literature.

Case Presentation and Observations

Two goats, 3.5 years and 2.5 years age each were presented to the Large Animal Medicine OPD, Guru Angad Dev Veterinary and Animal Sciences University, Ludhiana, Punjab with history of progressive ventral edema, anorexia and open-mouth breathing in one case and ascites in the other from last one week (Fig. 1). In one of the goats, rectal temperature was high (105.7 °F), while the other one had normal temperature (103.2 °F). The heart rate was 80 and 94 bpm respectively in both animals but the sounds were dull with reduced audibility and muffling. Conjunctival mucous membranes were pale in both cases. Haematology revealed, Hb as 8.5g%, 7.2 g% and TLC was 21500, 19000 cu mm, respectively. There was neutrophilic leucocytosis with mild left shift. The total protein was low i.e. 4.6g/dl, 4.9 g/dL and albumin was 1.8, 2.1 g/dl. Lateral chest radiographs were taken from both the animals that revealed that cardiac silhouette was not appreciable in first case and a fluid column covering heart along with moderate broncho-interstitial pattern in both the cases (Fig. 2). 2-D ultasonography of the chest revealed pericardial fluid column 2.2 cm & 5.2 cm, respectively (Fig. 5, 6). along with pleural effusions (Fig. 3). Liver appeared to be severely congested with dilation of the blood vessels (Fig. 4). M-mode echocardiography was performed to evaluate the cardiac functioning that revealed reduction in the lumen of the left ventricle and thus reduced EF% and FS% (Fig. 7, 8).



Fig. 1: Jugular engorgement and brisket edema in a goat suffering from pericarditis



Fig. 2: Chest radiograph (lateral) showing fluid line covering the base of heart

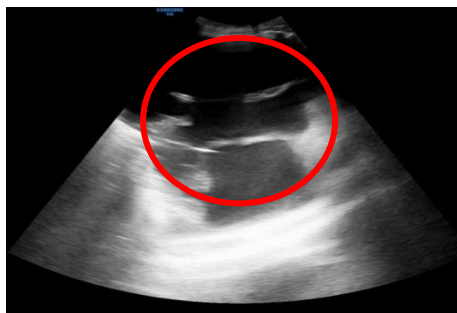


Fig. 3: Massive pleural effusions seen on thoracic ultrasound in a goat at 6th ICS



Fig. 4: Abdominal ultrasonography image showing congested liver with dilated caudal vena cava

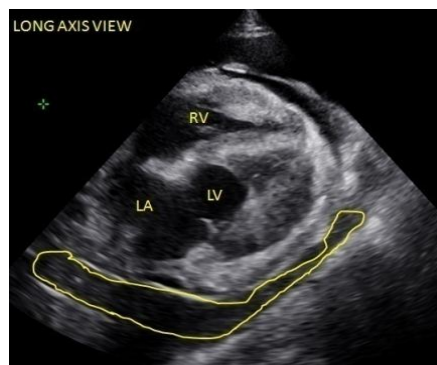
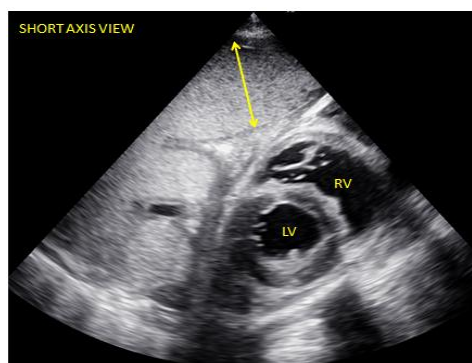


Fig. 5-6: 2-D echocardiographic images showing severe compression of the heart due to accumulation of pericardial fluid

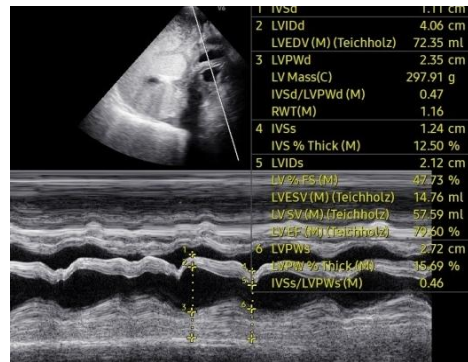
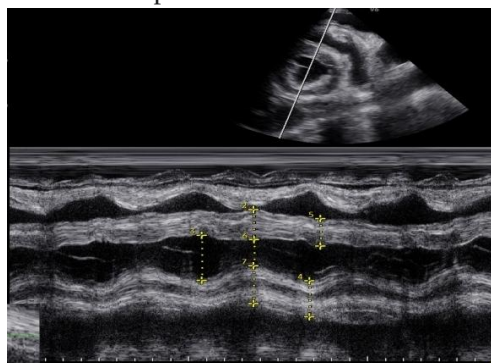


Fig.7-8: Right parasternal short axis M-mode echocardiographic images showing decrease in the lumen of left ventricle and right ventricle due to excessive pericardial effusions

All the M-mode echocardiographic parameters of both the cases have been described in Table 1. Based upon the findings, the cases were diagnosed for non-traumatic pericarditis. The first case was treated with enrofloxacin 6ml BID and Procaine penicillin 0.8gm BID for 6 days, Flunixin megludyne 1.2 ml BID for 3 days that collapsed 3 days post treatment. The first animal survived for only three days post- presentation. Other goat collapsed after examination.

Table 1: M-mode echocardiographic parameters in both the goats diagnosed for pericarditis

M-mode echocardiographic parameters		Case 1	Case 2
Interventricular septum	IVSd (cm)	1.11	2.18
	IVSs (cm)	1.24	2.32
Left ventricular internal diameter	LVIDd (cm)	4.06	3.58
	LVIDs (cm)	2.12	2.04
Left ventricular posterior wall	LVPWd (cm)	2.35	2.86
	LVPWs (cm)	2.72	3
Fractional shortening	FS%	47.73%	49.86%
Ejection fraction	EF%	79.50%	81.90%

Goat kids suffering from pleuropneumonia and pericarditis have been reported to have clinical signs of anorexia with dyspnoea and increased respiratory rate (Williamson *et al.*, 2007). Naik *et al.* (2021) also reported tachypnoea in a three-year-old non-descript goat suffering from pericarditis. Massive fluid accumulation in the thoracic cavity is the possible reason of respiratory distress in these animals. Tachycardia, muffled heart sounds, jugular vein distension and brisket edema have been reported as the pathognomic clinical signs of pericarditis (Sidhu *et al.*, 2024). Naik *et al.*, 2021 also reported anemia in a goat with traumatic reticulo-pericarditis. Thoracic radiography in cases of cardiac disease may reveal poor thoracic detail, an obscured cardiophrenic angle, and an indistinct or invisible cardiac silhouette (Sidhu, 2019). This study demonstrates the value of ultrasonography in identifying cardiothoracic disorders in goats presented with chronic oedema or respiratory distress. Abdominal ultrasonography in animals with pericarditis reveal reticular changes typical of TRP, hepatomegaly and moderate to severe ascites (Sidhu *et al.*, 2024). Upon ultrasonography, pleural effusion is seen as, the two-pleura separated from one another and presence of liquid-like content that can range from anechoic to more or less echoic depending on its particulate or cellular content (Sidhu, 2019). No study on echocardiographic findings of goats suffering from pericarditis except one. Excessive pericardial fluid accumulation leads to compression of the heart and also affecting the M-mode echocardiographic parameters. It is concluded that wherever possible ultrasonography and echocardiography should be extensively used for all the cases that are presented with signs of respiratory distress, brisket edema, coughing or open mouth breathing.

Contribution by Authors

All the authors contributed equally to writing the manuscript. The final manuscript was read by all authors and consented to publication.

Conflict of Interests

There is no conflict of interest.

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