

A RARE CASE OF DILATED CARDIOMYOPATHY IN A CROSSBRED CATTLE

S. SIDHU*, S.S. RANDHAWA, NEETU SAINI and ASMITA NARANG

Department of Veterinary Medicine, College of Veterinary and Animal Sciences,
Guru Angad Dev Veterinary and Animal Sciences University, Ludhiana-141004, Punjab

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SUMMARY

A three year old female Holstein-Friesian crossbred cow in first parity was presented to the Teaching Veterinary Hospital, Guru Angad Dev Veterinary and Animal Sciences University, Punjab, India with history of inappetence and pain since one week. The presenting clinical signs were abduction of elbows and bilateral jugular engorgement. Vital body parameters were within the normal range except tachycardia (112 bpm) along with increased area of cardiac auscultation. On the basis of echocardiographic findings i.e. visible enlargement of the left and right ventricle, flattening of the interventricular septum and reduced fractional shortening and ejection fraction, the case was presumptively diagnosed for congestive heart failure secondary to dilated cardiomyopathy which is a rarely reported condition in cattle.

Keywords: Congestive heart failure, Dilated cardiomyopathy, Echocardiography, Pleural effusions

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Cardiomyopathies are myocardial diseases characterized by a dominant involvement of right sided cardiac chambers that lead to cardiac dysfunction, heart failure and sudden death. Myocardial diseases are rare in cattle. Primary dilated cardiomyopathy (DCM) with a genetic origin has been reported in specific breeds like Simmental, Holstein and their crosses. Secondary cardiomyopathies are categorised as Nutritional cardiomyopathy (deficiency of vitamin E, selenium or copper), Toxic cardiomyopathy (ionophoretotoxicosis) and Infectious cardiomyopathy (myocarditis caused by viral, bacterial, or parasitic infection). Cattle suffering from heart diseases show variable clinical signs (Radostits *et al.*, 2007). Differential diagnosis in cattle with jugular vein distension and tachycardia include right-sided cardiac insufficiency due to valvular endocarditis, cardiomyopathy, cardiac leukosis and other diseases (Grunder, 2002). Primary tachycardia is one of the first compensatory mechanisms to maintain cardiac output.

Available literature on DCM reported diagnosis on the basis of electrolyte and protein analysis (Graber and Martig, 1993) and post mortem examination (Leifsson and Agerholm, 2004; Owczarek-Lipsa *et al.*, 2009). Only a single report reviewed from literature documented the diagnosis of dilated cardiomyopathy in a heifer on the basis of M-mode echocardiography (Gugliemini, 2003).

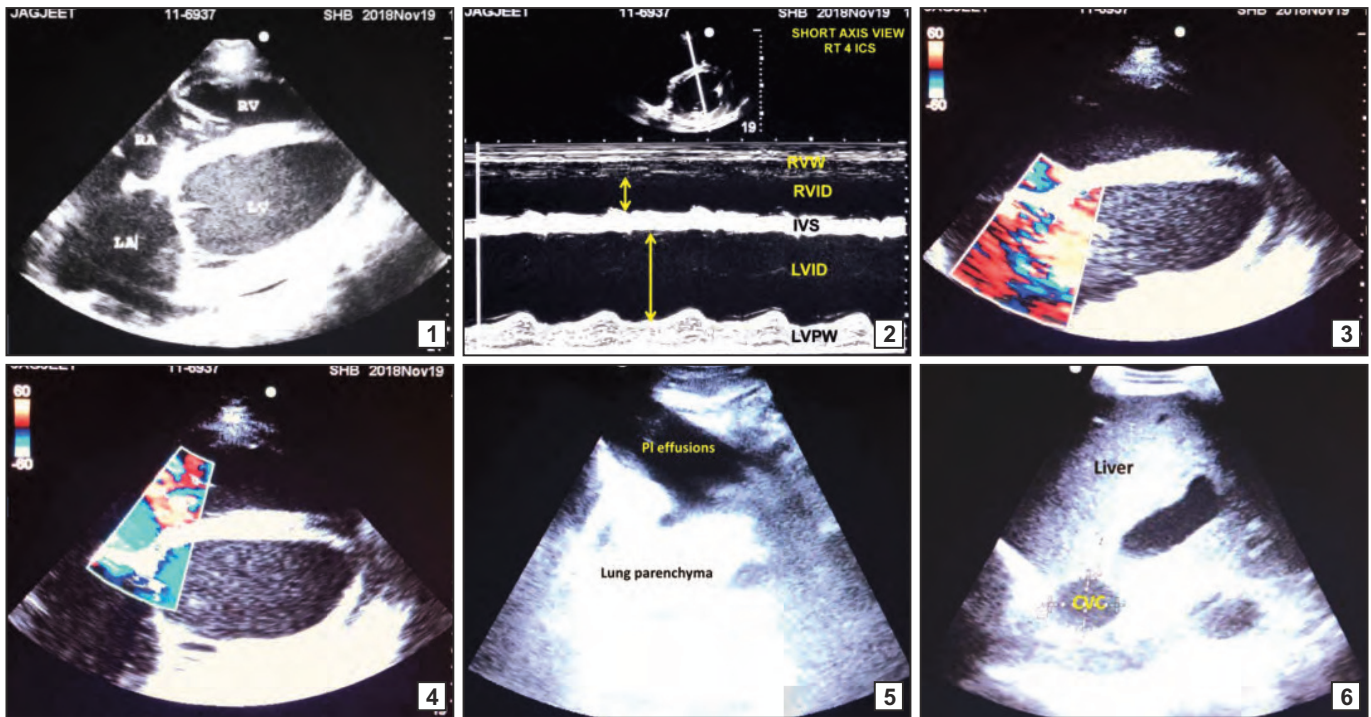
A three year old female HF crossbred cow in first parity was presented to the Teaching Veterinary Hospital, Guru Angad Dev Veterinary & Animal Sciences University with history of inappetence and pain from one week. Detailed history and clinical signs were noted and a comprehensive clinical examination was done. Physical

examination pertaining to heart rate, respiration rate and rectal temperature were noted. Blood samples were collected for the complete blood counts and changes due to the underlying disease.

Transcutaneous ultrasonography was performed in standing cattle after clipping of hair and application of ultrasound coupling gel at 6th-8th intercostal space. The transducer was applied to the ventral aspect of the thorax on the left and right of the sternum as well as the left and right lateral thorax up to the level of the elbow (Braun, 2003). A portable M-turbo ultrasound scanner (FUJIFILM SonoSite, USA) equipped with 3.5-5 MHz multi frequency convex sector with penetration of depth 30 cm was used. The examination was carried out from dorsal to ventral with the transducer held parallel to the ribs to determine the location of neighbouring organs. Echocardiography was performed using 1-5 MHz sector cardiac probe (Braun *et al.*, 2001). The patients were prepared by shaving 25 x 25 cm area over the 3rd-5th ICS in the cardiac region on both left and right side. Two dimensional and M-mode images were taken at the right parasternal long and short axis view, respectively. Measurements of the left ventricle were taken at right parasternal short axis view at the level of chordae tendinae using Teicholz formula.

The typical age at onset of bovine dilated cardiomyopathy is between 2 and 4 years but was also diagnosed in calves younger than 2 months and in cows older than 8 years (Graber and Martig, 1993). In present study, animal stood with its elbows abducted and had bilateral jugular engorgement. Physical examination revealed normal rectal temperature and respiration rate. There was no history of dyspnoea or coughing but tachycardia was evident on auscultation (HR-112/min).

*Corresponding author: vetsidhu@gmail.com



Figs. 1-6. (1) 2-D image at right parasternal long axis view showing dilation of cardiac chambers (LA-left atrium, LV-left ventricle, RA-right atrium, RV-right ventricle); (2) M-mode echocardiography at right parasternal short axis view showing increased lumen of LV along with flattening & thinning of IVS (IVS-interventricular septum); (3) Colour Doppler echocardiography showing mitral regurgitation; (4) Colour Doppler echocardiography showing tricuspid regurgitation; (5) Ultrasonographic image showing pleural effusions at left 6th ICS in the left hemithorax; (6) Visibly congested liver (dilation of CVC and other hepatic veins) indicative of systemic congestion (CVC-caudal vena cava)

Heart sounds were thumping on auscultation and the area of cardiac auscultation was also increased. One of the most common signs in heart disease is primary tachycardia, which is one of the first compensatory mechanisms to maintain cardiac output (De Moraes and Schwartz, 2002). Sometimes the heart rate is mildly elevated i.e. 80–100 bpm, however the heart rate is severely increased in some cases with rates high as upto 130 bpm (Braun, 2009). In a rare case of dilated cardiomyopathy reported in a heifer, there was bilateral distension and pulsation of jugular veins along with mild brisket edema (Gugliemini, 2003). The common symptoms of bovine dilated cardiomyopathy are subacute subcutaneous edema, congestion of the jugular veins, and tachycardia with gallop rhythm (Owczarek-Lipsa *et al.*, 2009). However, these signs are not specific to dilated cardiomyopathy and can be present in certain other conditions also. Differential diagnoses in cattle with jugular vein distension and tachycardia include right-sided cardiac insufficiency attributable to valvular endocarditis, cardiomyopathy, cardiac leucosis (Grunder, 2002), pericarditis (Braun *et al.*, 2007), and cystic lung and liver disease (Sidhu *et al.*, 2019).

Hematological examination revealed Hb-6 g% and total leukocyte count as 10500/cu mm suggesting hypochromic anaemia, absolute neutrophilia and mild left shift. Blood picture changes in different type of heart

diseases depend upon the lesions present and the causative agent (Radostits *et al.*, 2007). Non-specific haematological and biochemical changes have been reported in calves with monensin induced DCM (Litwak *et al.*, 2005) and primary DCM (Nart *et al.*, 2004).

Two-dimensional real time echocardiography at right parasternal caudal long axis view showed dilated right ventricle and left ventricle (Fig. 1). Using M-mode echocardiography at right parasternal caudal short axis view, the measured right ventricular end diastolic (RVIDd) and systolic diameters (RVIDs) were 4.9 cm and 4.23 cm, respectively and left ventricular end diastolic (LVIDd) and systolic diameters (LVIDs) were 7.11 cm and 6.24 cm, respectively (Fig. 2). In addition, reduced contractility of the interventricular septum and normal motility of the left ventricular free wall were evident. The overall left ventricular contractility was reduced with FS% as 12.24% and ejection fraction (EF%) as 25.59%. The measurements of left ventricular dimensions in this case were higher than reported for healthy cattle by various researchers (Halowell *et al.*, 2007, Boon 2011, Acorda *et al.*, 2016). Colour Doppler echocardiography revealed moderate regurgitation of the mitral (Fig. 3) and tricuspid valve (Fig. 4). Tricuspid regurgitation has also been reported in a heifer diagnosed with dilated cardiomyopathy, secondary to right-sided cardiac insufficiency (Gugliemini, 2003). Very

few reports are available on M-mode echocardiographic and Doppler aspects of various cardiovascular diseases in bovines, however description about ultrasonographic features of some congenital and acquired cardiac diseases (endocardial and pericardial diseases) are available.

Moderate amount of pleural effusions were observed on the left side of the thorax (Fig. 5) along with dilation of caudal vena cava indicative of systemic congestion (Fig. 6). Replacement of reverberation artifact of a normal lung parenchyma by hypoechoic structure and echogenic debris with distal comet tail artefacts along with anechoic pleural effusion and echogenic fibrin in pleural sac are the characteristic features of pleuropneumonia in bovines (Gouda, 2015). Pleural effusions can occur due to pleural pathology itself or a condition affecting the surrounding organ structures (particularly heart) that leads to passive venous congestion (Babkine and Blond, 2009). So, this effectively explains accumulation of pleural fluid in the present case. The caudal vena cava (CVC) has a characteristic triangular shape on cross-section because its embedded in the sulcus of vena cava in the liver (Braun, 2008). However, it was dilated and round in shape in the present case indicating congestion in the systemic circulation. CVC congestion could be due to right-sided cardiac insufficiency as in our case, however other causes have also been defined like caudal vena cava thrombosis and compression in thorax or subphrenic region by some space occupying lesions (Braun, 2009).

The case was presumptively diagnosed for congestive heart failure secondary to dilated cardiomyopathy. DCM is a progressive degenerative disorder that causes congestive heart failure and subsequently death (Leifsson and Agerholm, 2004). According to the authors knowledge, this is the first report of dilated cardiomyopathy from India in a HF crossbred cows rarely reported condition in dairy animals.

REFERENCES

- Acorda, J.A, Constante, J.L., Rayos, A.A. and Pajas, M.G.A. (2016). M-mode echocardiographic measurements in pregnant and non-pregnant Holstein-Friesian X Sahiwal Crossbred dairy cattle. *Philippine J. Vet. Med.* **42(1)**: 28-34.
- Babkine, M. and Blond, L. (2009). Ultrasonography of the Bovine Respiratory System and Its Practical Application. *Vet. Clin. N. Am. Food Anim. Pract.* **25**: 633-649.
- Boon, J.A. (2011). Manual of Veterinary Echocardiography. Boon, J.A. (Edt.). Philadelphia, Lippincott Williams & Wilkins.
- Braun, U. (2003). Clinical findings and diagnosis of thrombosis of the caudal vena cava in cattle. *Vet. J.* **175(1)**: 118-125.
- Braun, U. (2009). Ultrasonography of the liver in cattle. *Vet. Clin. N. Am. Food Anim. Pract.* **25**: 591-609.
- Braun, U., Lejeune, B., Schweizer, G., Puorger, M. and Whrensprenger, F. (2007). Clinical findings in 28 cattle with traumatic pericarditis. *Vet. Rec.* **161**: 558-563.
- Braun, U., Schweizer, T. and Pusterla, N. (2001). Echocardiography of the normal bovine heart: technique and ultrasonographic appearance. *Vet. Rec.* **148**: 47-51.
- Gerspach, C., Schwarzwald, C.C., Hilbe, M. and Buczinski, S. (2016). Clinical and echocardiographic findings in an 8 year old Brown Swiss cow with myocardial abscess. *J. Vet. Cardiol.* **18(2)**: 194-198.
- Gouda, S.M. (2015). Ultrasonographic identification of abdominal and thoracic lesions resulting from foreign body syndrome in buffaloes. *Res. J. Vet. Pract.* **3(2)**: 41-46.
- Graber, H.U. and Martig, J. (1993). Diagnosis of bovine cardiomyopathy by electrolyte and protein analysis. *J. Vet. Med.* **40**: 690-696.
- Grunder, H.D. (2002). Diseases of the heart and the pericardium. Dirksen G., Grunder H.D. and Stober M. (Eds.), Internal Medicine and Bovine Surgery, (4th Edn.), Parey Buchverlag, Berlin. pp. 159-181.
- Gugliemini, C. (2003). Echocardiographic and Doppler echocardiographic findings of dilated cardiomyopathy in a heifer. *Vet. Rec.* **153**: 535-536.
- Hallowell, G.D., Potte, T.J. and Bowen, I.M. (2007). Methods and normal values for echocardiography in adult dairy cattle. *J. Vet. Cardiol.* **9**: 91-98.
- Leifsson, P.S. and Agerholm, J.S. (2004). Familial occurrence of bovine dilated cardiomyopathy in Denmark. *J. Vet. Med.* **51**: 332-335.
- Litwak, K.N., McMahan, A., Lott, K.A., Lott, L.E. and Koenig, S.C. (2005). Monensin Toxicosis in the Domestic Bovine Calf: A Large Animal Model of Cardiac Dysfunction. *J. Am. Assoc. Lab. Anim. Sci.* **44(3)**: 45-49.
- Nart, P., Thompson, H., Barrett, D.C., Armstrong, S.C. and McPhaden, A.R. (2004). Clinical and pathological features of dilated cardiomyopathy in Holstein-Friesian cattle. *Vet. Rec.* **155**: 355-361.
- Owczarek-Lipsa, M., Denis, C., Eggen, A., Leeb, T., Posthaus, H., Dolf, G. and Braunschweig, M.H. (2009). The bovine dilated cardiomyopathy locus maps to a 1.0-Mb interval on chromosome 18. *Mamm. Genome* **20**: 187-192.
- Radostits, O.M., Gay, C.C., Hinchcliff, K. and Constable, P.D. (2007). Veterinary Medicine. In: A Textbook of the Diseases of Cattle, Horses, Sheep, Pigs, and Goats, (10th Edn.), Saunders Elsevier, Philadelphia. pp. 3-31, 293-375, 2047-2050.
- Sidhu, S., Uppal, S.K., Kumar, A., Gupta, D. and Randhawa, C.S. (2019). Rare Presentations of Cystic Lung and Liver Disease in Cattle and Buffaloes. *Int. J. Livest. Res.* **9(4)**: 32-40.