

Case Report – Idiopathic Hemorrhagic Pericarditis in a Holstein Cow: A Rare, Non-fatal Heart Disease

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Abstract

A two-year-old Holstein heifer was presented with clinical signs of right-sided heart failure which appeared two weeks after calving, including tachycardia and muffled heart sounds. A diagnosis of pericarditis was made by echocardiography. Pericardiocentesis revealed hemorrhagic pericardial fluid, and cytologic findings were compatible with idiopathic hemorrhagic pericarditis. Pericardial drainage and lavage was suggested, but the owner refused. A rumen magnet was administered to the cow, and penicillin was given for seven days. Two months after the initial diagnosis, clinical examination of the cow was normal, including normal echocardiographic findings.

Keywords: bovine, pericardial effusion, traumatic pericarditis, idiopathic hemorrhagic pericarditis

Résumé

Une taure Holstein de deux ans a été présentée avec des signes cliniques de défaillance cardiaque droite apparus deux semaines suivant le vêlage, incluant la tachycardie et des bruits cardiaques assourdis. Un diagnostic de péricardite a été fait grâce à l'échocardiographie. Une péricardiocentèse a révélé la présence de fluide péricardique hémorragique et les résultats de l'analyse cytologique étaient compatibles avec une péricardite hémorragique idiopathique. Une vidange péricardique et un lavage ont été suggérés au propriétaire qui a toutefois refusé. On a utilisé un aimant dans le rumen et administré de la pénicilline pendant sept jours. Près de deux mois suivant le diagnostic initial, l'examen clinique de la vache n'a révélé aucune anomalie et les résultats de l'échocardiographie étaient normaux.

Introduction

The most common pericardial disease in cattle is traumatic pericarditis, a condition considered to have a poor prognosis.³ Recently, idiopathic hemorrhagic

pericarditis (IHP) has been described as an uncommon cause of pericardial effusion in cows.^{9,13} The presentation and clinical findings of IHP are difficult to differentiate from traumatic pericarditis.^{3,9} The prognosis for cattle with IHP is generally good^{9,13} following pericardial drainage and lavage, despite the risk of non-fatal relapse.⁹ This case report describes a Holstein heifer diagnosed with IHP that recovered without pericardial drainage or lavage.

History and Physical Examination

A two-year-old Holstein heifer was presented to the bovine ambulatory clinic at the Université de Montréal because of a sudden decrease in appetite and milk production. Milk production had dropped from 28 lb (13 kg) to 4 lb (2 kg) per milking. She had calved uneventfully two weeks earlier, and had no known previous medical problems.

Two months earlier, an adult cow in the same herd was diagnosed with traumatic pericarditis, which was revealed by echocardiography and pericardiocentesis. Prophylactic use of magnets was not practiced in the herd.

On arrival, the heifer was depressed, and had submandibular and brisket edema, as well as jugular venous distension. Rectal temperature was 101.8°F (38.8°C), and the respiratory rate was 20 breaths per minute. Cardiac auscultation revealed tachycardia (112 beats per minute) and bilateral, muffled heart sounds compatible with pericardial effusion. The rumen was atonic, and a ping was auscultated in the left cranial portion of the abdomen, suggestive of a left displaced abomasum (LDA). No abdominal pain was detected when performing back-forced flexion. No magnet was detected in the reticulum when using a compass near the reticulum area. Rectal examination was normal except for large fiber particles in the feces.

There was no attempt to correct the LDA on the day of the initial visit because traumatic pericarditis was suspected, which has a poor prognosis.^{3,5} Echocardiography and pericardiocentesis were planned on day 2 to

determine the cause of the pericardial effusion, including traumatic pericarditis, IHP, and cardiac lymphoma, which is uncommon in a heifer. The “ping” in the left flank was not detected on day 2.

Echocardiography and Laboratory Findings

Standard echocardiography was performed as previously described^{6,11} using a portable unit with a 2.5 MHz sectorial probe.^a The short axis views of the heart were not performed due to the large size of the probe and difficulties in obtaining good quality images. Echocardiography results were compatible with hypoechogenic pericardial effusion and epicardial echoic strands compatible with fibrin clots (Figure 1). The tricuspid, mitral, aortic, and pulmonary valves appeared normal on the ultrasonogram. A small amount of anechoic pleural effusion was also observed.

Pericardiocentesis using an 18-gauge spinal needle was performed at the left 5th intercostal space to collect pericardial fluid. The centesis yielded large amounts of an odorless, hemorrhagic fluid that did not coagulate. A total of 20 mL of pericardial fluid were collected in a test tube containing EDTA, and submitted for cytologic examination. Pericardial fluid was also submitted for aerobic and anaerobic bacterial culture. At the same time, blood samples were submitted for a complete serum biochemistry panel and ELISA test for bovine leukosis virus (BLV).

The biochemistry panel revealed an increase in total bilirubin (15.9 $\mu\text{mol/L}$, reference value less than 14 $\mu\text{mol/L}$); increased gamma-glutamyltransferase activity (53 IU/L, reference range 0-39 IU/L); decreased albumin (25.8 g/L, reference range 27.7-40.4 g/L); decreased serum calcium (2.05 mmol/L, reference range 2.22-2.70 mmol/L); slightly decreased blood sodium (133.3 mmol/L, reference range 134.0-147.0 mmol/L); and slightly decreased chloride (91.7 mmol/L, reference range 96.4-109.2 mmol/L). Blood glucose, urea, creatinine, aspartate aminotransferase, glutamate dehydrogenase, creatine kinase, globulin, β -hydroxybutyrate, potassium, phosphorus, and total CO_2 were within the reference ranges. The ELISA test for BLV infection was negative.

Cytologic examination of the pericardial fluid was compatible with a mixed inflammatory pericarditis (total protein 50 g/L; total nucleated cells 2,480/ μL ; and a differentiated count of 71% neutrophils, 16% macrophages, and 13% lymphocytes). There were no signs of hemosiderophagy. Bacterial culture of the pericardial fluid for aerobic and anaerobic bacteria did not yield any growth. The pericardial fluid analysis was compatible with a diagnosis of IHP.^{9,13}

The owner declined a complete pericardial lavage and drainage for the heifer. A magnet was administered with a balling gun, and a single dose of furosemide^b (0.91

mg/lb; 2 mg/kg) was given IV. Penicillin^c (10,000 IU/lb; 22,000 IU/kg, IM, BID) was administered for one week. The owner was advised that the heifer had a guarded prognosis with only conservative treatment. He chose to give the heifer time to recover rather than electing salvage slaughter.

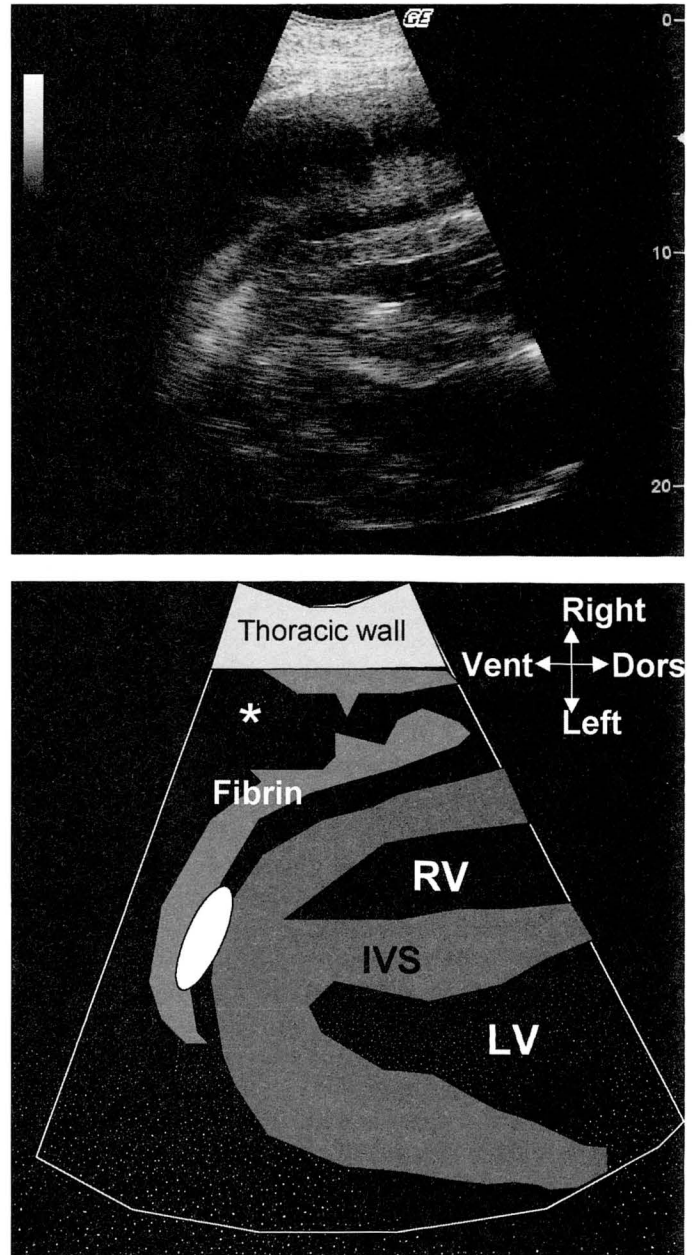


Figure 1. Right long axis view of the heart of a heifer with idiopathic hemorrhagic pericarditis. Pericardial hypoechoic effusion is observed (*). Some echoic strands of fibrin are also observed. The right ventricle (RV), the left ventricle (LV), and the interventricular septum (IVS) are observed.

Follow-up Report on the Case

One month after the initial visit, the heifer was still alive and appetite had improved. Two months after the initial examination, the heifer was re-examined. Milk production had increased to 51 lb (23 kg) per milking, physical examination was normal, and the edema had disappeared. A second echocardiography was performed, and no pericardial effusion was seen (Figure 2). The heart was considered normal. Seven months after the initial visit the heifer was still in the herd with no recurrence of the problem. Projected 305-day milk production was 20,629 lb (9,377 kg); she was successfully bred at 110 days-in-milk.

Discussion

Idiopathic hemorrhagic pericarditis has been recently described in seven adult dairy cows^{9,13} as a cause of pericardial effusion leading to right-sided congestive heart failure and muffled heart sounds. Differentiating between IHP and traumatic pericarditis is important in practice since the prognosis differs between the two conditions. Traumatic pericarditis has a poor prognosis,^{2,3} even if 5th rib resection and pericardiostomy is attempted to allow pericardial drainage and flushing;^{8,10} one review suggests pericardial drainage and lavage are not useful to treat traumatic pericarditis.³ In contrast, drainage and pericardial lavage is reportedly highly successful in cows (6 of 6) with IHP^{9,13} although in one of the reports relapses occurred within two months following initial treatment in two of four cows.⁹ Long-term prognosis was good for treated cows.^{9,13}

Other causes of pericardial effusion in cows include cardiac manifestation of enzootic lymphoma,¹⁹ cardiac tamponade due to ruptured coronary artery,¹ trauma,³ coagulation disorder,⁹ cobalt toxicosis,⁹ and heartwater disease.²⁰ These conditions have not been incriminated in IHP.⁹

Echocardiography has been recommended as an important non-invasive tool for assessment of pericardial disorders.^{3,4,7,9,13} Pericardial effusion is often present with traumatic pericarditis, IHP, cardiac manifestation of bovine enzootic lymphoma, or other causes of hydropericardium. Ultrasonographic appearance of the pericardial fluid may help the clinician distinguish traumatic pericarditis from IHP. Anechoic pericardial effusion may be observed in IHP.¹³ Echocardiographic findings in traumatic pericarditis cases consist of hypoechoic to echoic pericardial fluid with echogenic fibrin clots that can be observed in the epicardium or in the pericardial space.^{3,4} However, those findings can also be found in cases of IHP.⁹ The presence of echogenic fibrin strands in the pericardial space is, therefore, a poor criterion to differentiate these diseases. Pericardiocen-

tesis is necessary for a definitive diagnosis. Typically, the macroscopic findings of the pericardial fluid are characteristic of the disease.⁷ A purulent, foul-smelling fluid generally indicates traumatic pericarditis, whereas a hemorrhagic, odorless fluid is found in IHP.^{3,7} Cytological examination of the fluid in septic pericarditis cases reveals suppurative inflammation and signs of

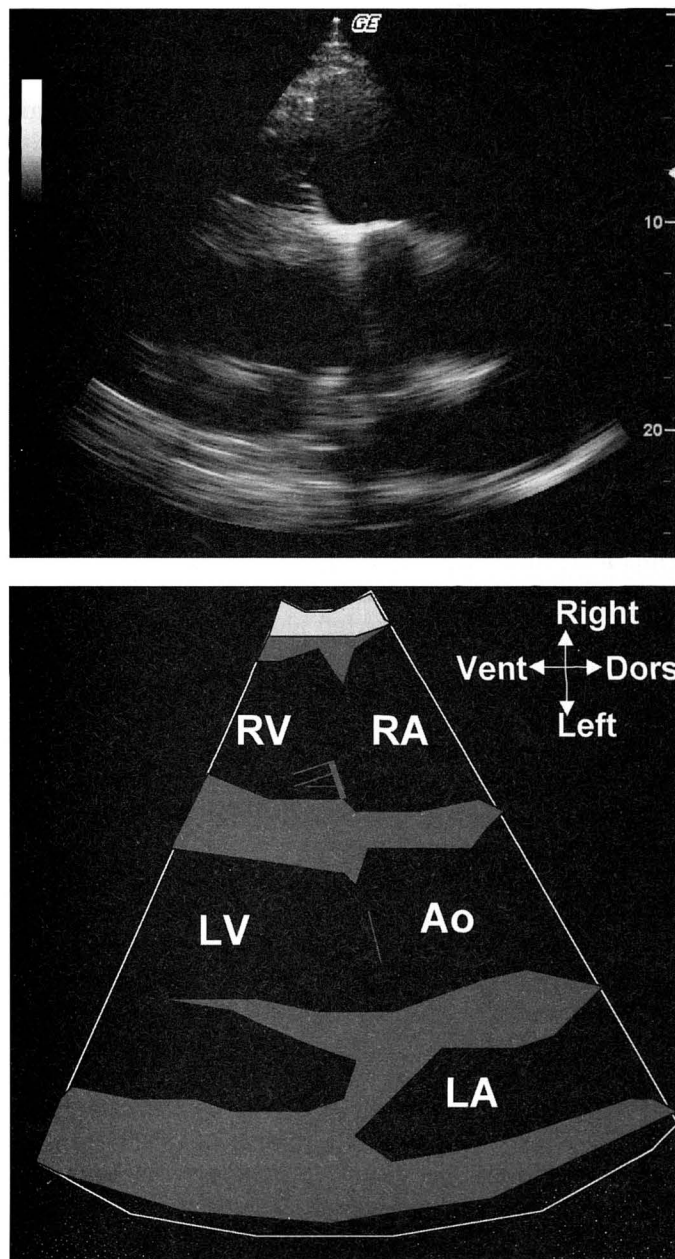


Figure 2. Right long axis view of the left ventricular outflow in the heifer, two months after the initial diagnosis of idiopathic hemorrhagic pericarditis. The right ventricle (RV), the left ventricle (LV), and the interventricular septum are observed as well as the right atrium (RA), the left atrium (LA), and the aortic root (Ao).

neutrophil degeneration,¹⁵ whereas IHP is accompanied by mixed inflammatory changes with neutrophils and lymphocytes.^{9,13} The cytologic findings of pericardial effusion secondary to neoplasia may be useful to identify neoplastic cells.¹⁸ However, in contrast to dogs,¹⁶ there are no specific studies evaluating the diagnostic value of pericardial effusion to diagnose neoplasia in cattle.

Despite the absence of specific therapy for the pericardial effusion, the heifer survived and had a good clinical outcome. Treatments included pericardiocentesis, penicillin, and a magnet, which are ineffective for treatment of traumatic pericarditis.³ In horses, pericardial disease is commonly associated with idiopathic pericarditis,²¹ and the prognosis is good if pericardial drainage is attempted.²¹ Canine idiopathic pericardial effusion is first treated by pericardiocentesis;¹⁷ relapses are subsequently treated by pericardiectomy.¹⁷ Acute human pericarditis can be managed without pericardial drainage if signs of tamponade are absent.^{12,18} When some degree of tamponade is observed or when the pericardial effusion is greater than 2 cm, pericardial drainage is required.^{12,18}

The precise etiology of IHP in cattle remains unclear. The absence of pericardial anomalies two months after the initial diagnosis without any attempt of pericardial drainage is an unusual outcome, especially since clinical signs of congestive heart failure were present. It is possible that pericardiocentesis allowed the pericardial fluid to escape into the left pleural space. Treatment with penicillin may have been beneficial since *Streptococcus bovis* has been cultured from the myocardium of a cow with idiopathic pericarditis;⁹ however, culture of the pericardial fluid from this heifer was negative. The heifer was normal seven months after the initial diagnosis, and was productive in the herd as previously described for cows with IHP.^{9,13}

This case report illustrates the importance of pericardiocentesis in cases of suspected pericardial effusion in cattle. The procedure can be performed safely in the hospital as well as on the farm. Complications of pericardiocentesis are rare in cattle. Adverse effects of pericardiocentesis are pneumoperitoneum, cardiac puncture leading to hemorrhage, and leakage of pericardial fluid into the pleural cavity, resulting in pleuritis.¹⁴ The adverse effects of pericardiocentesis in small animals include accidental myocardial puncture, arrhythmia, and hemorrhage, which is generally secondary to tumor or coronary artery laceration.¹⁷ One fatal complication has been reported in a cow after pericardiocentesis with gas jetted from the needle; however, necropsy did not reveal any myocardial injury or hemorrhage.¹⁴

When presented with a cow demonstrating clinical signs of heart failure secondary to pericardial effusion, a macroscopic and cytological assessment of the pericardial fluid is needed to distinguish traumatic pericarditis

from IHP or neoplastic effusion. Echocardiography can also add valuable information in helping to choose the best site for the pericardiocentesis, but it is not widely used in farm settings. The prognosis for IHP is good with pericardial drainage and lavage. Some cows may return to normal production with a single drainage of pericardial fluid and antibiotic therapy. Before condemning a cow with clinical signs of right-sided heart failure and suspected pericardial effusion,^{2,3} the pericardial fluid should be assessed.

Conclusions

Idiopathic hemorrhagic pericarditis was diagnosed in the field using echocardiography and pericardiocentesis. These tools are useful to differentiate causes of pericardial effusion.

Endnotes

^aGE LogiqBook, General Electric Health Care, Wauwatosa, WI

^bFurosemide 5% Solution, Sandoz Canada Inc., QC, Canada

^cDepocillin, Intervet, QC, Canada

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