

PATIENT PRESENTING CLINICAL SIGNS

Bonnie Hough Grade 2-3/6 systolic heart murmur. Pt had a cervical slot surgery at the beginning of the month and is now experiencing an increased RR and labored breathing overall

SPECIES

Canine

Abnormal PE/Chem/CBC/UA Results: 130 HR 30 RR Blood Pressure Measurements n/a Current Medications Methocarbamol 500mg Tablet, Vetprofen 100mg Caplet, Gabapentin 300mg Capsule, Trazodone 100mg Tablet

BREED

Great Dane

ULTRASONOGRAPHIC EXAMINATION OF THE HEART

SEX

Spayed Female

AGE

6 Years

WEIGHT

121 Pounds

CANINE CARDIAC PARAMETERS	MR VMAX (m/s)	TR VMAX (m/s)	LA/AO (Boon method)	LA/AO (Heart Base; Swe)	FS (%)	EF (%)	EPSS (cm)
NORMAL PARAMETER	4.5-5.5	<2.7	1.3	<1.6	28-40	40-100	<0.6
PATIENT	5.0		NM	>2.5	20	45	1.87
CANINE CARDIAC PARAMETERS	HR (BPM)	AV VMAX (m/s)	PV MAX (m/s)	BODY WEIGHT (kg)	LA 2D short axis Base view (cm)	LVIDd Avg; 2D and m-mode short axis (cm)	LVIDs Avg; 2D and m-mode short axis (cm)
NORMAL PARAMETER	50-100	0.7-1.7	0.7-1.6	BELOW	BELOW	BELOW	BELOW
PATIENT	130	1.3	0.6		10.4	7.3	

INTERPRETED BY

Eric Lindquist, DMV

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IMAGING PERFORMED BY

Sara Hansen

HOSPITAL NAME

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Cardiac Presentation

The cardiac presentation presented severe volume overload of the left atrium and left ventricle with myocardial insufficiency. Mitral and tricuspid insufficiency noted. Both left and right atrial enlargement present. No pericardial or pleural effusion noted. However, pulmonary edema lines were present. This is most consistent with dilatative cardiomyopathy with left-sided heart failure.

ULTRASONOGRAPHIC FINDINGS

- DCM type presentation

INTERPRETATION OF THE FINDINGS & FURTHER RECOMMENDATIONS

Recommend quadrotherapy in this patient with Pimobendan 0.3 mg/kg BID, ACE inhibitor 0.5 mg/kg SID progressing to BID, Spironolactone 2.0 mg/kg BID, and Lasix at 2-4 mg/kg BID. Target sleeping respiratory rate of <25/min. Taurine supplementation also valid. Recheck echo in 2-4 weeks depending upon response to therapy. Guarded prognosis. Cage rest and calm, non-exertive environment recommended until the patient can stabilize.

Given the myocardial insufficiency noted in this patient Nutritional Cardiomyopathy (Taurine deficiency/grain free diet) and infectious agents should be considered. Infectious agents such as



PATIENT

Bonnie Hough

Bartonella, Leptospirosis, Parvo (current or historical), Bacterial sepsis and less likely and regional infectious agents such as Trypanosoma, Toxoplasmosis and Babesia should be considered as underlying clinical players.

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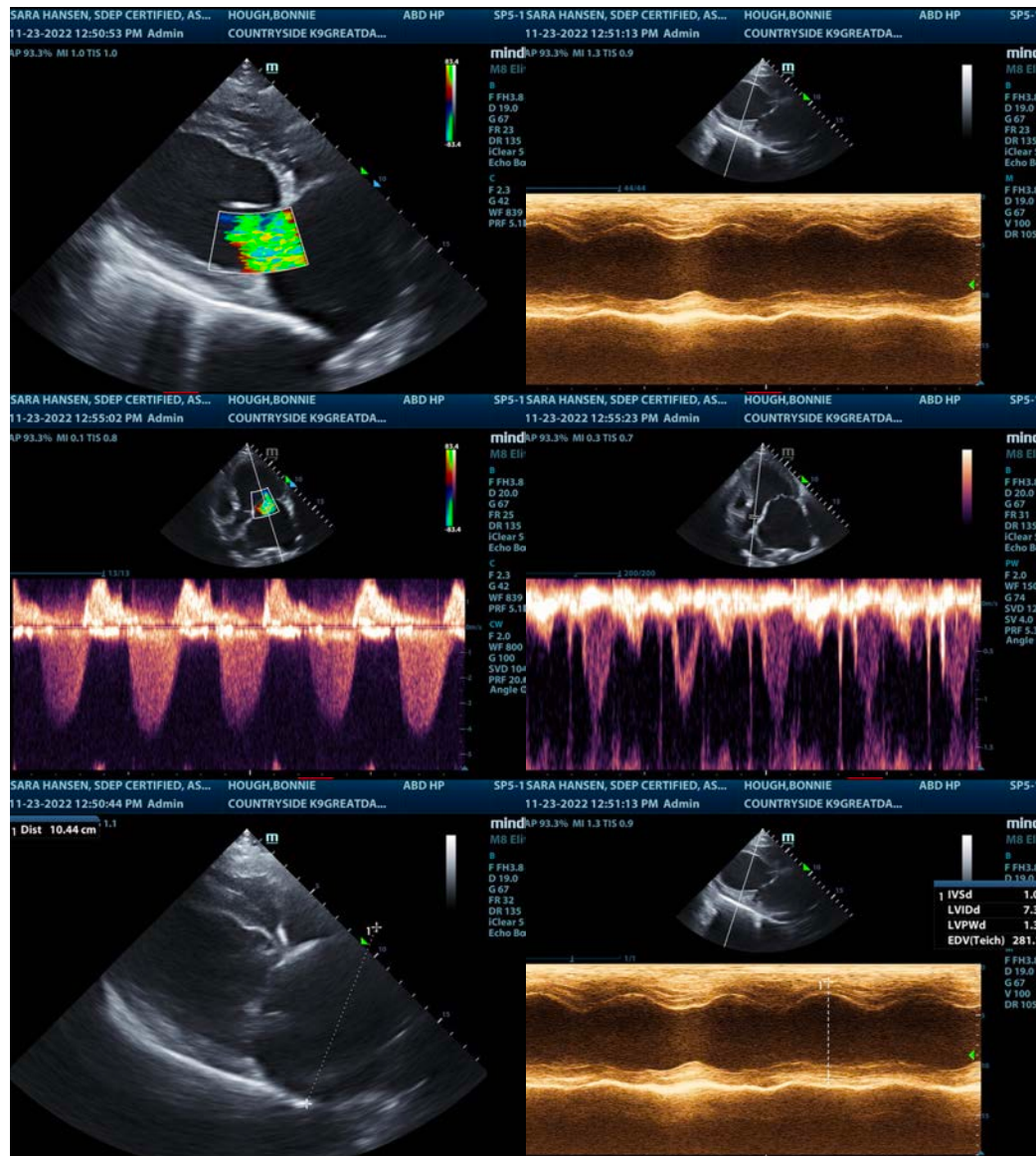
Dr. Cox

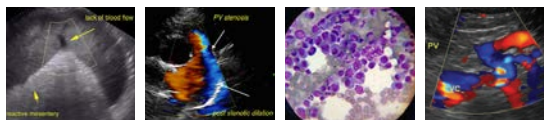
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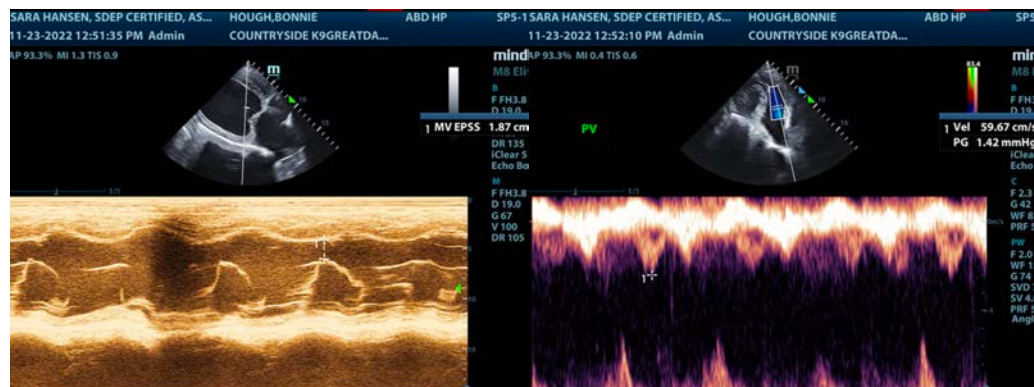
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The information and recommendations provided are based on the images presented by the referring veterinarian/sonographer. No evaluation can be communicated regarding pathology that was not visible in the image/video clips provided.

Thank you for this referral. If the clinical or image interpretation does not parallel your findings or if I can be of any further assistance please contact me.

Eric Lindquist, DMV, DABVP, Cert. IVUSS, CEO of SonoPath.com

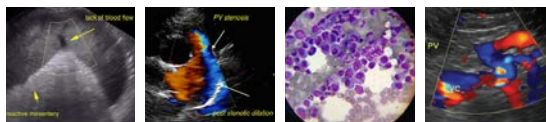
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Canine Dilated Cardiomyopathy

<http://www.sonopath.com/DilatedCMY>

Description: Dilated cardiomyopathy (DCM) is the most significant acquired cardiac disease of large to giant breed dogs; it especially affects Doberman Pinschers, Great Danes, and Labrador Retrievers. DCM is primarily a systolic dysfunction caused by a progressive decrease in myocardial contractility. As contractility worsens, all chambers of the heart progressively dilate and the walls become increasingly stiff as intracardiac pressure rises. The net result is reduced cardiac output, which causes a decrease in muscle perfusion. As the disease progresses, the left ventricle continues to dilate, causing the mitral valve annulus to widen; cardiac output is further reduced as a result of mitral regurgitation. The reduced cardiac output stimulates the sympathetic nervous system to increase preload (diastolic volume), heart rate, and peripheral vascular resistance. Consequently, there is an increase in volume and pressure, and clinically, it is at this stage of the disease that most animals develop pulmonary edema.

Although the most common etiology is idiopathic, it can also be the result of hypothyroidism, taurine deficiency, L-carnitine deficiency, parvovirus, Lyme disease, and possibly myocarditis. In Doberman Pinschers there is some evidence that there may be a causative genetic mutation. Doxorubicin



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chemotherapy may induce a DCM-type presentation due to its myocardial toxicity. In Boxers, it is possible for primary myocarditis to precipitate DCM in the later stages of the condition. Hypothyroidism may also be a complicating factor in DCM as it has the potential to further aggravate the systolic dysfunction.

Clinical signs: Clinical signs include weakness, lethargy, exercise intolerance, coughing, anorexia, ascites, syncope, tachypnea, and dyspnea. Pulses are weak and rapid, and often there are pulse deficits. Pulmonary crackles may be auscultated. Jugular distention and muffled heart sounds may also be present.

Diagnostics: It is possible that NT-proBNP testing will be utilized in the future to detect occult DCM. One recent study showed that NT-proBNP levels were higher in dogs with DCM as well as apparently healthy patients that went on to develop DCM within 1.5 years of the samples being obtained.

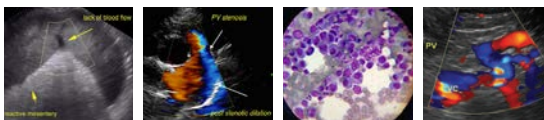
The echocardiographic parameters for diagnosing DCM include an increased left ventricular (LV) diameter, depressed fractional shortening, and increased EPSS (> 0.8 cm); there is the possibility of an enlarged left atrium. A recent study showed that the best discriminating value for differentiating healthy Doberman Pinschers from those with DCM was the LV diastolic diameter (> 48mm for male dogs and > 46 mm for female dogs).

Ideally, an ECG should be performed with a Holter monitor over a 24-hour period. Fifty to 100 VPCs are considered diagnostic for DCM in Doberman Pinschers when other systemic causes for arrhythmias have been excluded. The absence of detectable VPCs in the 5-minute ECG, however, should not lead to the assumption that the dog is healthy. Even one VPC in a 5-minute ECG strongly warrants further examination.

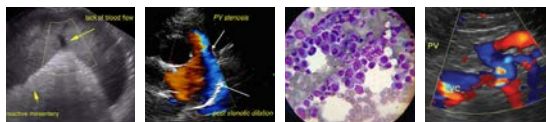
When congestive heart failure (CHF) develops, patients will exhibit an increased respiratory rate and there will be evidence of pulmonary edema on survey radiographs. One might also note elevated NT-proBNP levels.

Treatment: Pimobendan (0.25-0.3 mg/kg PO BID) is a phosphodiesterase inhibitor and positive inotropic medication. (Note: The latter is a more powerful positive inotrope than digoxin.) Studies have shown that pimobendan significantly prolongs survivability in Dobermans with DCM and CHF; their mean survival time was 329 days compared to 50 days for those in the placebo group. There was also clinical improvement in dogs that had CHF.

Diuretics: Lasix should be administered at 2-4 mg/kg PO BID-TID as needed and subsequently reduced to the lowest tolerated dose to maintain respiratory comfort, which is approximately 2 mg/kg PO BID (higher doses will be required as the disease progresses). Spironolactone (0.5 mg/kg PO BID) is used primarily for its anti-aldosterone effect and to decrease remodeling of the heart. In



PATIENT	human trials, the addition of spironolactone to standard therapy has been shown to increase life span in cases of CHF.
Bonnie Hough	
SPECIES	Angiotensin-converting enzyme (ACE) inhibitors: Enalapril (0.5 mg/kg BID) or benazepril (0.5 mg/kg PO Q12-24hr) therapy decreases systemic afterload, which diminishes the chamber stretching effects on the myocardium and thereby improves oxygen carrying capacity. A recent retrospective study showed that the early use of benazepril prolonged the onset of overt DCM in Dobermans with occult DCM.
Canine	
BREED	
Great Dane	
SEX	Anti-arrhythmics: These should be used as needed. In cases of ventricular tachycardia where severe systolic dysfunction is a possibility, amiodarone (10 mg/kg PO Q24hr until stabilized and then 8 mg/kg PO Q24hr) and mexilitine (5-8 mg/kg PO TID) can be used. Although beta blockers, such as sotalol, can be used, they must be prescribed with extreme caution in dogs with severe systolic dysfunction as they have a decreased inotropic effect. Therapy for atrial fibrillation would include diltiazem (start at 0.5 mg/kg PO TID and increase to a target dose of 2 mg/kg PO TID) and/or digoxin, or amiodarone.
Spayed Female	
AGE	
6 Years	
WEIGHT	Carvedilol: Carvedilol is a calcium channel blocker, acts as a positive inotrope and free radical scavenger, and has ACE inhibiting effects. The target dose is approximately 1 mg/kg BID; it should be titrated up gradually from 0.25 mg/kg with dose adjustments made every 2 weeks until the ideal dose is reached.
121 Pounds	
INTERPRETED BY	Morphine: Morphine (0.025-0.05 mg/kg IV) decreases anxiety and improves respiratory efficiency and oxygen consumption. Morphine also dilates splanchnic vasculature and increases venous capacitance thereby reducing pulmonary edema.
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IMAGING PERFORMED BY	Supplements: These may aid in some cases of DCM. In taurine-deficient patients (based on plasma or whole blood taurine levels), one should supplement taurine at 500 mg PO BID and L-carnitine at 175 mg/kg PO BID. Coenzyme Q10 is also used as a means of myocardial ischemic prevention (30-90mg BID). Omega-3 fatty acid supplements can help with cell membrane stabilization and be used as inflammatory mediators (EPA 40mg/kg, DHA 25mg/kg PO Q24hr).
Sara Hansen	
HOSPITAL NAME	Salt restriction: An optimized high-quality protein diet (4gm/100kcal) that is mildly restricted in salt should be considered to minimize the onset of sodium-induced volume overloads.
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Prognosis: The prognosis is variable and largely dependent on the individual animal and its response to therapy.

References:

Fuentes VL, Corcoran B, French A, Schober KE, Kleemann R, Justus C. A double-blind, randomized, placebo-controlled study of pimobendan in dogs with dilated cardiomyopathy. *J Vet Intern Med.* 2002;16:255-261.

O'Grady MR, Minors SL, O'Sullivan ML, et al. Effect of pimobendan on case fatality rate in Doberman Pinschers with congestive heart failure caused by dilated cardiomyopathy. *J Vet Intern Med* 2008;22:897-904.

O'Grady MR, O'Sullivan ML, Minors SL, et al. Efficacy of benazepril hydrochloride to delay the progression of occult dilated cardiomyopathy in Doberman Pinschers. *J Vet Intern Med* 2009;23:977-83.

O'Grady MR, O'Sullivan ML, Pyle WG, et al. Evaluation of 10 genes encoding cardiac proteins in Doberman Pinschers with dilated cardiomyopathy. *Am J Vet Res* 2011;72:932-39.

Wess G, Butz V, Mahling M, et al. Evaluation of N-terminal pro-B-type natriuretic peptide as a diagnostic marker of various stages of cardiomyopathy in Doberman Pinschers. *Am J Vet Res* 2011;72:642-49.