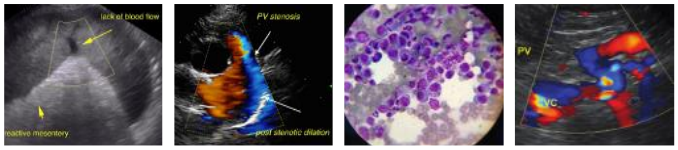
SonoPath
Clinical Sonography & Telecytology
EDUCATIONAL TELECONSULTATION SERVICES™
SonoPath.com
1-800-838-4268 info@sonopath.com



PATIENT
Holly Perket

SPECIES
Canine

BREED
Golden Retriever

SEX
FI

AGE
5 years

WEIGHT
57 lbs

INTERPRETED BY
Maggie Machen Lamy, DVM, DACVIM (Cardiology)

IMAGING PERFORMED BY
Kim Liedberg

HOSPITAL NAME
SVS Imaging WI

REFERRING VET
Dr. Bianco

INVOICE
24564

DATE
6/2/22

PRESENTING CLINICAL SIGNS

History: 24 hours lethargy and anorexia, acute collapse prior to presentation.
Pericardial effusion with ventricular arrhythmia requiring sotalol/lidocaine overnight.
Pericardiocentesis was performed; no further information provided.

ECHOCARDIOGRAM FINDINGS

2D, m-mode, color flow and doppler imaging is available. Mild thickening of mitral valve leaflets with no prolapse into the left atrial lumen. Mild mitral regurgitation with mild left atrial dilation. Mild to moderately increased LV diameter in both systole and diastole with increased sphericity. Moderate systolic dysfunction. The tricuspid valve appears normal with mild to moderate tricuspid regurgitation. Mild RH enlargement. No overt evidence of pulmonary arterial hypertension. The pulmonic and aortic valves are normal in morphology and mobility. Normal pulmonic and aortic outflow velocities with laminar flow. No obvious aortic or pulmonic insufficiency. Scant pericardial effusion. No pleural effusion noted. Small volume peritoneal effusion on subcostal views. No obvious cardiac masses.

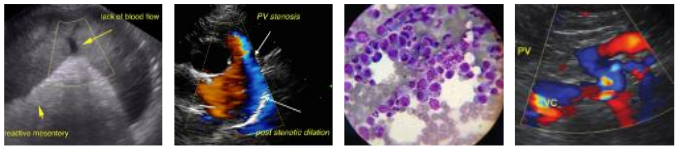
CARDIAC CHART

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	5.2	2.5	1.2	1.4	16	30	0.95
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	100	1.1	0.79	23	3.3	6.0	5.0
*Normal chamber parameters expressed as a mean value (SD)				3	1.27 (5.3)	2.46 (2.46)	1.36 (5.5)
BODY WEIGHT DEPENDENT PARAMETERS				5	1.40 (4.5)	2.74 (5.2)	1.60 (4.7)
**Note: All measurements based upon multi-modal images and methods. An average value is reported.*				10	1.50 (3.8)	3.27 (3.5)	2.06 (3.1)
				15	1.83 (2.0)	3.71 (2.4)	2.43 (2.1)
				20	2.02 (1.9)	4.14 (2.2)	2.80 (2.0)
				25	2.18 (2.4)	4.48 (2.9)	3.10 (2.5)
				30	2.33 (3.3)	4.83 (3.9)	3.39 (3.4)
				35	2.48 (4.3)	5.17 (5.0)	3.69 (4.5)
				40	2.62 (5.2)	5.48 (6.1)	3.96 (5.4)
				50	2.88 (7.1)	6.07 (8.3)	4.46 (7.4)

Adapted from June Boon, Veterinary Echocardiography, 1998
Rishniw M and Hollis NE, J Vet Intern Med 2000; 14:429-435
Hansson et al, Vet Rad and Ultrasound 2002
Bonagura et al. Echocardiography: principles of interpretation, Vet Clin North Am 15:1177, 1995

INTERPRETATION OF THE FINDINGS & FURTHER RECOMMENDATIONS

Unusual case. Left heart structural changes are identified, with mild to moderate LA/LV dilation and systolic dysfunction. The right heart is also mildly affected, with mild enlargement overall. This degree of structural changes is highly concerning for emerging dilated cardiomyopathy (DCM) phenotype; however, screening for possible contributing causes is recommended as below. Mild MR/TR are noted which should be monitored for progression going forward. Regardless the left atrium is only mildly dilated, indicating low risk for left-sided CHF in the near future. Finally, only scant pericardial and peritoneal effusion are identified, which likely suggests



SonoPath.com
1-800-838-4268 info@sonopath.com

PATIENT
Holly Perket

SPECIES
Canine

BREED
Golden Retriever

SEX
FI

AGE
5 years

WEIGHT
57 lbs

INTERPRETED BY
Maggie Machen Lamy, DVM, DACVIM (Cardiology)

IMAGING PERFORMED BY
Kim Liedberg

HOSPITAL NAME
SVS Imaging WI

REFERRING VET
Dr. Bianco

INVOICE
24564

DATE
6/2/22

no significant rebleeding at this time (assuming hemorrhage was the effusion removed). No obvious intra or extra-cardiac tumors are appreciated; that being said, these are easily missed on 2D imaging and remain a possibility. Consider advanced imaging and/or reassessment in the future if suspicion is high.

Systolic dysfunction can be primary in nature (DCM) or develop secondary to taurine deficiency, myocarditis, tachycardia-induced cardiomyopathy, thyroid imbalance, or infiltrative disease such as lymphoma. A thyroid level should be submitted. Given the recent evidence of grain free/boutique/exotic ingredient diets leading to DCM in some (but certainly not all) dogs, highly recommend a thorough diet history in this patient. If grain free, boutique brand or exotic ingredient, recommend immediate change to a more standard well formulated diet. Additionally, a taurine level can be submitted, however regardless of results recommend a taurine supplement in this case as below. Other possibilities should also be considered in this case, such as negative inotropic impact of certain drugs, as well as sustained tachycardias can impact the overall dimensions and function of the heart. Follow up is advised to screen for progression/regression once the arrhythmia is resolved.

In looking at the findings in total, it is unclear how they fit together. Assuming hemorrhage was found in the pericardium, the structural changes would be incidental and unrelated. Causes of hemorrhagic effusion include undiagnosed neoplasia, a bleeding disorder, or potentially an idiopathic effusion, and should all be considered. Full systemic evaluation is advised to screen for additional abnormalities in search of a diagnosis.

Speaking strictly on the LV dilation and dysfunction, Pimobendan is indicated as below at least for the short term. No sedation or sotalol is mentioned in this history that would impact these values, and there is concern for primary disease. The development of VT is clearly concerning, and this can occur due to either primary cardiomyopathy or pericardial effusion, both which are present in this case. Further treatment/work up for VT is recommended as dictated by the ECG evaluation.

Anesthesia is not advised.

Prognosis is guarded until further evaluation is perfomed. If neoplasia such as HSA is found, prognosis is poor to grave. VT carries a highly variable prognosis. Finally, LV changes may also limit outcome, and reassessment will help dicate long term picture.

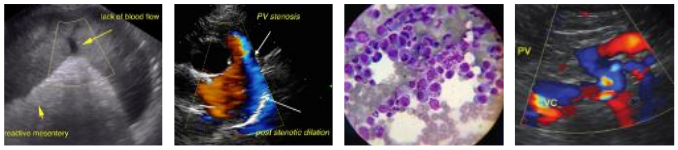
Monitor for development of a murmur, cough, labored breathing, exercise intolerance or collapse episodes.

PLAN
Recommend Pimobendan (0.3mg/kg PO q12h). Diet history as discussed. Supplement taurine, 1000mg PO q12h.

Further historical information regarding the pericardial effusion, arrhythmia, etc is needed. Further systemic evaluation as discussed. Follow up/tx for the arrhythmia should be dictated by the ECG report. Highly recommend referral to a multi-specialty center in this complicated case.

A recheck echocardiogram is recommended in 3-4 months, sooner if a murmur develops or any signs of cardiac disease are noted.

SonoPath
Clinical Sonography & Telecytology
EDUCATIONAL TELECONSULTATION SERVICES™



SonoPath.com
1-800-838-4268 info@sonopath.com

PATIENT
Holly Perket

SPECIES
Canine

BREED
Golden Retriever

SEX
FI

AGE
5 years

WEIGHT
57 lbs

INTERPRETED BY
Maggie Machen Lamy, DVM, DACVIM (Cardiology)

IMAGING PERFORMED BY
Kim Liedberg

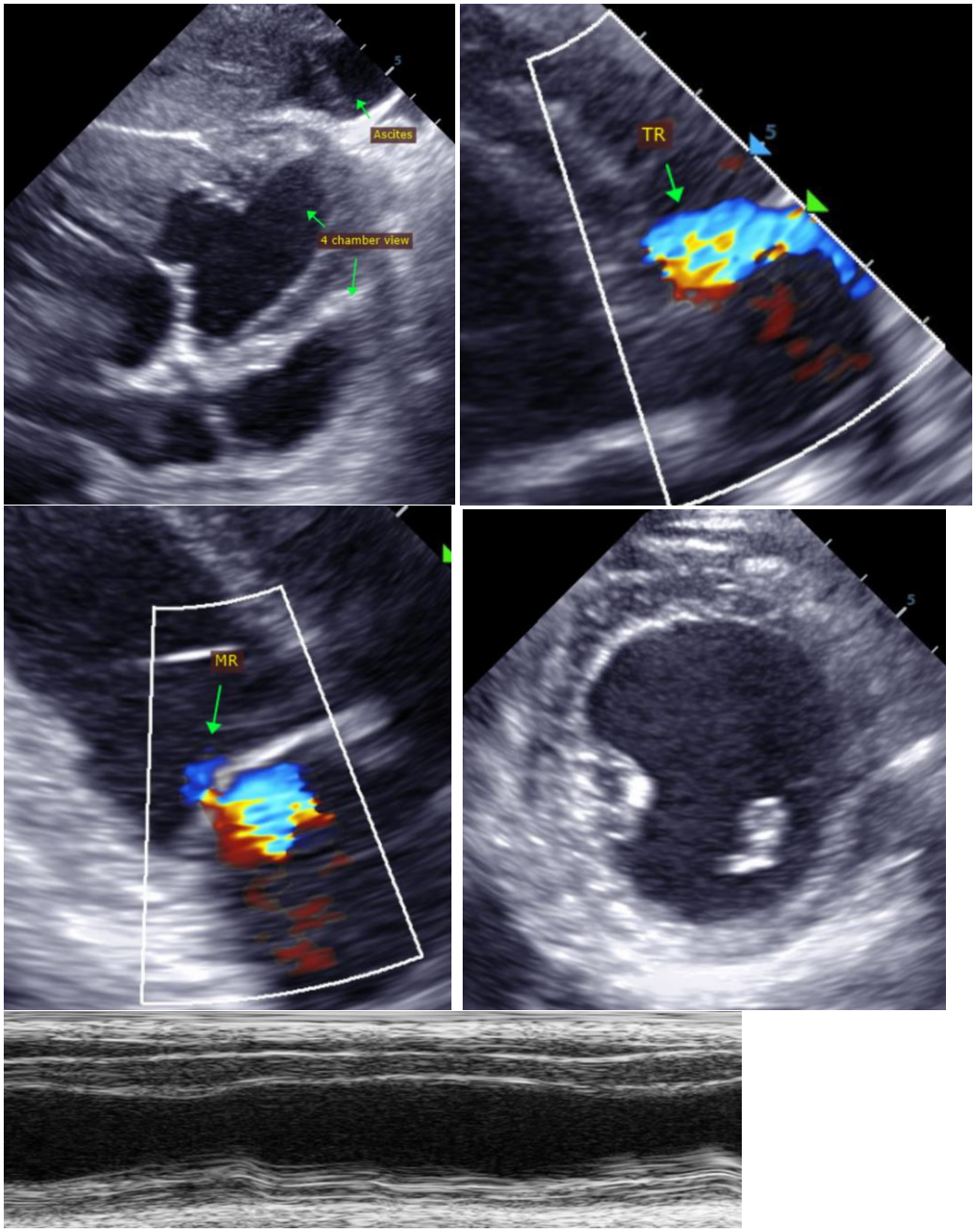
HOSPITAL NAME
SVS Imaging WI

REFERRING VET
Dr. Bianco

INVOICE
24564

DATE
6/2/22

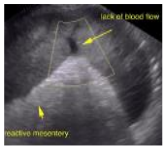
IMAGES

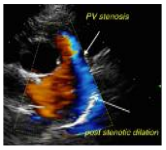


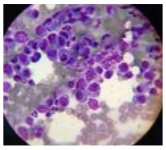
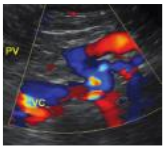
The information and recommendations provided are based on the images presented by the referring veterinarian. No evaluation can be communicated regarding pathology that was not visible in the image/video clips provided.

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.

SonoPath
Clinical Sonography & Telecytology
EDUCATIONAL TELECONSULTATION SERVICES™





SonoPath.com
1-800-838-4268 info@sonopath.com

PATIENT
Holly Perket

SPECIES
Canine

BREED
Golden Retriever

SEX
FI

AGE
5 years

WEIGHT
57 lbs

INTERPRETED BY
Maggie Machen Lamy, DVM, DACVIM (Cardiology)

IMAGING PERFORMED BY
Kim Liedberg

HOSPITAL NAME
SVS Imaging WI

REFERRING VET
Dr. Bianco

INVOICE
24564

DATE
6/2/22

Maggie Machen Lamy, DVM
Diplomate of the American College of Veterinary Internal Medicine (Cardiology)
info@sonopath.com