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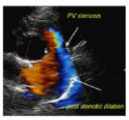
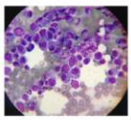
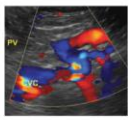

SonoPath
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PATIENT
Violet Drinkwater

SPECIES
Canine

BREED
Boston Terrier

SEX
Female Spayed

AGE
12.11 years

WEIGHT
19lbs

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

IMAGING PERFORMED BY
Tom McNeill

HOSPITAL NAME
SVS Imaging CT

REFERRING VET
Dr. Daggett

INVOICE
25033

DATE
6/29/22

PRESENTING CLINICAL SIGNS

History: Presented for respiratory distress. Has had a distended abdomen for awhile, and the owner noticed that it was firmer last night. Owner believes there is fluid in the abdomen. Violet had been diagnosed with a heart murmur within the last year, and since January, it has gotten worse. Violet hasn't eaten today which is unusual, drinking normal. She is active at night, barking often and gets worked up. No recent history of vomiting or diarrhea, urinating every 2 hours which is more than usual. Owner has noticed that Violet has gained weight. Violet is deaf and blind. She had a dental procedure this January and has cognitive dysfunction - on supplements for it.

ECHOCARDIOGRAM FINDINGS

2D, m-mode, color flow and doppler imaging is available. Mild diffuse thickening of mitral valve leaflets with no obvious prolapse into the left atrial lumen. No mitral regurgitation with a normal left atrial dimension. Normal LV diameter with adequate myocardial function. The tricuspid valve appears markedly thickened with septal prolapse, and there is moderate to severe tricuspid regurgitation. Severe right atrial enlargement; severe right ventricular dilation and hypertrophy. TR velocity supports moderate PAH, which is thought to be an underestimation. Subtle systolic flattening of the IVS consistent with pressure overload. The pulmonic and aortic valves are normal in morphology and mobility. Trace pulmonic insufficiency. MPA and branch dilation. Normal pulmonic and aortic outflow velocities. Scant pericardial and pleural effusion noted. No cardiac tumors observed.

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	NA	3.5	NM	1.3	41	80	NM
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	NM	0.7	0.4	21.3	1.8	2.2	1.3
*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

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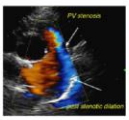
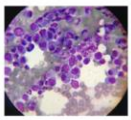
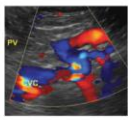

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INTERPRETATION OF THE FINDINGS & FURTHER RECOMMENDATIONS

Severe pulmonary hypertension (PAH) is present, as evidenced by significant TR, an elevated TR velocity and right heart changes. The estimated systolic pulmonary arterial pressure is >90mmHg, with normal being <25mmHg. This is causing severe hypertrophy and dilation of the right ventricle (indicating severe right-heart pressure overload). The left heart is essentially normal.

Clinical signs of weakness, heavy breathing, cyanosis, ascites and syncope are attributed to severe PAH. The underlying genesis of PAH is poorly understood in cases other than heartworm infestation, though it occurs with increased frequency in a variety of forms of chronic lung disease and in patients with idiopathic pulmonary fibrosis. If not performed, a heartworm antigen test is highly recommended. If any historical cough or respiratory issues, further workup/therapy may also be useful including bronchodilators, pulmonary antibiotics, etc.

Patients with this degree of PAH can develop right-sided congestive heart failure (ascites, pleural effusion) as is seen in this case, debilitating cyanosis/labored breathing and exertional syncope if poorly controlled. The prognosis is guarded to poor with an MST of <1 year after the onset of CHF, and respiratory disease may limit QOL if significant.

Medical management of PAH and CHF is indicated as below and initial therapeutic dosages are indicated. A therapeutic abdominocentesis is recommended if or when the patient is inappetant or uncomfortable going forward. Further respiratory therapy may also be warranted pending CXR results.

Omega fatty acid supplementation and mild salt restriction may be of some long-term benefit.

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

Anesthesia, fluid or steroid therapy should be avoided in this patient.

PLAN

Screening BP, CXR and HW Ag test. Institute sildenafil 1-2mg/kg PO TID. Institute spironolactone 1-2mg/kg PO BID. Institute furosemide 1-2mg/kg PO q12h. Institute pimobendan 0.3mg/kg PO BID. If BP >130mmHg, institute ACE-I (benazepril or enalapril) 0.5mg/kg PO BID. Consider abdominocentesis if indicated. Consider primary respiratory therapy if indicated.

Recommend renal panel and BP in 10-14 days, then every 3-4 months lifelong on diuretics.

Once stabilized, recommend recheck echocardiogram in 6 months to reassess structure and function, sooner if any development of clinical signs.

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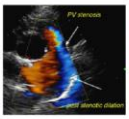
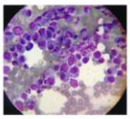
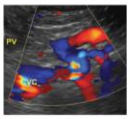

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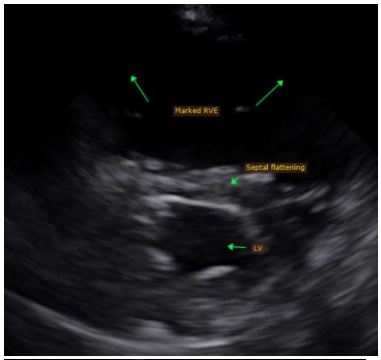

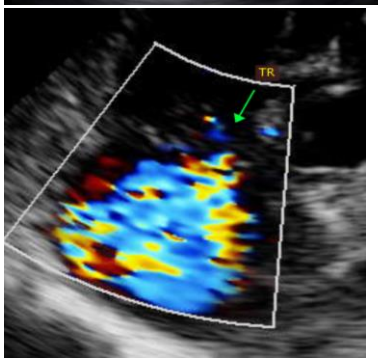

The information and recommendations provided are based on the images presented by the referring veterinarian. No evaluation can be communicated regarding pathology that was not visible in the image/video clips provided.

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.

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