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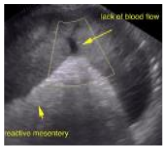
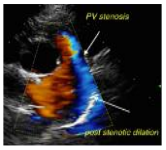
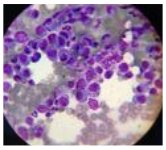
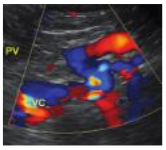

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PATIENT
Liri Nault

SPECIES
Canine

BREED
Chihuahua

SEX
Female Spayed

AGE
9 years

WEIGHT
6.6lbs

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

IMAGING PERFORMED BY
Alastair Westcott, DVM

HOSPITAL NAME
Alastair Westcott, DVM

REFERRING VET
Dr. Westcott

INVOICE
23286

DATE
3/25/22

PRESENTING CLINICAL SIGNS

History: Increasing weakness, exercise intolerance and dyspnea over past few days with the last 24 hours of very rapid breathing at home and now anorexic. A few short, coughing episodes. No historical or current heart murmur.
-Abnormal PE/Chem/CBC/UA Results: Mild elevation in ALKP Hyperglobulinemia with an elevated granulocyte count Increased RR and mild increase in inspiratory effort. No obvious cardiomegaly on radiographs. Interstitial bordering on alveolar edema in the perihilar and caudal lung fields.
-Current medications: Sildenafil 1mg/kg PO q8h. Single dose of 3mg/kg furosemide was administered.
-Sedation: Aggressive and intractable so required sedation IM with butorphanol/diazepam and alfaxalone.

ECHOCARDIOGRAM FINDINGS

2D, m-mode, color flow and doppler imaging is available. Mild thickening of mitral valve leaflets with mild prolapse into the left atrial lumen. Trace/mild mitral regurgitation with normal left atrial dimension. Decreased LV diameter with adequate myocardial function. The LV wall thickness appears increased. The tricuspid valve appears thickened with septal prolapse and mild to moderate tricuspid regurgitation. Mild right atrial enlargement; no right ventricular dilation with mild hypertrophy consistent with so degree pulmonary arterial hypertension. No systolic flattening appreciated. TR velocity consistent with pulmonary pressure gradient >100mmHg. The pulmonic and aortic valves are normal in morphology and mobility. Mild MPA and branch dilation. Mild pulmonic insufficiency. Normal pulmonic and aortic outflow velocities. No pericardial effusion noted. A very scant effusion is seen in the sub-costal views. 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	NM	5.1	NM	1.4	65	95	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	1.0	0.7	3.0	1.3	1.2	0.4
*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)
Adapted from June Boon, Veterinary Echocardiography, 1998				25	2.18 (2.4)	4.48 (2.9)	3.10 (2.5)
Rishniw M and Hollis NE, J Vet Intern Med 2000; 14:429-435				30	2.33 (3.3)	4.83 (3.9)	3.39 (3.4)
Hansson et al, Vet Rad and Ultrasound 2002				35	2.48 (4.3)	5.17 (5.0)	3.69 (4.5)
Bonagura et al. Echocardiography: principles of interpretation, Vet Clin North Am 15:1177, 1995				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)

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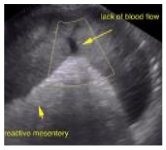

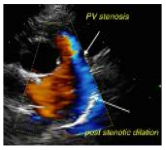

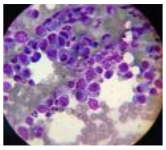
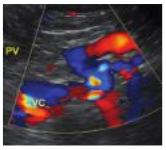

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INTERPRETATION OF THE FINDINGS & FURTHER RECOMMENDATIONS

Severe pulmonary hypertension (PAH) is present, as evidenced by an elevated TR velocity. The estimated systolic pulmonary arterial pressure is >100mmHg, with normal being <25mmHg. This is causing right heart changes (indicative of pressure overload). What is unusual is the overall right heart is not significantly enlarged with only mild hypertrophy and mild RA enlargement. This may reflect a more acute cause, such as a PTE. Additionally, the left heart has a volume underloaded appearance which may be further exacerbating the appearance of the right heart. This is likely due to a Lasix injection, in addition to possible underlying dehydration. Recheck renal values are recommended. A small mitral leak is also noted, which is clinically insignificant compared to the right heart. No additional issues are identified.

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 recommended. Given what is seen here, some acute chronic issues as a PTE is suspected, further historical respiratory information may be beneficial. Regardless, patients with this degree of PAH and pulmonary disease can develop right-sided congestive heart failure (ascites), debilitating cyanosis, labored breathing and exertional syncope if poorly controlled.

Given the recent history of respiratory signs, the most common cause is an infectious or inflammatory insult causing a decline in already poor oxygenation status. A PTE should also be considered, as was mentioned previously. Coverage with broad spectrum pulmonary antibiotic (fluoroquinolone) is recommended, in addition to aggressive vasodilation using pimobendan and sildenafil. **Recommend discontinue Lasix (even though scant effusion was appreciated), as this volume should not be contributing to current clinical issues and the patient appears dehydrated.** If the amount of effusion increases in the future, this may have to be revisited; however, patients with this degree of PAH do better without Lasix if possible. Continue hospitalization may be indicated depending on patient response to medications. Prognosis is guarded to poor, however if the patient can be stabilized hopefully, we can provide relief for a matter of months going forward.

Once stable, use of theophylline and/or taper course of anti-inflammatory steroids can also be beneficial in these cases, to treat exertional dyspnea or acute flare ups and decrease the inflammatory component as much as possible. PRN use of cough suppressants may also be beneficial. Unfortunately, the prognosis overall is poor, however I am hopeful we can provide some medical relief going forward.

Omega fatty acid supplementation (anti-inflammatory) may be of some long-term benefit. Monitor for worsening of labored breathing, exercise intolerance or collapse episodes.

PLAN

Continue hospitalization until stable on room air. Immediate reassessment of patient volume status is recommended. Discontinue diuretic. Institute course of pulmonary antibiotics (Enrofloxacin 5-7mg/kg PO q24h for 10 days). Institute sildenafil (Viagra) 1-2mg/kg PO q8h. Institute Pimobendan 0.3mg/kg PO q12h. Can also use hydrocodone and/or theophylline depending on chronic clinical signs of cough/exertional dyspnea.

Recommend recheck echocardiogram in 6 months to reassess pulmonary pressures, sooner if any development of clinical signs.

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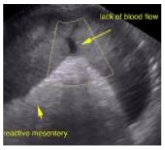
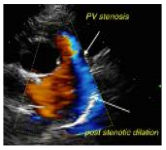
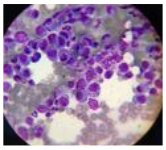
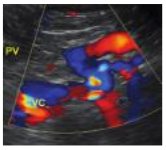

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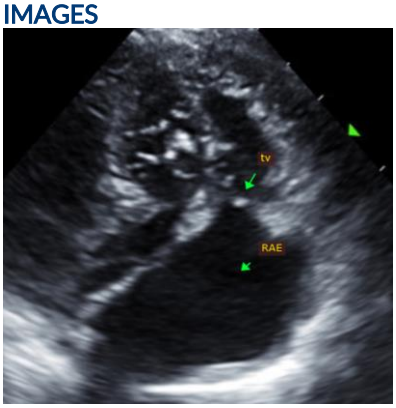
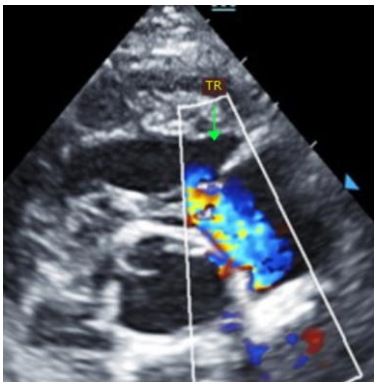
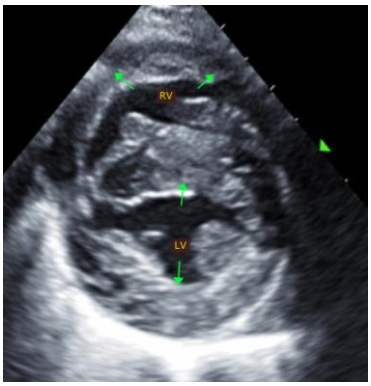
IMAGES







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. This report was generated using transcription software, and minor dictation errors may be present. 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