SonoPath
Clinical Sonography & Telecytology
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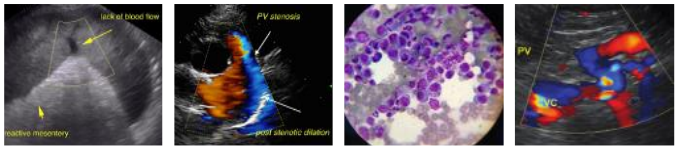

SonoPath.com
1-800-838-4268 info@sonopath.com

PATIENT
Izzy-Belle Duff

SPECIES
Canine

BREED
Shih Tzu

SEX
Female Spayed

AGE
15 years

WEIGHT
19lbs

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

IMAGING PERFORMED BY
Potomac Mobile Veterinary Ultrsound

HOSPITAL NAME
Banfield Sterling Cascades

REFERRING VET
Dr. Jarrett

INVOICE
21279

DATE
9/29/21

PRESENTING CLINICAL SIGNS

History: Presented yesterday for labored breathing/cough that continued through the weekend. Not eating much. Lethargic. Increased respiratory effort and abdominal breathing. RR 56.
-Abnormal PE/Chem/CBC/UA Results: Chem ALP 515, ALT 221 CBC WBC 17.9, Ne 13.8, Hgb 18.5, HCT 57%

RADIOGRAPHIC FINDINGS *NOTE: Images submitted for supplemental cardiac information only.

Severe right-sided cardiomegaly with a bulge in the region of the heart base/great vessels. No obvious evidence of CHF.

ECHOCARDIOGRAM FINDINGS

2D, m-mode, color flow and doppler imaging is available. Diffuse thickening of mitral valve leaflets with no obvious prolapse into the left atrial lumen. No mitral regurgitation with no left atrial enlargement. Decreased LV diameter with increased wall dimensions consistent with pseudohypertrophy. Adequate systolic function. The tricuspid valve appears mildly thickened with severe tricuspid regurgitation. Severely elevated TR velocity. Severe right atrial enlargement; severe right ventricular dilation and hypertrophy consistent with severe pulmonary arterial hypertension. The pulmonic and aortic valves are normal in morphology and mobility. Main PA and branch dilation. Decreased pulmonic and aortic outflow velocities. Mild to moderate pulmonic insufficiency. Normal pulmonic valve. No pericardial or 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	4.7	NM	1.2	41	76	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	160	1.4	0.5	8.6	1.8	1.6	0.9
*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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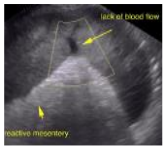
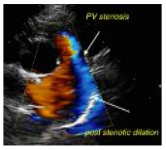
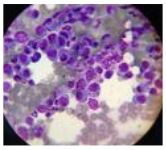
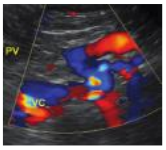

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INTERPRETATION OF THE FINDINGS & FURTHER RECOMMENDATIONS

Severe pulmonary hypertension (PAH) is present, as evidenced by significant right heart enlargement and an elevated TR velocity. The estimated systolic pulmonary arterial pressure is >100mmHg, with normal being <25mmHg. This is causing severe hypertrophy and dilation of the right ventricle (indicating severe right-heart pressure overload). Clinical signs of weakness, heavy breathing, cyanosis, and syncope are attributed to severe PAH. The LV is also significantly volume underloaded, resulting in pseudohypertrophy due to dehydration. No additional valve leaks are seen, and no effusions seen.

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 the chronicity of the disease seen here, a chronic process such as COPD/chronic bronchitis or primary PH as an underlying issue with an acute secondary exacerbating insult (infectious or inflammatory) is suspected. 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 acute respiratory signs, the most common cause is an infectious or inflammatory insult causing a decline in already poor oxygenation status. A PTE cannot be entirely ruled out, however is unlikely due to the severity of chronic RV changes. Coverage with broad spectrum pulmonary antibiotic is recommended, in addition to aggressive vasodilation using pimobendan and sildenafil. Lasix/ACE-I should not be utilized as diuretics can actually further reduce preload in cases of debilitating PAH and worsen clinical signs. Specifically in this case the LV is quite volume underloaded and may have contributed to acute decompensation and hypotension. Fluid therapy is advised if the patient is hospitalized. Consider hospitalization for oxygen support and IV therapy is recommended. Depending on stability, can also consider anti-inflammatory steroids, bronchodilators, etc. in an attempt to stabilize in the acute scenario as needed. Prognosis is poor, however if the patient can be stabilized hopefully, we can provide relief for a matter of months going forward. If the patient remains oxygen dependent for any length of time, however, recommend consider euthanasia due to poor prognosis.

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.

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:

Consider hospitalization for O2 support/stabilization. Do not use diuretic/ACE-I and consider fluid resuscitation. Institute Baytril or similar +/- oxygen for supportive care. Institute sildenafil (Viagra) 1-2mg/kg PO q8h. Institute Pimobendan 0.3mg/kg PO q12h. Bronchodilators, steroids, etc. as needed.

Recommend recheck echocardiogram in 4-6 months to reassess pulmonary pressures, sooner if any development of clinical signs.

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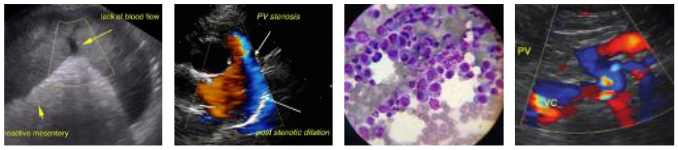

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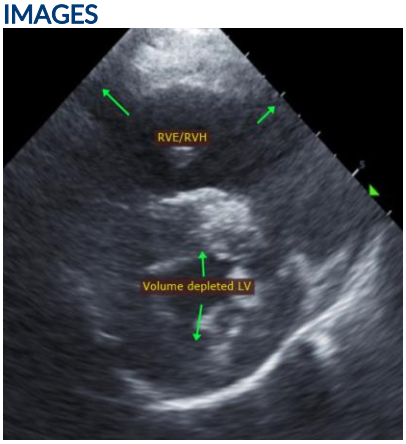
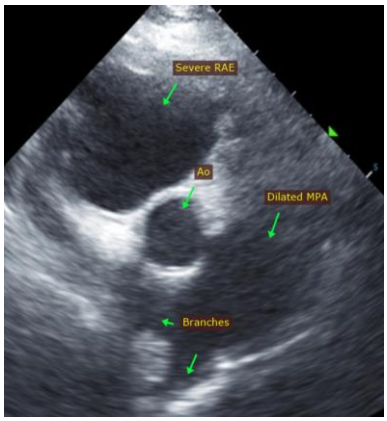
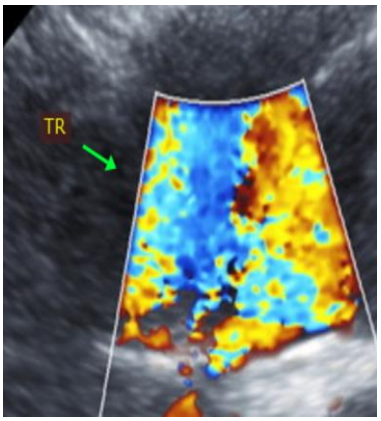
IMAGES







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)
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