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Clinical Sonography & Telecytology
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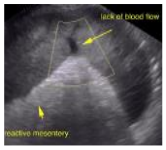
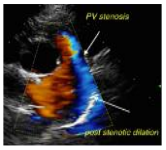
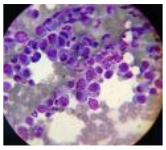
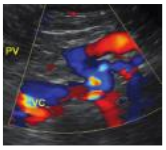

SonoPath.com
1-800-838-4268 info@sonopath.com

PATIENT
Gizmo Woodby

SPECIES
Canine

BREED
Shih Tzu

SEX
Male Intact

AGE
13 years

WEIGHT
17.8lbs

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

IMAGING PERFORMED BY
Potomac Mobile Veterinary Ultrsound

HOSPITAL NAME
NOVA Pets Health Center

REFERRING VET
Dr. Jarrett

INVOICE
22258

DATE
12/2/21

PRESENTING CLINICAL SIGNS

History: Has been coughing for more than 2 months. Six months ago, diagnosed with bronchopneumonia. Productive cough, coughing all day. Had chest rads done, sent to a radiologist, who reported the coughing was likely due to a combination of early cardiac enlargement secondary to mild mitral insufficiency and chronic bronchitis with mild bronchiectasis. No evidence of pulmonary edema at this time. Sedated with torbugesic as severe coughing prevented getting any views performed.
-Abnormal PE/Chem/CBC/UA Results: ALP 140, BUN 55, Creat 3.3, Glucose 63, Ca 13.7, Chol 386, precision PLS 167, platelet 446.

ECHOCARDIOGRAM FINDINGS

2D, m-mode, color flow and doppler imaging is available. Mild thickening of mitral valve leaflets with no obvious prolapse into the left atrial lumen. Mild mitral regurgitation with minimal left atrial dilation. Normal MR velocity. Decreased LV diameter with adequate myocardial function. Septal flattening in systole. The tricuspid valve appears thickened with severe tricuspid regurgitation. Moderate right atrial enlargement; moderate right ventricular hypertrophy consistent with severe pulmonary arterial hypertension. TR velocity consistent with pulmonary pressure gradient >90mmHg. The pulmonic and aortic valves are normal in morphology and mobility. Main PA and branch dilation. Trace pulmonic and no aortic insufficiency. 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	5.5	4.8	1.3	1.3	33	60	0.14
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	1.4	0.81	8.1	1.9	1.5	1.0
*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

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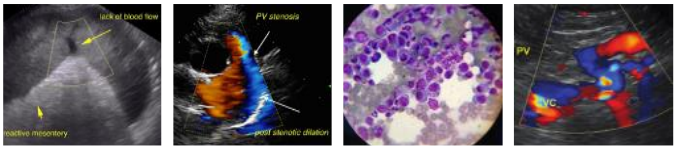

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INTERPRETATION OF THE FINDINGS & FURTHER RECOMMENDATIONS

Severe pulmonary hypertension (PAH) is present, as evidenced by an elevated TR velocity and right heart enlargement. The estimated systolic pulmonary arterial pressure is >90mmHg, with normal being <25mmHg. This is causing significant hypertrophy and dilation of the right heart (indicating severe right-heart pressure overload). Clinical signs of weakness, heavy breathing, cyanosis, and syncope are attributed to severe PAH. Mild MR is likely consistent with early valve disease; however, the LA is unremarkable at this time. 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 the chronic cough and degree of the disease seen here, COPD/chronic bronchitis and/or primary PF as an underlying cause 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 a chronic cough, recommend coverage with a board-spectrum pulmonary antibiotic as below to treat any infectious component. Additionally, aggressive vasodilation using pimobendan and sildenafil is recommended. No indication for Lasix therapy as diuretics can actually further reduce preload in cases of debilitating PAH and worsen clinical signs. Depending on severity of symptom, can also consider anti-inflammatory steroids, bronchodilators, etc. The best way to slow progression in PAH is adequate cough control, and cannot be stressed enough. Long term prognosis is poor, with risk for acute respiratory compromise, syncope and/or sudden death 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.

Once on the medications for 3-5 days, anesthetic risk remains moderately elevated. Patient's with respiratory disease are at risk for hypoxia both during and after the event, and pre-oxygenating for 5-10 minutes is recommended. Additionally, recovery in an oxygen chamber is ideal. Cardiac protective drug choices (opioid/benzodiazepine premedication, Propofol or alfaxalone induction, iso or sevo gas) are recommended. Monitor for arrhythmias, hypotension, and hypoxia both intra and post-operatively and intervene as necessary. Judicious IV fluid rates are recommended to avoid fluid overload. Avoid heart rate stimulating drugs such as atropine unless clinically indicated.

PLAN

Institute 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. Bronchodilators, steroids, etc. as needed.

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

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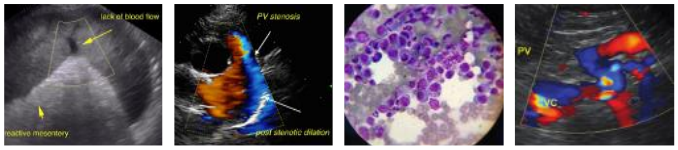

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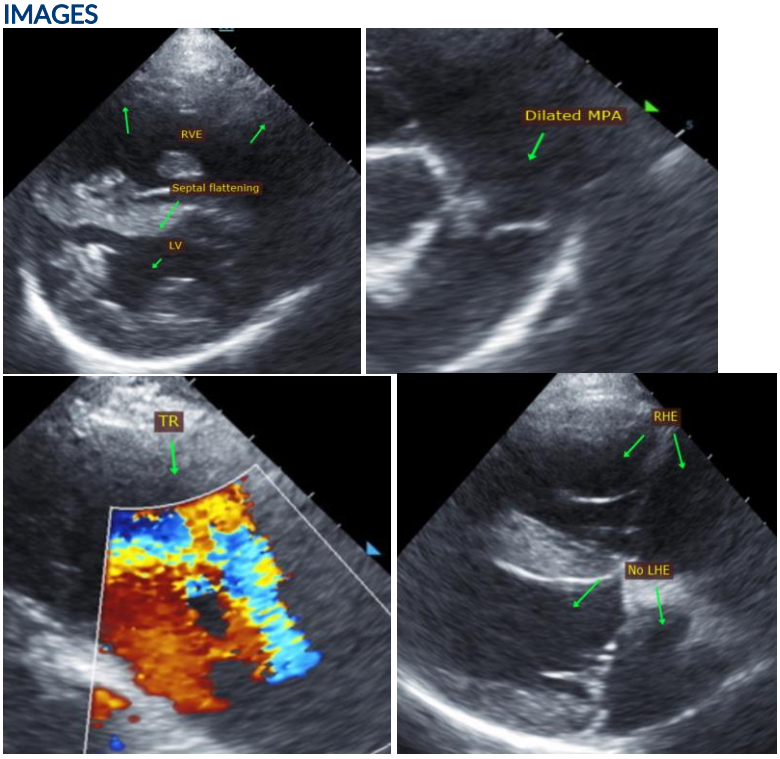
IMAGES



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