



PATIENT

Bruzer Santillanes

SPECIES

Canine

BREED

Chihuahua

SEX

Male Neutered

AGE

15 years

WEIGHT

6.9lbs

INTERPRETED BY

Maggie Machen Lamy,
DVM, DACVIM
(Cardiology)

IMAGING PERFORMED BY

Dana Alterman,
RDCS, LVT

HOSPITAL NAME

Eubank Animal Clinic

REFERRING VET

Dr. Barnes

INVOICE

22554

DATE

2/14/22

PRESENTING CLINICAL SIGNS

History: Murmur, grade 5/6 left systolic. Multiple episodes of syncope daily despite furosemide, pimobendan and sildenafil. Suspect early CHF. Persistently tachycardic ~174bpm. Had course of Clavamox + Baytril.

-Abnormal PE/Chem/CBC/UA Results: Azotemic prior to furosemide, BUN 39 creat 2.2.

ELECTROCARDIOGRAPHIC FINDINGS *Note: Single lead ECGs are evaluated as a rhythm strip. Morphology/MEA cannot be definitively commented on.

A single lead ECG is available; 50mm/s, 20mm/mV. The average heart rate is 165bpm with a largely regular rhythm. The rhythm is sinus in origin, with a p for every QRS complex and vice versa. The P morphology is positive. The QRS is inverted. No ectopic beats, pauses or other dysrhythmias observed.

ECG diagnosis: Normal sinus tachycardia.

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. Mild mitral regurgitation with normal left atrial dimension. Decreased LV diameter with adequate myocardial function. Increased LV wall thickness. The tricuspid valve appears mildly thickened with mild tricuspid regurgitation. Velocity consistent with severe pulmonary hypertension. Moderate right atrial enlargement; significant right ventricular dilation and hypertrophy consistent with pulmonary arterial hypertension. Subtle systolic flattening of the IVS consistent with pressure overload. The pulmonic and aortic valves are normal in morphology and mobility. Mild MPA and branch dilation. No obvious pulmonic or aortic insufficiency. Normal pulmonic and aortic outflow velocities. 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	5.2	5.1	NM	1.4	70	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	1.1	0.5	3.1	1.4	1.7	0.5
*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)
<i>*Note: All measurements based upon multi-modal images and methods. An average value is reported.</i>				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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INTERPRETATION OF THE FINDINGS & FURTHER RECOMMENDATIONS

The primary abnormality identified is severe pulmonary hypertension (PAH), as evidenced by an elevated TR velocity and significant right heart compensatory changes. The estimated systolic pulmonary arterial pressure is >100mmHg, with normal being <25mmHg. The degree of hypertrophy and dilation of the right ventricle and MPA is indicative of severe right-heart pressure overload. Of additional great concern, the left heart appears volume depleted with a small dimension and increased wall thickness. This is suspected to reflect severe dehydration/volume depletion (particularly given azotemia prior to Lasix) and **baseline lab work is recommended imminently**. There is also mild mitral regurgitation; however, this appears well compensated for at this time. The ECG is unremarkable with a normal sinus tachycardia.

Clinical signs of weakness, heavy breathing, cyanosis, 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. Given the breed, chest x-rays are recommended with further respiratory historical information if available. This signalment is predisposed to chronic lower airway disease and if present the cough should also be addressed. Patients with this degree of PAH can develop right-sided congestive heart failure (ascites), debilitating cyanosis, labored breathing and exertional syncope if poorly controlled.

Given reported syncope, medical management with Pimobendan and Sildenafil is certainly indicated as below. **Lasix should be discontinued**, as the risk for CHF is low at this time and diuretics can further decrease preload in patients with pulmonary hypertension. **Highly recommend fluid resuscitation if azotemia is significant, as this can also contribute to syncope and tachycardia**. As mentioned previously, adequate cough control is also key to managing these cases if present.

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 improved 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:

Discontinue Lasix. Renal panel ASAP. Consider fluid therapy as discussed. Baseline BP as discussed. Institute sildenafil 1-2mg/kg PO q8h. Institute Pimobendan at 0.3mg/kg PO q12h. Consider ancillary respiratory therapy if indicated by baseline chest radiographs and clinical signs. Fluid resuscitation is indicated if significant azotemia.

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



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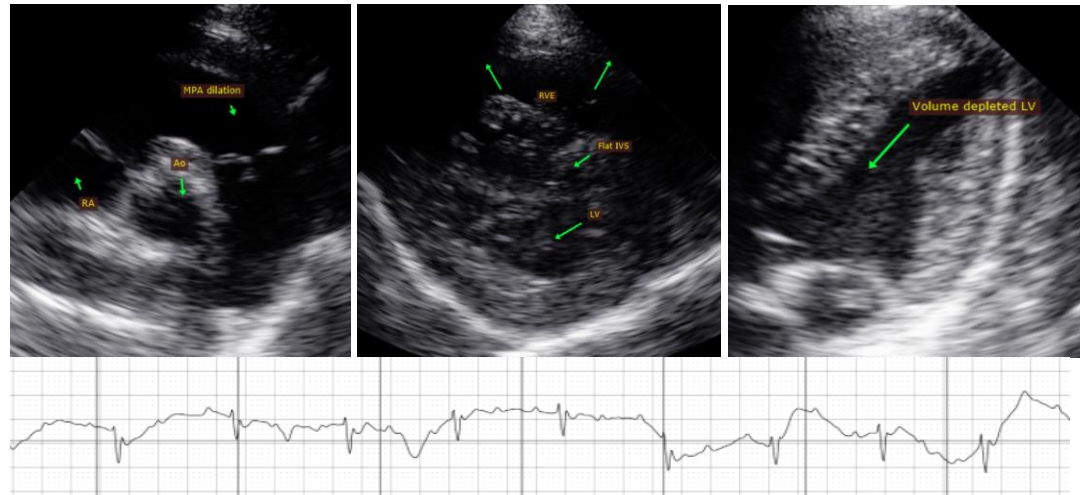
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IMAGES



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
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