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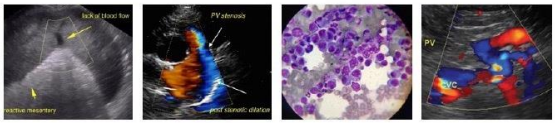

THE FOCAL ZONE
IMAGING PERFORMED BY
289-808-2608 info@thefocalzone.com

PATIENT
Pugsly Bonomo

SPECIES
Canine

BREED
Pug

SEX
Male Neutered

AGE
10 years

WEIGHT
15lbs

INTERPRETED BY
Maggie Machen Lamy, DVM DACVIM (Cardiology)

IMAGING PERFORMED BY
Kelly Reschny, RVT

HOSPITAL NAME
Millen Road Animal Hospital

REFERRING VET
Dr. Sandhu

INVOICE
29695

DATE
3/20/23

PRESENTING CLINICAL SIGNS

History: Repeated syncopal episodes. History of chronic cough and COPD. No murmur detected. Enlarged heart on radiographs.
-Current medications: Furosemide, Benazepril, Theophylline.

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. No mitral regurgitation with no left atrial dilation. Normal to decreased LV diameter with adequate myocardial function. The tricuspid valve appears thickened with moderate tricuspid regurgitation. Moderate right atrial enlargement; moderate right ventricular hypertrophy and enlargement consistent with severe pulmonary arterial hypertension. TR velocity is suspected to be an underestimation. The pulmonic and aortic valves are normal in morphology and mobility. Main PA and branch dilation. Normal pulmonic and aortic outflow velocities. Mild pulmonic 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	NM	>4.0	1.1	1.3	43	77	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	110	1.1	1.0	6.8	1.6	2.2	1.2
*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)

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 >80mmHg, with normal being <25mmHg. This is causing significant hypertrophy and dilation of the right heart (indicating severe right-heart pressure overload). No additional valve leaks are seen, and left heart dimensions are normal.

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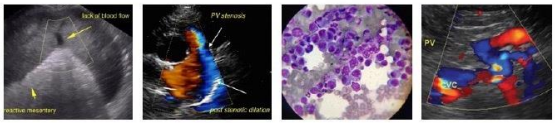

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Clinical signs of weakness, heavy breathing, cyanosis, and syncope are attributed to severe PAH. The underlying genesis of PAH is poorly understood in cases other than heartworm infestation, though it occurs with increased frequency in a variety of forms of **chronic lung disease** and in patients with idiopathic pulmonary fibrosis. If not performed, a heartworm antigen test is recommended. Given the chronicity of the cough in this patient, COPD/chronic bronchitis and/or primary PF as an underlying cause 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 chronic cough, upper and lower airway disease is suspected although a Radiologist review of the films may be useful. Left-sided CHF is ruled out, and **Lasix/ACEI can and should be discontinued as diuretics can actually further reduce preload in cases of debilitating PAH and worsen clinical signs.** Depending on current clinical signs (only a chronic cough and syncope reported), can also consider anti-inflammatory steroids, bronchodilators, etc. as needed. Continuing theophylline is reasonable, assuming there is clinical benefit. It is important to note that the PAH does not cause the cough; rather it develops secondary to the cough. Adequate cough control is therefore of the utmost importance in case management. Long-term prognosis is guarded to poor; however, if the patient's symptoms can be managed successfully, we can provide relief for some time going forward.

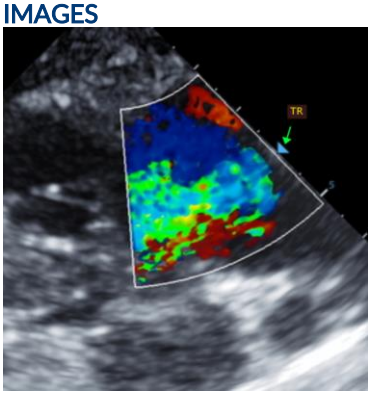
Omega fatty acid supplementation (anti-inflammatory) may be of some long-term benefit. Monitor for worsening of labored breathing, exercise intolerance or collapse episodes.

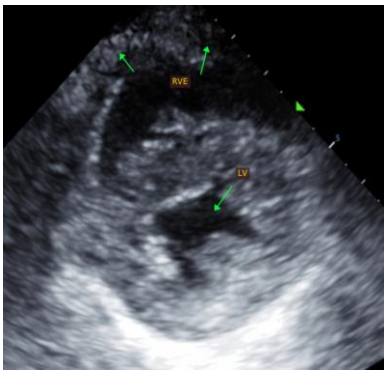
PLAN

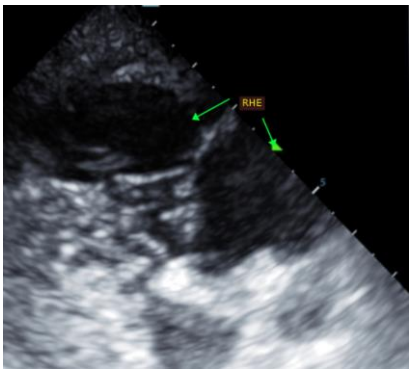
Continue Theophylline. Institute sildenafil (Viagra) 1-2mg/kg PO q8h. Institute Pimobendan 0.3mg/kg PO q12h. Discontinue Lasix and Enalapril therapy as discussed. Bronchodilators, cough suppressants, steroids, etc. as needed.

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

IMAGES







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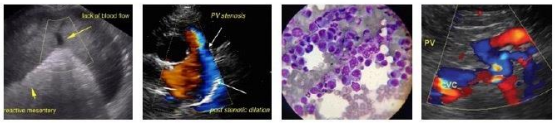

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The information and recommendations provided are based on the images presented by the referring veterinarian. No evaluation can be communicated regarding pathology that was not visible in the image/video clips provided.

Thank you for this referral. 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