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Clinical Sonography & Telecytology
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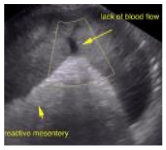
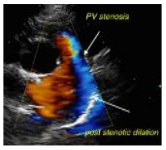
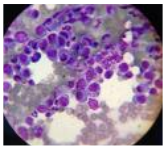
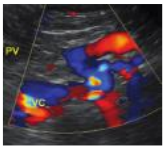

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PATIENT
Eddie Bickerton

SPECIES
Canine

BREED
Mix

SEX
Male Neutered

AGE
9 years

WEIGHT
17kgs

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

IMAGING PERFORMED BY
Dr. Mark vanCampen

HOSPITAL NAME
Mississippi Mills AH

REFERRING VET
Dr. vanCampen

INVOICE
22791

DATE
2/24/22

PRESENTING CLINICAL SIGNS

History: Diagnosed with PS and AS as a puppy. Grade V/VI systolic HM since this time - no other clinical signs previously. 1 week lethargy - one collapsing episode, Chlylothorax present 1 week, VI/VI HM today. Drained 2L chyle 1 week ago, another 2L today. Systolic BP after drainage was 120 mmHg.
Abnormal PE/Chem/CBC/UA Results: Chylous effusion. -see cytology report Mild lymphopenia Chem all WNLs Abdominal ultrasound WNL except some CVC dilation, Thorax - no obvious masses - large volume of hypoechoic fluid
Pertinent previous echo findings (7mo old): PS PG 50mmHg; AS PG 25mmHg

ECHOCARDIOGRAM FINDINGS

2D, m-mode, color flow and doppler imaging is available. Normal mitral valve leaflets with no obvious prolapse into the left atrial lumen. Mild central mitral regurgitation. Mild left atrial dilation. Decreased LV diameter with normal myocardial function. The LV wall thickness is increased (1.0cm globally). The tricuspid valve appears normal with no significant tricuspid regurgitation present. Mild right atrial dilation. Moderate right ventricular hypertrophy and remodeling indicative of pressure overload; decreased RV chamber dimension. Moderate elevation of pulmonic outflow velocities at the level of the valve. The PV leaflets are elongated and tethered. Mild post-stenotic dilation of the main pulmonary artery. Mild pulmonic insufficiency. The aortic valve is markedly thickened with moderate stenosis. The ascending segment of the aorta is significantly dilated. Severe AI. No obvious cardiac shunts are visualized. No pericardial or pleural effusion noted.

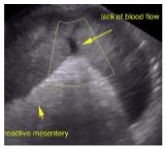
CARDIAC CHART

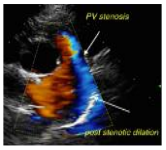
CANINE CARDIAC PARAMETERS	MR VMAX (m/s)	TR VMAX (m/s)	LA/AO (Boon method)	LA/AO (Heart Base; Swe)	FS (%)	EF (%)	EPSS (cm)
NORMAL PARAMETER	4.5-5.5	<2.7	1.3	<1.6	28-40	40-100	<0.6
PATIENT	6.9	NA	NM	1.4	50	92	NM
CANINE CARDIAC PARAMETERS	**HR** (BPM)	**AV VMAX** (m/s)	**PV MAX** (m/s)	**BODY WEIGHT** (kg)	**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	4.5	3.9	17	2.8	3.0	1.5
*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)
**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)

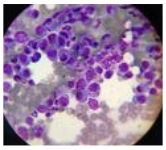
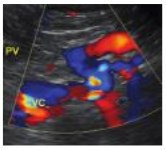
Adapted from June Boon, Veterinary Echocardiography, 1998
Rishniw M and Hollis NE, J Vet Intern Med 2000; 14:429-435
Hansson et al, Vet Rad and Ultrasound 2002
Bonagura et al. Echocardiography: principles of interpretation, Vet Clin North Am 15:1177, 1995

INTERPRETATION OF THE FINDINGS & FURTHER RECOMMENDATIONS

Congenital malformation of the aortic and pulmonic valves persists. Moderate PS is largely unchanged compared to what was described on the initial exam, with secondary right heart





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changes. There is also moderate aortic stenosis which was previously described as mild. The aortic leak is severe and the valve morphology highly abnormal, which likely reflects chronic damage to the valve over time. An additional acquired stenosis cannot be ruled out; however, is exceedingly rare in small animals.

Both PS and AS can progress up to a year of age, which is suspected in this case. Additionally, volume changes can affect the pressure gradient/flow through the great vessels. In this case with marked pleural effusion and signs of volume depletion (small LV/RV, some component of pseudohypertrophy) which is likely contributing to these findings. The aorta is dilated past the level of the valve, which can certainly be seen with AS. That being said, the degree of dilation is more than is typically expected and other possibilities should be considered. Rule outs include SHT (not present), coarctation of the aorta (distal narrowing), annuloaortic ectasia (dilation due to Marfan-like syndrome), aortic dissection (unlikely), normal variant, other. Although the reported BP is normal, consider a screening BP on both the forelimbs and pelvic limbs to assess for discrepancy. If systemic pressures are normal and consistent cranial and caudal, coarctation is considered unlikely. Regardless, the patient may have increased risk for aortic aneursym/rupture and sudden death in the future. Advanced imaging can also be considered, to rule out the listed abnormalities and assess risk. The possibility of a normal variant remains.

All of these findings are suspected to be unrelated to the current issue of a chylothorax. There is no obvious correlation between the structural disease and this development, although advanced thoracic imaging (such as a thoracic CT scan) would be suggested to fully understand the anatomy prior to proceeding with any surgical correction. As an additional issue, anesthesia must be approached carefully in this case with risk for complication. Recommendations are as follows: Anesthetic risk is mild to moderate at this time and a facility with an Anesthesiologist should be considered. **Avoid heart rate stimulating drugs such as atropine or glycopyrrolate unless absolutely necessary**. Avoid vasodilators such as acepromazine. Mild IV fluid restriction is advised. Cardiac protective drug choices (opioid/benzodiazepine premedication, propofol or alfaxalone induction, isoflurane gas) are recommended. Pre-oxygenate for 5-10 minutes prior to induction and recover in O2 if possible. Monitor for arrhythmias, hypotension, and hypoxia both intra and post-operatively and intervene as necessary.

Monitor for development of associated clinical signs (collapse, abdominal distention, cough, labored breathing). **Mild exercise restriction is advised.** Omega fatty acid supplementation may have some long term benefit, given these cases are predisposed to development of arrhythmias going forward.

Plan: Consider referral for thoracic CT. No obvious indication for medications at this time; however, reassessing the patient's structure and gradients once volume corrected may lead to institution of atenolol. A brief echocardiogram is recommended at least 2 weeks following resolution of effusion/surgical correction to reestablish a baseline.

Recommend recheck echocardiogram in 6-12 months to assess for progression, response to medication.

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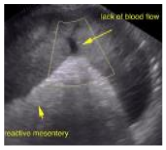
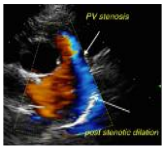
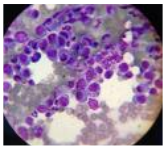
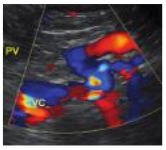

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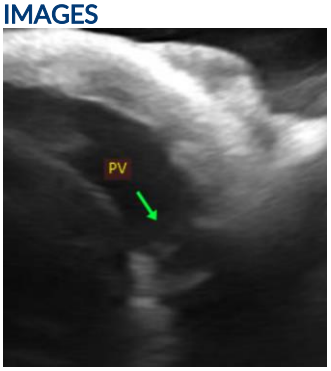
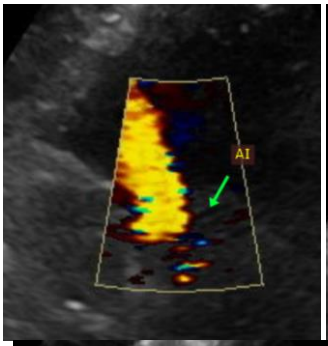
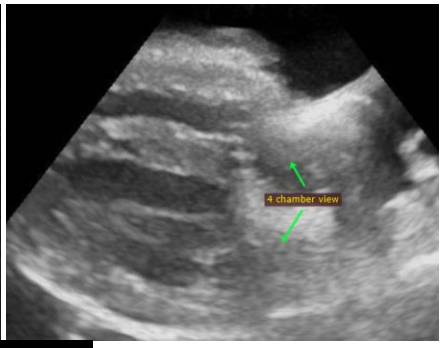
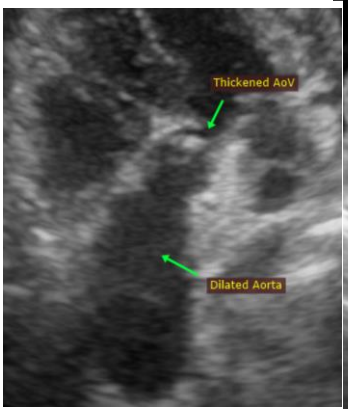
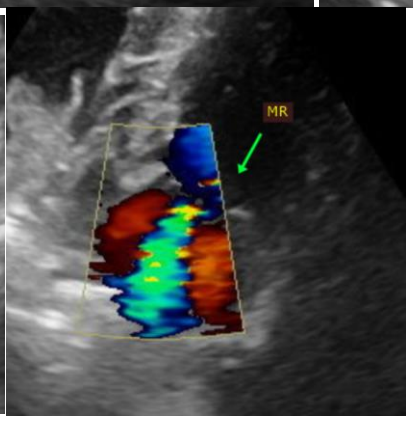
IMAGES











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