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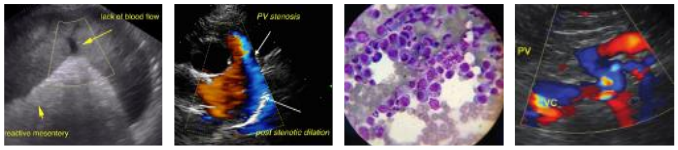

PATIENT
Frank Hogge

SPECIES
Canine

BREED
Husky

SEX
Male

AGE
11 weeks

WEIGHT
11.7lbs

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

IMAGING PERFORMED BY
A. Carver, DVM

HOSPITAL NAME
Red River Animal Emergency Hospital aned Referral Center

REFERRING VET
Dr. Carver

INVOICE
28974

DATE
2/14/23

PRESENTING CLINICAL SIGNS

History: DVM noted systolic heart murmur at recent wellness visit. They have owned the puppy for just over a week and since acquiring him he has been lethargic and low energy with a reduced appetite the entire time. No syncope, no respiratory symptoms.
-Abnormal PE/Chem/CBC/UA Results: Grade 4 basilar systolic murmur slightly more intense on right basilar. Mild non-regen anemia. Doppler BP 104mmHg. slightly thin BCS otherwise unremarkable PE as mm were pink, normal pulse quality and no deficits, no differential cyanosis noted. He had chest radiographs recently that showed cardiomegaly but normal vessels and no pulmonary changes.

ECHOCARDIOGRAM FINDINGS

2D, m-mode, color flow and doppler imaging is available. The mitral valve appears thickened with abnormal motion in systole. Mild mitral regurgitation. Mild left atrial enlargement. Decreased LV diameter with adequate myocardial function. Severe LV hypertrophy (0.9cm globally). A large ventricular septal defect is identified. VSD flow appears primarily left to right, although low velocity is suspected (max is not measured). The tricuspid valve appears normal with trace tricuspid regurgitation. The right atrium is mildly enlarged. The right ventricle is moderate to severely enlarged with significant hypertrophy consistent with pressure overload. The pulmonic valve appears thickened with abnormal motion consistent with pulmonic stenosis. Pressure gradient is moderately elevated, thought to be mild underestimation. Significant post stenotic dilation. Trace pulmonic insufficiency. The aortic valve appears normal, although not extensively visualized. The LVOT is not visualized; however, stenosis is suspected. The aortic root is over-riding the IVS. No pericardial or pleural effusion noted. No obvious cardiac masses.

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	NM	NM	1.2	44	79	NM
CANINE CARDIAC PARAMETERS	**HR** (BPM)	**AV VMAX** (m/s)	**PV MAX** (m/s)	**BODY WEIGHT** (kg)	**LA** 2D short axis Base view (cm)l	**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	2.7	4.4	5.3	1.7	1.5	0.7
*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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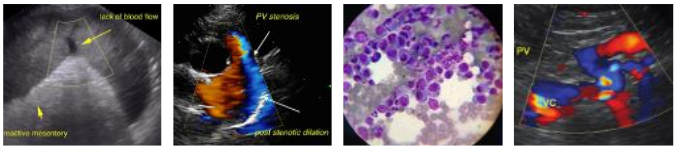

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INTERPRETATION OF THE FINDINGS & FURTHER RECOMMENDATIONS

Complex congenital heart disease is present, with both a VSD and significant pulmonic stenosis. This is likely a form of Tetralogy of Fallot (TOF) with an overriding aorta. The PS is primarily valvular; however, a dynamic sub or supravalvular component is not entirely ruled out. The VSD appears mostly left to right; however, the velocity is concerning for shunt reversal in the future. Of additional great concern, the LV is severely hypertrophied with mitral valve dysplasia and a suspect outflow tract obstruction. A primary SAS is not ruled out and may also be contributing. No additional congenital defects are observed; however, it is important to note that small changes are easily missed particularly given the degree of abnormality on this cardiac exam.

Given the complexity of the findings, **highly recommend referral to an attending Cardiologist in this case for advanced echocardiography and conformation of the diagnosis**. Surgical options can be discussed, such as balloon valvuloplasty, although long-term benefit would be questionable in this case. If referral is declined, recommend medical management with Atenolol as pulmonic and LVOT stenosis are at least for now is the most significant issue. This should not be instituted until at least 4-6 months of age however, and only if referral is declined. No additional medications are clearly indicated at this time in this young puppy.

Assessment of progression in the future will help predict long term prognosis, which is guarded to poor going forward. There is a chance that the combination of right-sided issues may remain stable for some time; however, the patient will always be at risk for progression to right-sided CHF, symptoms of hypoxia, polycythemia, etc. with shunt reversal. Arrhythmias/collapse and/or sudden death is also a possibility lifelong. Hypoxic heart disease will often present as marked exercise intolerance, cyanosis and syncope at home, and monitoring is advised.

Omega fatty acid supplementation and mild salt restriction may be of some long-term benefit. Lifelong activity restriction is advised. Elective anesthesia is not advised. If necessary, referral to a facility with an Anesthesiologist should be considered.

Monitor for development of a cough, labored breathing, abdominal distention, exercise intolerance or collapse episodes.

PLAN

Highly recommend referral to a local Cardiologist. If declined and once the puppy is 6 months old, institute lose dose Atenolol 1-2mg/kg PO q24h (compounded liquid solution recommended). Up-titrate to effect; and target heart rate is <140bpm in hospital. A baseline PCV, BP and ECG are recommended q6-12mo.

Recommend conservative monitoring with a recheck echocardiogram in 6 months, sooner if any development of clinical signs.

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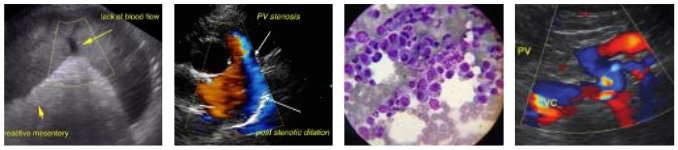

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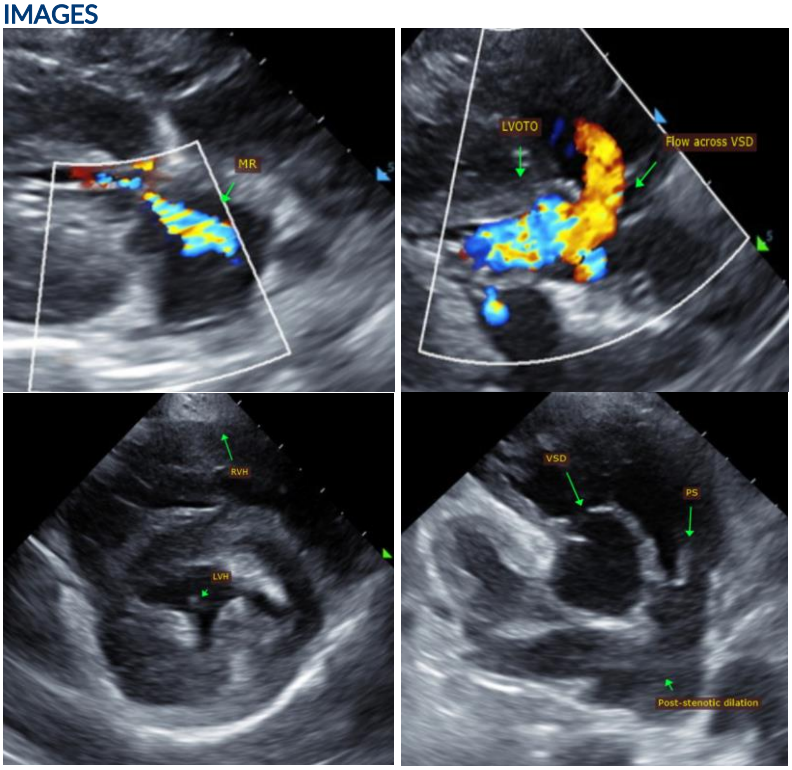
IMAGES



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