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Clinical Sonography & Telecytology
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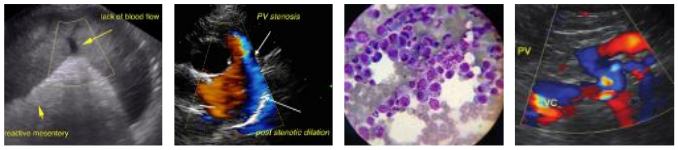

PATIENT
Duke Foster

SPECIES
Canine

BREED
Husky

SEX
Male Neutered

AGE
11 years

WEIGHT
79lbs

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

IMAGING PERFORMED BY
Dana Alterman, RDCS, LVT

HOSPITAL NAME
Eubank Animal Clinic

REFERRING VET
Dr. Smith

INVOICE
23849

DATE
4/25/22

PRESENTING CLINICAL SIGNS
History: Left and right-sided murmur. On fluconazole. Mild elevation of ALT, AST + ALKP.

RADIOGRAPHIC FINDINGS *NOTE: Images submitted for supplemental cardiac information only.
Normal cardiac silhouette. No obvious evidence of CHF.

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 60bpm (range 40-78bpm). P waves cannot be visualized throughout; however, this may be due to device insensitivity. P for every QRS complex and vice versa. The P and QRS morphologies are positive. No ectopic beats, pauses or other dysrhythmias observed.
ECG diagnosis: Suspect profound sinus bradycardia.

ECHOCARDIOGRAM FINDINGS
2D, m-mode, color flow and doppler imaging is available. Mild mitral valve leaflet thickening with no obvious prolapse into the left atrial lumen. No mitral regurgitation is identified. Mild LA enlargement. Mild LV dilation with adequate myocardial function. The tricuspid valve appears subjectively normal. No TR. The right heart is normal. No overt evidence of pulmonary arterial hypertension. The pulmonic and aortic valves are normal in morphology and mobility. No aortic abnormalities identified, with normal outflow velocity. Normal pulmonic outflow velocities. No aortic insufficiency. No 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	NA	NA	NM	1.5	40	72	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	1.2	1.0	35.8	3.8	5.5	3.3
*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 *Note: All measurements based upon multi-modal images and methods. An average value is reported.*				5	1.40 (4.5)	2.74 (5.2)	1.60 (4.7)
				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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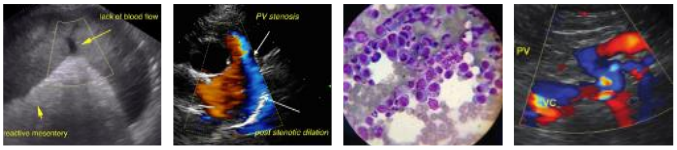

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INTERPRETATION OF THE FINDINGS & FURTHER RECOMMENDATIONS

Overtly normal cardiac structure and function with no cause of a murmur identified. The only abnormality identified is mild LA and LV enlargement, which is of unknown significance (rule out a normal variant versus emerging underlying pathology). No significant valvular insufficiencies were noted, and no structural issues identified. In the absence of significant volume changes (dehydration) or anemia, other possibilities include a physiologic flow murmur only present with elevated heart rates, or a small flow abnormality not seen here. It is reasonable to monitor periodically via recheck echocardiography in the future, particularly should the murmur persist/progress.

The ECG does show a significant bradycardia with an average heart rate of <60bpm. There is also some irregularity to the rate and rhythm, which may suggest respiratory variation; however, correlation with respiratory cycle is necessary. If the pattern does not follow respiratory phase however (i.e., increased HR with inspiration, decrease with expiration), sinus node dysfunction would be the other possibility. P waves cannot be identified; however, this may simply be due to device insensitive. An atropine challenge should be utilized to determine health of conduction system and confirm suspected high vagal tone (0.04mg/kg IV or IM; monitor for significant HR increase that is sustained for 10+ minutes). If abnormal, referral to a local Cardiologist is highly recommended for further evaluation, holter monitor, etc.

Pending a normal atropine challenge, the bradycardia/high vagal tone would be considered secondary rather than a primary issue. In a senior dog, primary causes of high vagal tone that can also lead to lethargy should be considered including neurologic disease, respiratory disease, etc.

No cardiac medications are clearly indicated. Prognosis is open pending further evaluation. Monitor for development of a cough, labored breathing, exercise intolerance or collapse episodes.

Pending a normal atropine response, anesthetic risk is considered mild if needed. Cardiac protective drug choices (opioid/benzodiazepine premedication, propofol or alfaxalone induction, isoflurane gas) are recommended. Pre-medicate with atropine or glycopyrrolate. Pre-oxygenate for 5-10 minutes prior to induction. Monitor for arrhythmias, hypotension, and hypoxia both intra and post-operatively and intervene as necessary. Mild IV fluid restriction is recommended to avoid fluid overload.

PLAN

Atropine challenge as discussed with consideration of causes of high vagal tone

Recommend conservative monitoring with a recheck echocardiogram in 6-12 months, to screen for any progression and structural abnormalities.

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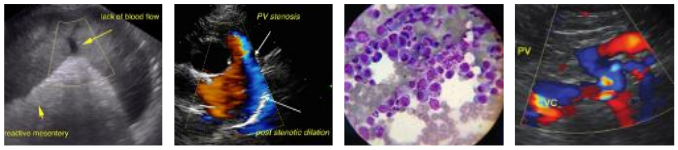

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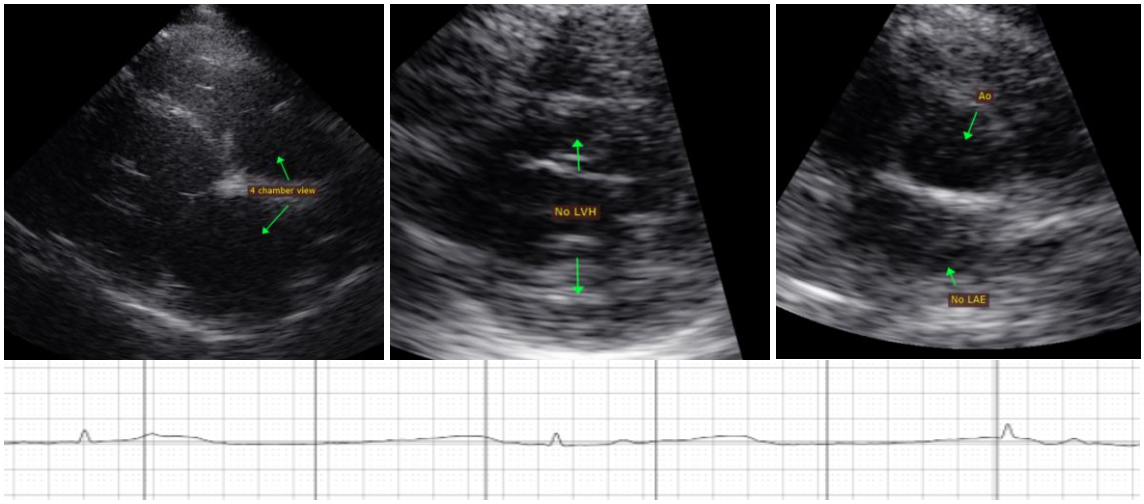
IMAGES



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