



PATIENT

Diesel Lindemuth

SPECIES

Canine

BREED

Shih Tzu Mix

SEX

Male Neutered

AGE

13.3 years

WEIGHT

18lbs

INTERPRETED BY

Maggie Machen Lamy,
DVM, DACVIM
(Cardiology)

IMAGING PERFORMED BY

Loetitia St-Jacques,
LVT/RVT

HOSPITAL NAME

MountainView
Animal Hospital

REFERRING VET

Dr. Kalivoda

INVOICE

24557

DATE

6/2/22

PRESENTING CLINICAL SIGNS

History: Grade 3/6 systolic heart murmur. Assess prior to anesthesia.
-BP: 104, 108, 110mmHg.

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

ELECTROCARDIOGRAPHIC FINDINGS

A six lead ECG is available at 50mm/s; 10mm/mV. The average heart rate is 120bpm (range 58-150bpm). The rhythm is sinus in origin, with a p for every QRS complex and vice versa. The P wave morphology is positive with a normal dimension. Normal PR. The QRS morphology is positive with normal dimension. 2 blocked P waves are appreciated; low grade, 2:1, suspect type I. MEA is shifted right. No ectopic beats, pauses or dysrhythmias observed.
ECG diagnosis: Suspect profound sinus arrhythmia with occasional 2nd degree AV block (low grade, type I).

ECHOCARDIOGRAM FINDINGS

2D, m-mode, color flow and doppler imaging is available. Diffuse thickening of mitral valve leaflets with mild prolapse into the left atrial lumen. Mild eccentric mitral regurgitation with minimal left atrial dilation. Normal MR velocity. Normal LV diameter with adequate myocardial function. The tricuspid valve appears normal with trace tricuspid regurgitation. Velocity consistent with early pulmonary hypertension. Normal right atrial and ventricular diameter and morphology. The pulmonic and aortic valves are normal in morphology and mobility. Normal pulmonic and aortic outflow velocities with laminar flow. No obvious aortic or pulmonic insufficiency. 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	5.3	3.2	NM	1.3	45	86	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	0.9	0.7	8.2	2.0	3.1	1.7
*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)
<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

Chronic degenerative valve disease causing mild mitral and trace tricuspid regurgitation. Lack of significant left atrial enlargement indicates the current risk for complication is low. Early pulmonary hypertension is noted, which is of unknown significance in an asymptomatic dog. No additional issues are noted in this study.

The ECG does show a respiratory sinus arrhythmia with occasional 2nd degree AV block. This implies that there is a non-conducted P wave; however, never more than one in a row. Type I block is suspected, which implies the PR interval elongates prior to the block. Type I is typically due to high vagal tone and is often physiologic/benign. This is in comparison with type II block, which develops secondary to AV nodal disease. What is seen here is unlikely to cause clinical signs and most likely resolves with activity or excitement.

Consider further evaluation through an atropine challenge prior to anesthesia (administer 0.04mg/kg atropine IV or IM and assess response); this can even be done as a pre-medication prior to proceeding. Pending a normal response (heart rate >160+bpm and maintains for 10-15 minutes) high vagal tone is diagnosed which is a benign cause. High vagal tone can be a normal variant or be secondary to a variety of systemic issues such as neurologic or respiratory disease. If the atropine challenge is normal, consider further evaluation for causes of high vagal tone. An abnormal response would indicate electrical dysfunction, and a holter monitor and/or referral should be considered.

No cardiac medications are clearly indicated. Assessment of progression in the future will help predict long term prognosis, which is highly variable at this stage. Omega fatty acid supplementation and mild salt restriction may be of some long-term benefit. 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-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

Reassess baseline ECG non-sedated for ideally a 3 min recording. Atropine challenge is recommended as a premedication: Administer 0.04mg/kg IV and assess response; record a second ECG 10 min following the injection. Normal would be a HR >>160+bpm for 10-15 minutes. If abnormal, anesthesia should be aborted and referral to a local Cardiologist is recommended.

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



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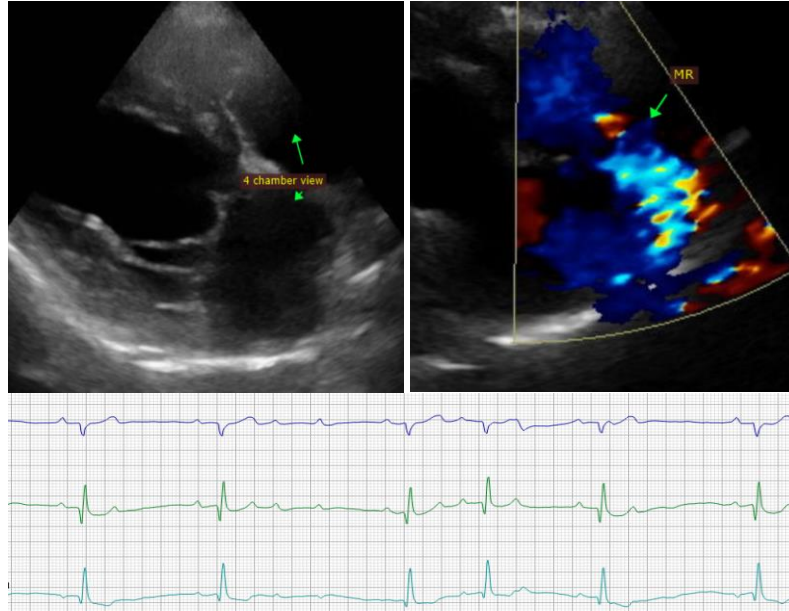
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IMAGES



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
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