SonoPath
Clinical Sonography & Telecytology
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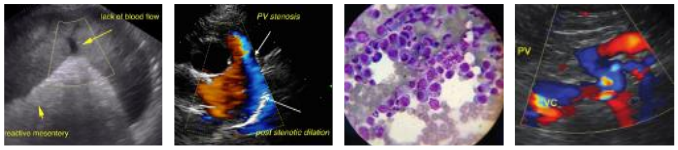

SonoPath.com
1-800-838-4268 info@sonopath.com

PATIENT
Pepper Robinson

SPECIES
Canine

BREED
Schnauzer

SEX
Femal Spayed

AGE
9 years

WEIGHT
20lbs

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

IMAGING PERFORMED BY
Mark van Campen, DVM

HOSPITAL NAME
Mississippi Hills Animal Hospital

REFERRING VET
Dr. van Campen

INVOICE
25122

DATE
7/4/22

PRESENTING CLINICAL SIGNS

History: Presented 6/22 for cough. Arrhythmia with bradycardia. AV block on ECG. VHS - 12.1. Lungs clear (no obvious congestion). Grade III/VI heart murmur. BP 150mHg

ELECTROCARDIOGRAPHIC FINDINGS

A six lead ECG is available at 25mm/s; 10mm/mV. The average heart rate is 100bpm (range 50-150bpm) depending on P:QRS conduction. The rhythm is sinus in origin, with a p for every QRS. The P wave morphology is positive with a normal dimension. P wave/sinus rate is regular with a HR of 150bpm. Second degree AV block throughout; primarily 2:1 with a single 3:1 interval. Normal PR with little variation. The QRS morphology is positive with normal dimension. MEA is normal. No ectopic beats observed.
ECG diagnosis: High grade 2nd degree AV block; type 2.

ECHOCARDIOGRAM FINDINGS

2D, m-mode, color flow and doppler imaging is available. Normal mitral valve leaflets with no prolapse into the left atrial lumen. Trace eccentric mitral regurgitation with minimal left atrial dilation. Diastolic MR appreciated as well. Borderline LV dimension with adequate myocardial function. The tricuspid valve appears normal with trace tricuspid regurgitation. Mild right atrial and ventricular enlargement. The pulmonic and aortic valves are normal in morphology and mobility. Normal pulmonic and aortic outflow velocities with laminar flow. Trace aortic and pulmonic insufficiency. No pericardial or pleural effusion noted. No obvious cardiac masses. High grade AV block noted throughout the study (single lead attached).

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	1.2	32	60	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	1.5	1.5	9.1	2.4	3.4	2.3
*Normal chamber parameters expressed as a mean value (SD)				3	1.27 (5.3)	2.46 (2.46)	1.36 (5.5)
				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)

BODY WEIGHT DEPENDENT PARAMETERS

**Note: All measurements based upon multi-modal images and methods. An average value is reported.*

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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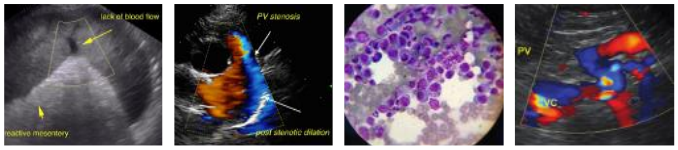

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INTERPRETATION OF THE FINDINGS & FURTHER RECOMMENDATIONS

Overtly normal cardiac dimensions and function. Minimal 4 chamber dilation is noted, which is likely secondary to bradycardia. MR and TR are noted which are likely physiologic in origin. Diastolic leaks are also noted, which are typical of AV block. A small aortic leak is identified, and a baseline blood pressure is recommended. No additional issues are noted.

No cardiac medications are indicated at this time as there are no structural changes apparent here. The cough appears non-cardiac in origin. Continued work up for infectious/inflammatory respiratory causes is recommended. Options include Baytril or similar antibiotic, anti-inflammatory prednisone, aggressive hydrocodone, etc. If refractory, may consider TTW/BAL for further information.

The ECG does confirm an arrhythmia, with high-grade 2nd degree AV block. This implies that there are some non-conducted P waves, and occasionally more than one in a row. Type II block is suspected on this tracing, which implies the PR interval does not 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; however, frequent low grade and occasional high grade block is highly concerning for progressive AV nodal disease.

Recommend further evaluation through an atropine challenge (administer 0.04mg/kg atropine IV or IM and assess response); 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 (such a neurologic disease). An abnormal response would indicate electrical dysfunction, (**suspected)** and a holter monitor and/or referral to a local Cardiologist for holter placement and pacemaker consultation should be considered. In an asymptomatic dog simple monitoring would be an alternative approach, as most dogs with AV nodal disease will experience development of lethargy, syncope and exercise intolerance as the condition progresses. If this develops in the future, pacemaker implantation becomes necessary to maintain QOL.

Prognosis is guarded.

No cardiac medications are clearly indicated prior to further evaluation.

Elective anesthesia is **not advised** at this time.

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

PLAN

Atropine challenge: 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, a holter and/or referral to a local Cardiologist is recommended. Consider hydrocodone as discussed.

Recheck echocardiogram pending clinical progression.

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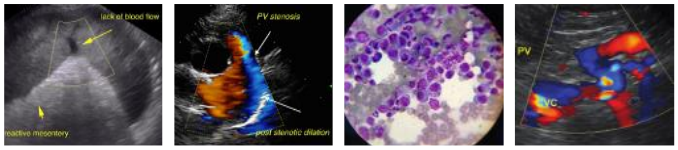

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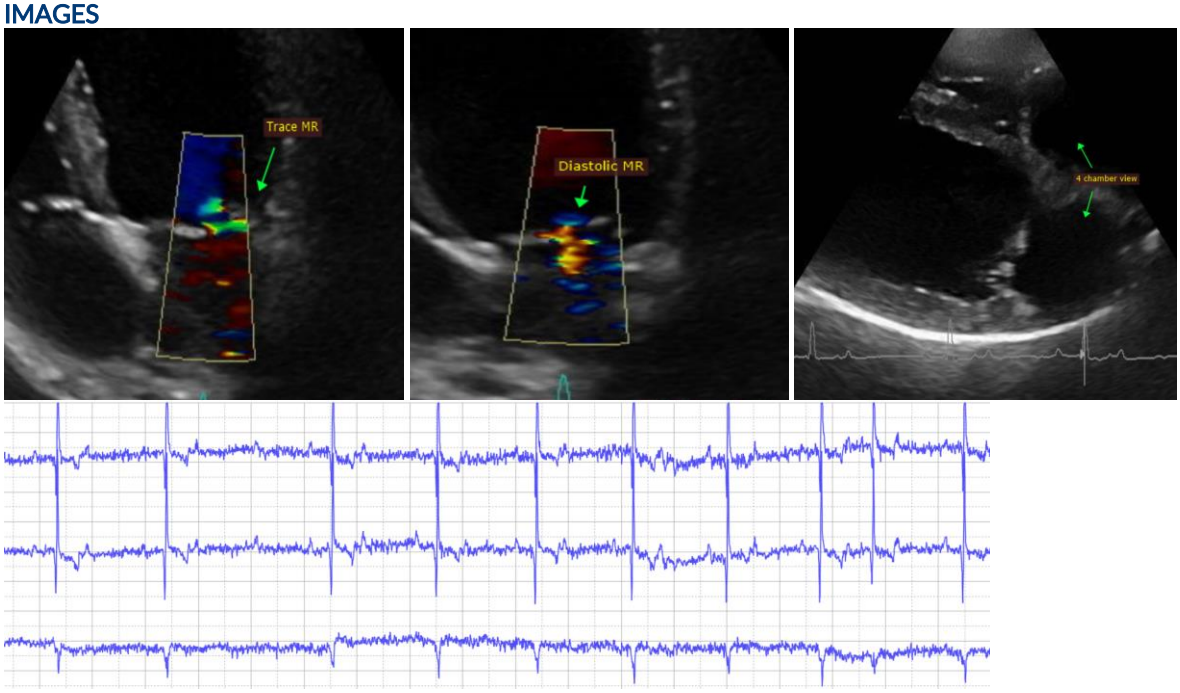
IMAGES



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