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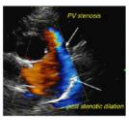
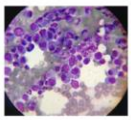
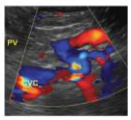




SonoPath
Clinical Sonography & Telecytology
EDUCATIONAL TELECONSULTATION SERVICES™
1-800-838-4268 info@sonopath.com SonoPath.com

PATIENT

Pippa Barringer

SPECIES

Canine

BREED

Beagle

SEX

Female Spayed

AGE

13 years

WEIGHT

23lbs

INTERPRETED BY

Maggie Machen Lamy, DVM, DACVIM (Cardiology)

IMAGING PERFORMED BY

Kim Liedberg

HOSPITAL NAME

SVS Imaging WI

REFERRING VET

Dr. Rudawski

INVOICE

27272

DATE

11/3/22

PRESENTING CLINICAL SIGNS

History: Known seizure patient. Tachycardic episodes.
-Current medications: Zonisamine 50mg BID, and Trilostane for Cushing's. Also, on vitamin B injections. and normosol SQ, fortiflora, lactulose and denamarin. She was started on Lasix and Enalapril.
-Radiographs: Show an enlarged heart and pulmonary edema.
-Abnormal PE/Chem/CBC/UA Results: Elevated Alk Phos 1256 elevated ALT 256.

RADIOGRAPHIC FINDINGS *NOTE: Images submitted for supplemental cardiac information only.

A single lateral film is included. Mild cardiomegaly. No obvious evidence of CHF.

ELECTROCARDIOGRAPHIC FINDINGS *Note: Single lead ECGs are evaluated as a rhythm strip. Morphology/MEA cannot be definitively commented on.

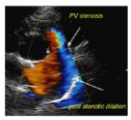
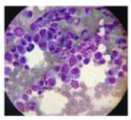
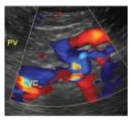
A single lead ECG is available; 25mm/s, 10mm/mV. The average heart rate is 60bpm. P waves can be seen throughout, with frequent high grade 2nd degree AV block suspected (single lead tracing limits interpretation with baseline insensitivity). The P wave/sinus rate is variable which is unusual, ranging from 100-188bpm.
ECG diagnosis: Suspect high grade 2nd degree AV block.

ECHOCARDIOGRAM FINDINGS

2D, m-mode, color flow and doppler imaging is available. Mild diffuse thickening of mitral valve leaflets with no prolapse into the left atrial lumen. Trace central mitral regurgitation with mild left atrial dilation. Diastolic MR is also appreciated. Mild LV dilation with adequate myocardial function. The tricuspid valve appears normal with mild tricuspid regurgitation. Normal velocity. Diastolic TR is also appreciated. Mild right heart 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.

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	5.2	2.6	NM	1.2	57	88	0.2
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	53	1.8	1.5	10.4	2.3	4.0	1.9
*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.* Adapted from June Boon, Veterinary Echocardiography, 1998				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)

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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	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)

INTERPRETATION OF THE FINDINGS & FURTHER RECOMMENDATIONS

The rhythm diagnosis is most consistent with high grade 2nd degree AV block, although a 6 lead tracing is suggested to confirm. This implies that while some P waves are conducting to the ventricular, the majority are not. This is resulting in a low ventricular rate of 60bpm. The echocardiogram shows the overall cardiac dimensions are mildly enlarged with mild MR and TR, which are likely due to the arrythmia and are hemodynamically insignificant. Follow up is advised in the future. No additional issues are identified at this time.

AV block is typically idiopathic in origin, with progressive deterioration of the electrical system resulting in persistent bradycardia, significant lethargy and collapse. An atropine challenge can be performed to ensure the diagnosis, with little to no response expected. These cases typically are unable to be managed medically; however, the atropine challenge will be telling. Baseline full lab work should also be performed, to rule out any electrolyte abnormalities that may be contributing.

Barring any treatable systemic issues, the recommended treatment in this case is referral for discussion of pacemaker implantation even without reported clinical signs. No symptoms are mentioned in the history other than tachycardic episodes, which does not make sense with this finding. Regardless, unless the patient is significantly tachypneic, there is no obvious indication for Lasix or ACEI at this time. Reasonable utilize Pimobendan until the HR is addressed, given the totality of the findings. If referral is declined, heart rate stimulation can be attempted as discussed; however, this is of little benefit.

Going forward, there is potential that the arrhythmia may remain subclinical for some time. If not corrected however, this patient will succumb to either continued cardiac dilation over time resulting in CHF (which will be difficult to manage in the absence of a normal heart rate), or to worsening bradycardia/syncope/sudden death. The goal would be to stabilize the situation through heart rate management and use medical support to hopefully support the structural disease.

Going forward, unfortunately, the patient will always be at risk for recurrent CHF, syncope and/or sudden death in the future. If patient develops syncope or QOL suffers, euthanasia or pacemaker implantation will become the only options, and this should be expressed to the owner.

PLAN

Consider referral to a tertiary facility for further evaluation of the bradyarrhythmia and discussion of surgical intervention. Systemic work up and atropine challenge should be considered as discussed: administer 0.04mg/kg atropine IV or IM and assess response. No indication for Lasix or Enalapril at this time in the absence of respiratory signs. Institute Pimobendan 0.3mg/kg PO q12h.

If referral is declined, reassess in 6 months, sooner if syncope or respiratory signs arise.

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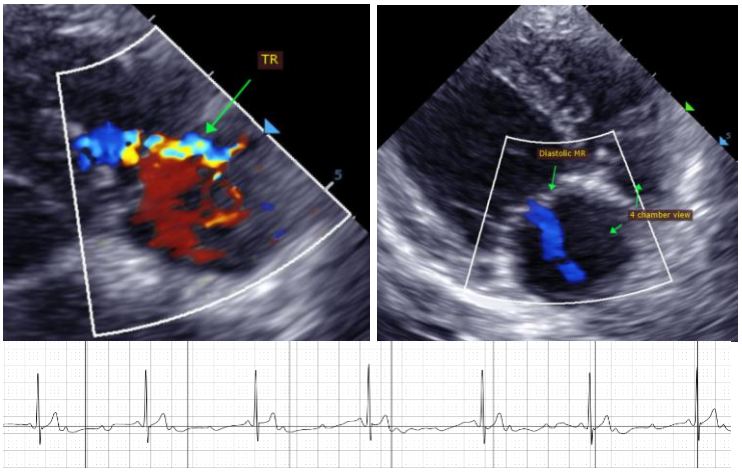

The information and recommendations provided are based on the images presented by the referring veterinarian. No evaluation can be communicated regarding pathology that was not visible in the image/video clips provided.

Thank you for this referral. 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