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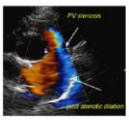
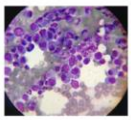
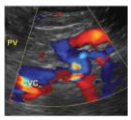
SVS IMAGING

SonoPath
Clinical Sonography & Telecytology
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PATIENT

Baby Love Tharp

SPECIES

Canine

BREED

Boston Terrier Mix

SEX

Female Spayed

AGE

14 years

WEIGHT

23lbs

INTERPRETED BY

Maggie Machen Lamy, DVM, DACVIM (Cardiology)

IMAGING PERFORMED BY

Amy Mayhew, LVT

HOSPITAL NAME

SVS Imaging MI

REFERRING VET

Wixom Family Pet Practice

INVOICE

238122

DATE

4/21/22

PRESENTING CLINICAL SIGNS

History: Recheck echo. History of heart murmur and arrhythmia with a syncopal episode. Grade 2/6 heart murmur. Patient acutely vomited this morning and became pale with irregular heart rate. Very lethargic. Presented to ER for evaluation. ER performed radiographs and BW. Gave Cerenia injection and discharged with instructions to have echo done ASAP.
-Abnormal PE/Chem/CBC/UA Results: Mild elevation in ALT and increase in glucose they attributed to stress. BP today: 69/48 (55)mmHg.
-Pertinent previous echo findings (11/2020 AIS): CVD B1 with MR and TR. No LAE, trivial TR. Syncope noted in the 2020 history as well.

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, 5mm/mV. The average sinus heart rate is 136bpm with a largely regular rhythm. P for every QRS complex and vice versa. The P and QRS morphologies are positive. An intermittent ventricular rhythm is noted throughout the study with frequent fusion beats. The rhythm is somewhat irregular without a constant coupling interval. The max ventricular heart rate recorded is 188bpm. No supraventricular premature beats, pauses or other dysrhythmias observed.
ECG diagnosis: Normal sinus rhythm with intermittent ventricular arrythmias. Suspect AIVR with VPCs; however, brief VT cannot be ruled out.

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/mild eccentric mitral regurgitation with minimal left atrial dilation. Small LV diameter with adequate myocardial function. Increased LV wall thickness, consistent with pseudohypertrophy. The tricuspid valve appears normal with trivial tricuspid regurgitation. Normal right atrial and ventricular diameter and morphology indicating no overt evidence of pulmonary arterial hypertension. 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	5.1	NA	NM	1.4	68	94	0.3
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	1.0		10.4	2.6	2.8	0.9
*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)

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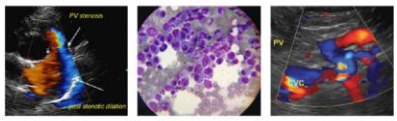

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BODY WEIGHT DEPENDENT PARAMETERS

**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

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)

INTERPRETATION OF THE FINDINGS & FURTHER RECOMMENDATIONS

Chronic degenerative valve disease causing mild mitral and trivial tricuspid regurgitation persists. Compared to the prior study, there is no evidence of progression with persistently subclinical disease. Lack of significant left atrial enlargement indicates the current risk for complication is low. No obvious additional issues, such as pulmonary hypertension, are identified. The LV is small with evidence of pseudohypertrophy, likely due to dehydration. This should be monitored once the patient is systemically well.

The ECGs does confirm an arrhythmia however, with ventricular premature beats as well as periods of AIVR approaching ventricular tachycardia. VPCs are commonly seen and rarely cause clinical signs unless sustained, and single beats do not warrant therapy at this time. There are also ventricular beats more consistent with accelerated idioventricular rhythm (AIVR). AIVR is similar to VPCs/VT in appearance as it is also generated from the ventricle, however the rate is significantly slower and there is typically no hemodynamic compromise (normal BP/pulses, no clinical signs). The term 'accelerated' is used as a comparison to the sinus rate (in this case sinus rate is on average 150bpm, and the beats consistent with AIVR are firing after the sequential P wave). These are less concerning than VPC/VT, as VT is a malignant, highly unstable rhythm with a HR>180-200bpm and accompanies weakness, lethargy/collapse, poor peripheral pulses and hypotension. While either rhythm is possible with systemic disease, AIVR does not require therapy and does not generally lead to VT or respond to lidocaine. All that being said, the rate in this case is >180bpm for brief periods, which may suggest a combination of rhythms. This is of course more concerning, particularly given the overall unstable appearance on the patient (hypotension, volume depletion, etc).

Given the suspicion for pancreatitis, evidence of volume depletion on the ultrasound and finding of arrythmias, **my suspicion in this case is the primary issue of GI disease is leading to development of the arrythmia. The ideal treatment of this patient would be hospitalization for ECG monitoring and GI support with fluid resuscitation. If this is elected, I would not institute Sotalol at this time, as the findings of the ECG are borderline for its use. My hope is that treating the underlying GI disease will improve the arrythmia significantly and lead to a more stable patient.** If any sustained arrythmias are seen in hospital (i.e.>180bpm and ventricular in origin), Lidocaine and/or Sotalol should be reconsidered. If hospitalization is not a possibility, we may err on the side of caution with at least short-term use of Sotalol as below, albeit potentially difficult to administer prior to resolution of vomiting. Discussion with the owner is advised.

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.

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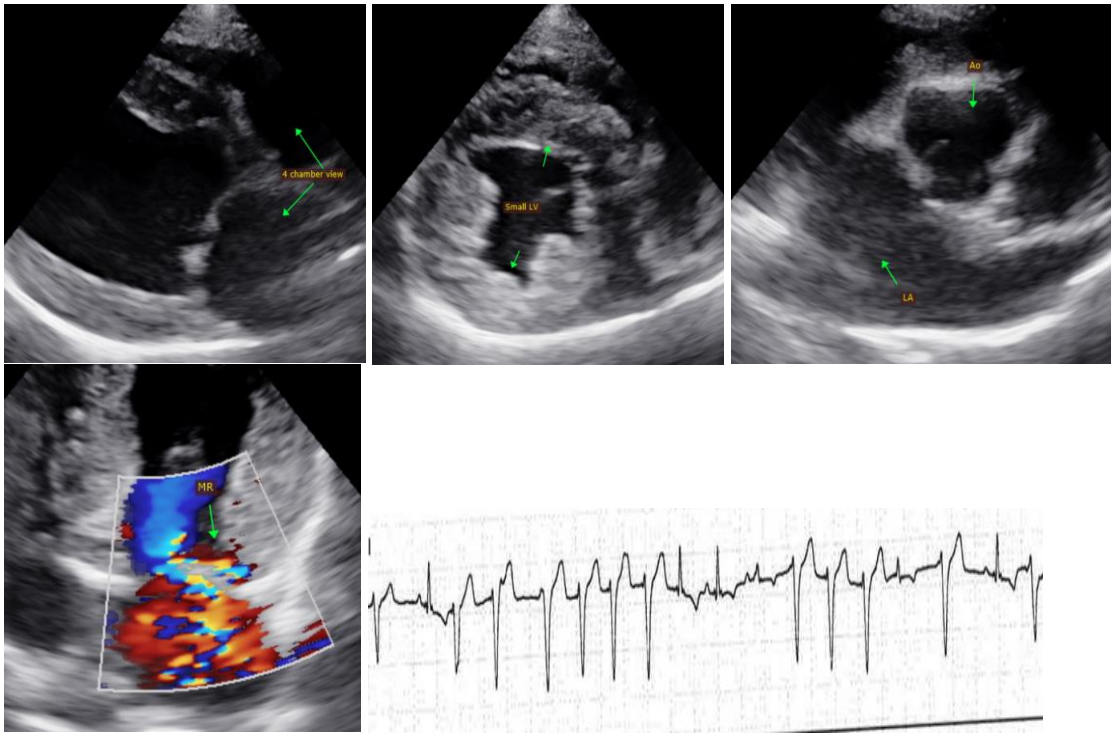
Prognosis is guarded given the complexity of issues and reassessing is advised once the systemic illness is stabilized.

PLAN

Consider hospitalization for ECG monitoring, GI support and fluid resuscitation, ideally at a multi-specialty center. In this case, unless sustained arrythmias are visualized, do not institute anti-arrhythmic at this time. If VT is confirmed, institute Lidocaine and/or Sotalol 1-2mg/kg PO q12h depending on clinical status.
If hospitalization is declined or not possible, discharge on Sotalol 1-2mg/kg PO q12h, in addition to full GI support.
Regardless, a recheck of the ECG is recommended in 3-5 days following resolution of systemic signs to ensure no persistent issues are visualized. A holter monitor can also be considered.

A recheck echocardiogram is recommended in 6 months, sooner if any development of clinical signs.

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. If the clinical or image interpretation does not parallel your findings or if I can be of any further assistance, please contact me.

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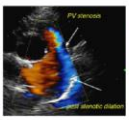
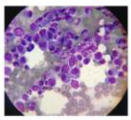
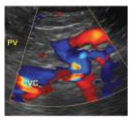

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