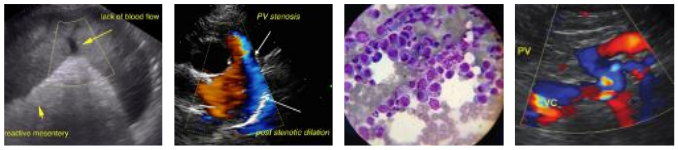
SonoPath
Clinical Sonography & Telecytology
EDUCATIONAL TELECONSULTATION SERVICES™



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

PATIENT
Cutler Lewis

SPECIES
Canine

BREED
Boxer

SEX
Male Neutered

AGE
10 years

WEIGHT
93lbs

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

IMAGING PERFORMED BY
Karen Ebersole, DVM, DABVP

HOSPITAL NAME
Scanvet

REFERRING VET
Dr. Sheridan

INVOICE
30019

DATE
4/4/23

PRESENTING CLINICAL SIGNS

History: Presented for evaluation for a dental, and arrhythmia was noted. Gabapentin and Trazodone PO for pre-visit sedation. Episode of syncope or seizure this morning while stressed and coming into clinic. Muffled heart sounds, panting and stressed, BCS 6-7/9, many benign lipomas, abdominal component to breathing, mm pink.
-Radiographs (this morning, lateral thorax): VHS 12.1, lung fields clear.

ELECTROCARDIOGRAPHIC FINDINGS

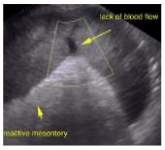
A six lead ECG is available at 25mm/s; 20mm/mV. The underlying rhythm is sinus in origin with an average heart rate of 140bpm. P for every QRS complex and vice versa. The P wave morphology is positive with a normal dimension. Normal PR. The QRS is isoelectric. MEA is shifted left. Frequent VPCs are seen throughout the study; primarily singles with an RBBB morphology, suggesting an LV origin. Periods of ventricular bigeminy. Brief salvo of VT captured with an R on T phenomenon and a heart rate of 300+bpm. No supraventricular premature beats, pauses or other dysrhythmias observed.
ECG diagnosis: Normal sinus rhythm with malignant ventricular arrythmias and salvos of ventricular tachycardia.

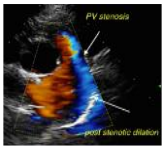
ECHOCARDIOGRAM FINDINGS

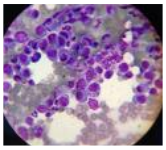
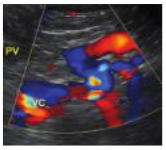
2D, m-mode, color flow and doppler imaging is available. Mild diffuse thickening of mitral valve leaflets with no prolapse into the left atrial lumen. Mild anterior-directed mitral regurgitation with moderate left atrial dilation. Mild LV dilation with adequate myocardial function. The tricuspid valve appears normal with no 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	<5.0		2.0	1.8	27	50	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	2.2	1.2	42.2	3.9	4.8	3.5
*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)
**Note: All measurements based upon multi-modal images and methods. An average value is reported.*				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)
Adapted from June Boon, Veterinary Echocardiography, 1998 Rishniw M and Hollis NE, J Vet Intern Med 2000; 14:429-435				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)





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Hansson et al, Vet Rad and Ultrasound 2002 Bonagura et al. Echocardiography: principles of interpretation, Vet Clin North Am 15:1177, 1995	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 primary structural abnormality identified is mild to moderate LA and LV enlargement with mild MR. The degree of dilation is unexpected with mild MR and is suspected to secondary to the arrythmia. The systolic function is adequate, and the right heart is normal in size.

Frequent ventricular premature contractions (VPCs) were confirmed as the cause of the noted arrhythmia with a brief salvo of ventricular tachycardia (VT). VPCs/VT are generated from abnormal conductive or fibrotic tissue in the ventricles of the heart muscle, and even frequent single VPCs will often cause no clinical signs in dogs. When sustained however, ventricular tachycardia can lead to symptoms such as lethargy and collapse.

Ventricular arrythmias are a very non-specific finding. They can be primary in origin (such as ARVC), be secondary to significant cardiac disease (mild present in this study) or be extra-cardiac in origin; i.e., due to pain, stress, inflammation, cancer, GI disease, DIC/sepsis, etc. In a 10yo Boxer, all possibilities should be considered. ARVC is possible, although the most typical age of onset is 6-9 years old. ARVC can occur with or without systolic dysfunction and structural issues; however, this should be monitored going forward for any progressive change. It is always reasonable to rule out other differentials for VPCs (AUS, tick titers, troponin, etc.). Unfortunately, there is always an elevated risk for collapse and sudden death in any arrhythmic patient, and even on medications this risk unfortunately still persists. ARVC (if diagnosed) carries a HIGHLY variable prognosis, with some dogs able to remain asymptomatic for extended periods of time, and others developing exercise intolerance, syncopal episode, and refractory arrhythmias/sudden death imminently.

Based upon the amount of arrhythmia and salvos of VT, **immediate anti-arrhythmic therapy is indicated. It is reasonable given the amount of arrhythmia to hospitalize at least for the day to strictly monitor the situation and institute Lidocaine if needed for any sustained arrhythmias**. Once sotalol is on board, an extended time 6 lead ECG and/or **holter monitor** (gold standard) is a reasonable next step to allow monitoring of the rhythm throughout 24 hours of a normal day to ensure good rhythm control. Given concurrent LA/LV dilation, Pimobendan is also suggested until stability is achieved and dimensions are reassessed.

Anesthesia is not recommended until good arrhythmic control is achieved. Once stabilized on sotalol (i.e., ECG or holter shows dramatic improvement), anesthetic risk is considered mildly elevated. Avoid ketamine, telazol, Dexdomitor (or other alpha-2 agonists) and acepromazine. Recommend having lidocaine CRI available for use in the event of worsening ventricular arrhythmias under anesthesia (CRI 50—75mcg/kg/min).

Fish oil supplementation is recommended for dogs with arrhythmias (1000mg of omega 3 and 6 once to twice daily as tolerated).

Monitor at home for collapse, exercise intolerance, and/or lethargy. Lifelong mild to moderate activity restriction is advised.

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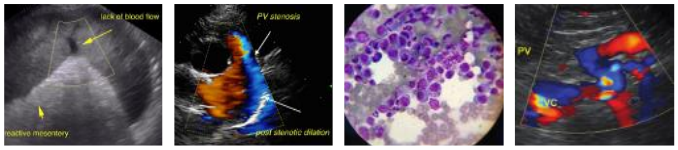

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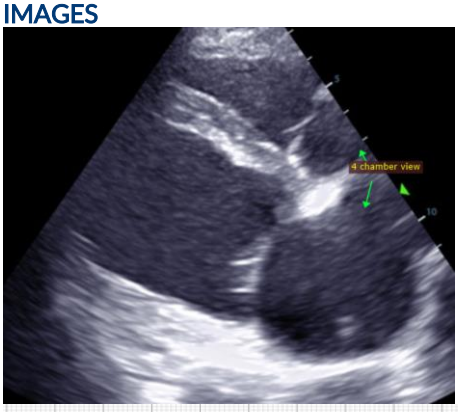
PLAN

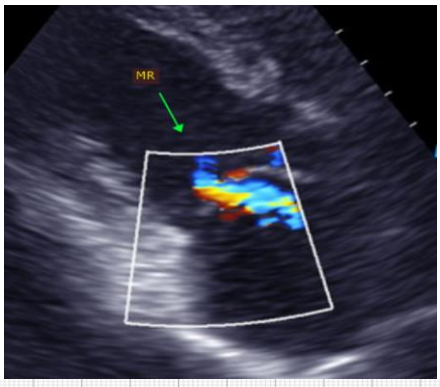
Consider hospitalization/ECG monitoring for 12-24 hours as discussed with use of lidocaine if further VT is noted. Immediately institute sotalol: administer a loading dose of 80mg PO; then administer 40mg PO q12h as a chronic dose going forward. Institute Pimobendan 0.3mg/kg PO q12h. Consider systemic screening as discussed.

Recheck ECG in 5-7 days to assess response (goal is significant reduction in ectopy without a significant change in underlying sinus rate). Consider holter at this time if desired.

Recheck ECG and echocardiogram is recommended in 6 months to determine progression/control, sooner if any development of associated 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. 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