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Clinical Sonography & Telecytology
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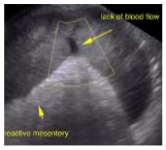
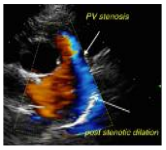
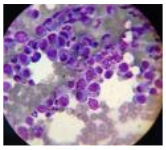
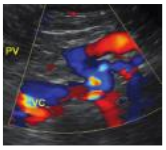

SonoPath.com
1-800-838-4268 info@sonopath.com

PATIENT
Brutus Witt

SPECIES
Canine

BREED
English Bulldog

SEX
Male Neutered

AGE
10 years

WEIGHT
90lbs

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

IMAGING PERFORMED BY
Kim Liedberg

HOSPITAL NAME
SVS Imaging WI

REFERRING VET
Dr. Herlugson

INVOICE
21697

DATE
10/25/21

PRESENTING CLINICAL SIGNS
History: Not eating since 10/3/21, irregular cardiac rhythm. Tachycardia 180 bpm noted. Ascites cytology-y mod transudate.

RADIOGRAPHIC FINDINGS *NOTE: Images submitted for supplemental cardiac information only.
Cardiomegaly. No obvious evidence of pulmonary edema. Ascites.

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 220bpm (range 188-250bpm). The rhythm is irregularly irregular without obvious P waves.
ECG diagnosis: Suspect rapid atrial fibrillation.

ECHOCARDIOGRAM FINDINGS
2D, m-mode, color flow and doppler imaging is available. The LV is normal in dimension with adequate systolic function. Mild left atrial enlargement. The mitral valve appears mildly thickened with no obvious prolapse into the left atrial lumen. Mild mitral regurgitation; normal velocity. Mild tricuspid regurgitation. Mildly elevated TR velocity. Moderate to severe right atrial and ventricular dilation. The RV systolic function appears depressed. The aortic valve is normal in morphology and mobility. No subvalvular ridge present; normal LVOT velocity. No aortic insufficiency. Normal pulmonic valve with no pulmonic insufficiency seen. No pericardial or pleural effusion noted. Small volume ascites. No obvious cardiac tumors.

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	2.9	1.66	1.4	33	64	0.26
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	190	1.2	0.85	40.8	3.0	3.0	2.0
*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)
				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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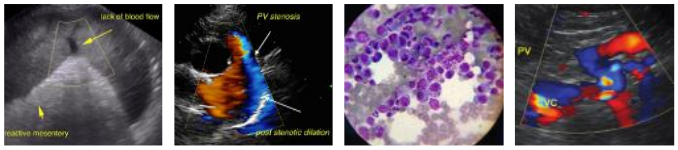

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INTERPRETATION OF THE FINDINGS & FURTHER RECOMMENDATIONS

Unfortunately, this patient has significant right ventricular cardiomyopathy and systolic dysfunction. This is causing dilation and volume overload of the right heart resulting in insufficiency of the tricuspid valve. The dysfunction and pump failure is severe on the right side, and confirms the origin of ascites is congestive heart failure. The academic diagnosis could be argued in this case (DCM affecting primarily the right side versus ARVC without obvious ventricular arrhythmias v other). It should be mentioned that even without obvious extracardiac masses identified here, peripheral compression of the pulmonary vasculature can also present in this manner (concern is low based upon CXR). The left- sided disease is mild with mild mitral regurgitation and mild left atrial enlargement. Regardless, the patient will always be at risk for right-sided CHF, development of arrhythmias/syncope and/or sudden death going forward.

As a complicating factor, the patient has also developed rapid atrial fibrillation (AF) secondary to atrial dilation. Development of the arrhythmia led to and/or further contributed to right-sided congestion (tachycardia-induced cardiomyopathy). AF is characterized by disorganized contractions of the atria leading to an irregular heart rhythm. The irregular heart rhythm rarely causes clinical signs in dogs; however, atrial fibrillation also usually causes an increase in the heart rate, and this can lead to clinical signs and CHF as we see in this patient. Once a patient is in AF, this will likely never convert back to sinus rhythm, however they typically do well with simply rate control. The structural disease and development of AF requires lifelong diuretics (due to high risk for decompensation) and management of the structural disease in addition to the arrhythmia as below. Close monitoring going forward is advised.

Regardless of cause, prognosis is guarded to poor at this stage in the disease process, with an average survival time of <6 months. The only treatable cause of systolic failure is diet/taurine deficiency, which is uncommon on commercially formulated dog foods. If the diet is of concern, highly recommend immediate diet change and taurine supplement regardless of blood taurine results. Please see the FDA website for more information.

Lifelong cardiac supportive medications are recommended as below with hospitalization indicated if the patient is or becomes unstable. Cases of systolic failure are at high risk for malignant tachyarrhythmias and sudden death, and this should be expressed to the owner. Activity restriction is advised.

Elective anesthesia is not advised due to high risk for complications.

Omega fatty acid supplementation and mild salt restriction may be of some long-term benefit. Monitor for development of a cough, worsening labored breathing, abdominal distention, exercise intolerance or collapse episodes in the future. Monitoring of sleeping breathing rates at home is recommended to assess response to medications and recurrence of CHF in the future.

PLAN:

Consider hospitalization if indicated +/- abdominocentesis if needed for comfort/stabilization. Initiate Lasix 1-2mg/kg PO q8h for 3-5 days, if doing well at that time decreased to q12h. Recommend Pimobendan 0.3mg/kg PO q12h, Spironolactone 1-2mg/kg PO q12h; Diltiazem 1-2mg/kg PO q8h (available commercially in 30, 60 and 90 mg tablets).

Recheck BP, heart rate/ECG and renal values in 5-7 days. If BP >130mmHg, institute Benazepril at that time (0.5mg/kg PO q12h). Target HR is 140-160bpm in hospital/stressed. Up-titrate diltiazem to effect. If difficult to control, can also consider digoxin (0.005mg/kg PO q12h with close monitoring of

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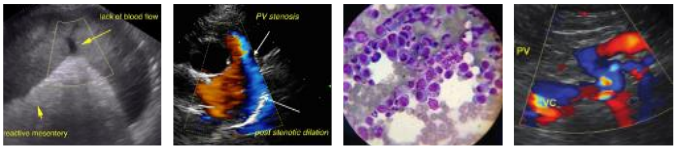

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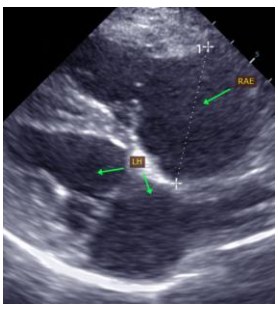
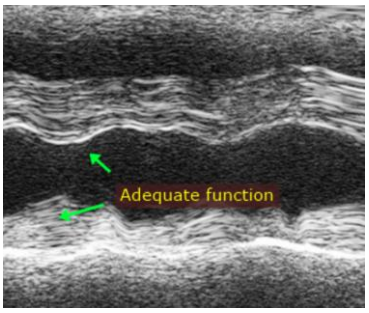
blood dig levels) due to synergistic effect with diltiazem.

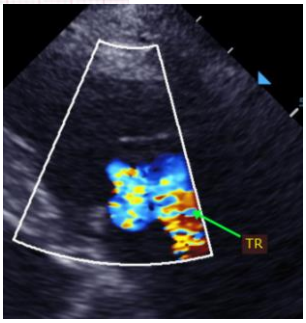
Monitor renal values/BP/HR every 3-4 months lifelong.

A recheck echocardiogram is recommended in 6 months to assess for progression, sooner if clinical signs arise.

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