

PATIENT

Solo Knight

SPECIES

Canine

BREED

Boxer

SEX

Male Intact

AGE

5 years

WEIGHT

34.2lbs

INTERPRETED BY

Maggie Machen Lamy,
DVM, DACVIM
(Cardiology)

IMAGING PERFORMED BY

Holly Burleson, LVT

HOSPITAL NAME

All Pets Medical
Cetner

REFERRING VET

Dr. Rupley

INVOICE

25970

DATE

8/23/22

PRESENTING CLINICAL SIGNS

History: Presented for urinating blood, decreased appetite, and mild lethargy. Coughs with activity. Grade 4/6 heart murmur, although appears to wax and wane. Ascites noted on exam. Heartworm positive. Abdominocentesis performed: unremarkable (no neoplastic cells seen). Multiple lab results concerning for Caval syndrome (hemoglobinuria, anemia, hemolysis, etc). Began Doxycycline 300mg PO q12h; Enalapril 15mg PO BID, Spironolactone 50mg PO q12h and Sildenafil. Upon recheck exam on 8/2022: no murmur was ausculted. Prednisone initiated.

ECHOCARDIOGRAM FINDINGS

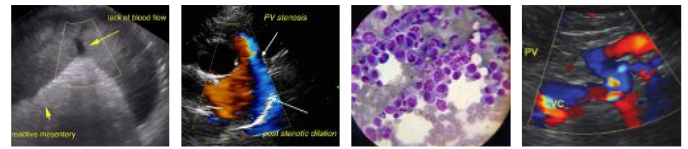
2D, m-mode, color flow and doppler imaging is available. Mild diffuse thickening of mitral valve with no prolapse into the left atrial lumen. No mitral regurgitation, normal left atrial dimension. Normal LV diameter with adequate function. The TV appears mildly thickened with moderate tricuspid regurgitation. Velocity consistent with severe pulmonary hypertension. Severe right atrial and ventricular dilation with evidence of hypertrophy. The MPA and branches are severely dilated. Adult heartworm and infestation suspected at the bifurcation extending into the right branch of the pulmonary artery. The pulmonic and aortic valves are normal in morphology and mobility. Normal pulmonic and aortic outflow velocities with laminar flow. Trace pulmonic insufficiency. No aortic insufficiency. No pericardial or pleural effusion noted.

CARDIAC CHART

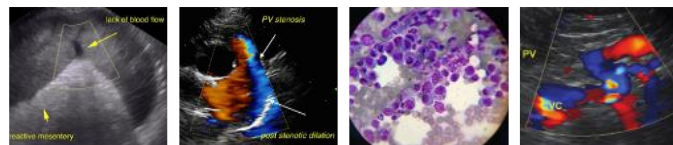
CANINE CARDIAC PARAMETERS	MR VMAX (m/s)	TR VMAX (m/s)	LA/AO (Boon method)	LA/AO (Heart Base; Swe)	FS (%)	EF (%)	EPSS (cm)
NORMAL PARAMETER	4.5-5.5	<2.7	1.3	<1.6	28-40	40-100	<0.6
PATIENT	NA	5.2	NM	1.1	50	94	NM
CANINE CARDIAC PARAMETERS	HR (BPM)	AV VMAX (m/s)	PV MAX (m/s)	BODY WEIGHT (kg)	LA 2D short 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	NM	1.2	15.5	2.4	3.4	1.7
*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)
<i>*Note: All measurements based upon multi-modal images and methods. An average value is reported.</i>				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

Suspicion for an adult heartworm infestation, leading to pulmonary hypertension, severe dilation of the right heart/pulmonary artery and congestive heart failure. The worms appear to be located near the bifurcation extending into the right branch of the pulmonary artery, which is a typical location. It is important to note that even with good visualization ultrasound is not entirely



PATIENT	Solo Knight	<p>sensitive (i.e., adult worms may easily be missed either peripherally or elsewhere). Regardless, there is evidence of significant pulmonary hypertension in this study as well, as evidenced by secondary RA/RV changes and development of TR. This is certainly a concern going forward and reassessing in the future is recommended to determine progression. Even if we are able to safely clear the infestation, these cardiac changes may be irreversible, and the prognosis is guarded to poor long term.</p> <p>Heartworms can cause significant damage to the lung tissue leading to pulmonary damage, pulmonary hypertension and clinical signs such as coughing, decreased ability to exercise, or difficulty breathing. Disease severity can range from an asymptomatic dog with few worms to dogs with severe respiratory signs. In the most severe cases, Caval syndrome may develop due to a very high worm burden sheering blood cells as they pass through the heart. Caval syndrome is a life-threatening emergency that requires immediate surgical removal of the worms. There is great concern that this dog is presenting with Caval syndrome, due to hemoglobinuria and reported red blood cell destruction. Given these findings, immediate referral to a local Cardiologist and Specialty Center is advised.</p> <p>Unfortunately, the degree of right-sided damage has also led to congestive heart failure as evidenced by large volume ascites. A therapeutic abdominocentesis is recommended to improve comfort. Additionally, immediate medical stabilization is recommended including diuretics, Sildenafil, Pimobendan and treatment for the cough (hydrocodone, Doxycycline, prednisone, etc). If referral/extraction is not a possibility, utilizing the standard approach to heartworm treatment as dictated by the American Heartworm Society is recommended, including 30 days of doxycycline and heart guard prior to continuing the split Immiticide protocol. Please see website and protocol for specific information.</p> <p>There is high risk for thromboembolism in any patient, however those with adult worms in the PA are no question at elevated risk. At this time, exercise restriction is paramount, including cage rest with leash_walks only, as a worm embolus can be a life-threatening complication of the disease. This should be continued for an additional 6-8 weeks following therapy.</p> <p>Modifications to this protocol are sometimes elected depending on individual circumstances which may involve fewer injections or a “slow kill” method. These are not, however, our standard recommendation as alternate treatment may not result in effective treatment of the infestation.</p> <p>Following treatment, retest for heartworm disease 6 months after completing the full course of therapy. Anesthesia is NOT advised prior to completing the protocol, as vasodilation can lead to increased risk for an embolus. Prognosis is guarded, as the right heart/MPA changes are often permanent and may cause clinical signs (exertional syncope/dyspnea, right-sided CHF) in the future. It must be reiterated that this patient is considered end-stage, and our goals are to improve QOL for the short term. If QOL suffers, humane euthanasia should be considered.</p> <p>During therapy, there is high risk for a worm embolus and breathing rate and effort should be monitored closely. Anti-inflammatory prednisone can be used if becomes symptomatic. Patient will be at high risk for developing clinical signs due to pulmonary hypertension with age given the inherent secondary inflammation and damage to the pulmonary vasculature and lungs, and periodic rechecks may be helpful. Monitor for exertional dyspnea or fainting episodes going forward.</p>
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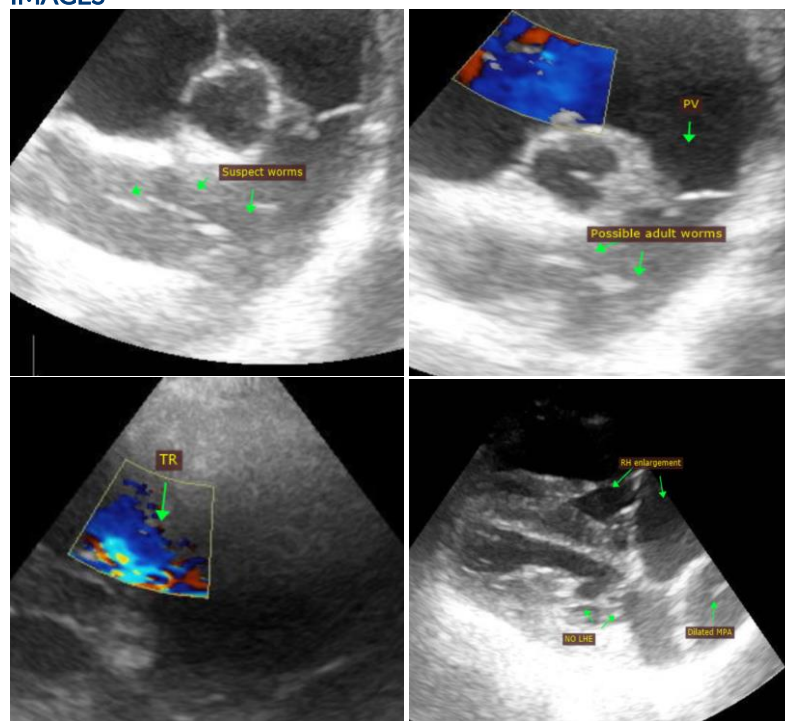
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PLAN

Abdominocentesis if needed. Immediate referral due to suspected Caval syndrome as discussed. If referral is not possible or declined, cardiac supportive medications can be attempted as follows with a poor prognosis: Institute Lasix 1-2mg/kg PO q12h. Institute Spironolactone 1-2mg/kg PO q12h. Institute Pimobendan 0.3mg/kg PO q12h. Institute Sildenafil 1-2mg/kg PO q8h. Continue Doxycycline/Heartguard as dictated by the HW society. Continue Prednisone. Once stabilized the split protocol is recommended, as dictated by the HW society.

Once heartworm negative, a recheck echocardiogram and chest radiographs are recommended in 6 months to reassess right heart changes.

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