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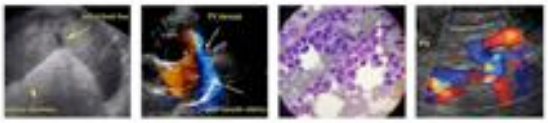

IMAGING PERFORMED BY
pawsonography@gmail.com 530-786-8340

PATIENT

Twister Pomeroy

SPECIES

Canine

BREED

Labrador Cross

SEX

Neutered Male

AGE

11 years

WEIGHT

48.8 lbs

INTERPRETED BY

Lisa Carioto, DVM, DVSc, Diplomate ACVIM

IMAGING PERFORMED BY

Loetitia Saint-Jacques, RVT

HOSPITAL NAME

Brighton Greens VH

REFERRING VET

Dr. Janeway

INVOICE

31242

DATE

6/22/22

PRESENTING CLINICAL SIGNS

History: Pt had a seizure during exam 6/16/2022- not on anticonvulsants currently. Hyperadrenocorticism on trilostane, Weight loss current weight 48.8lbs, prev 72.4 lb 2019 grade 3/6 murmur LHS and 1/6 RHS, RR 28 BW chem WNL, CBC WNL, T4 2.3 (well controlled hypothryoidism), UA USG 1.004 and trace proteinuria, fecal and accuplex all negative, ACTH stim pre 1.5 and post 5.0 (POST-TRILOSTANE: Pre & post cortisol levels between 1.5-9.1 ug/dL indicate optimal control) appears well controlled. Radiographic Findings Images of the thorax and abdomen. Cardiac size and shape is within normal limits. There is a cranial thoracic mass which is centralized. Pulmonary infiltrates are not present. Serosal detail is within normal limits. There appears to be enlargement of the liver identified with a nodular pattern involving the ventral liver on the lateral views. Gastrointestinal dilation is not present Conclusion Cranial mediastinal mass is identified with a concern for a nodular liver pattern and thoracic and abdominal ultrasound is indicated as round cell neoplasia is a top consideration Systolic blood pressure 130mmHg Rhythm: Sinus ECG AND CLINICAL ASSESSMENT: There are no pathologic arrhythmias noted on this ECG tracing. The P wave duration is increased; this may suggest left atrial enlargement but can also be identified as a normal patient variant. The reported heart murmur noted in this patient raises concern for underlying structural heart disease. DIAGNOSTIC RECOMMENDATIONS: Given the reported heart murmur, additional diagnostics including thoracic radiographs and an echocardiogram (if possible) are recommended prior to anesthesia to assess anesthetic risk. Recommend a blood pressure if not previously performed.

ULTRASONOGRAPHIC EXAMINATION OF THE HEART

CANINE CARDIAC PARAMETERS	MR VMAX (m/s)	TR VMAX (m/s)	LA/AO (Boon method)	LA/AO (Heart Base; Swedish)	FS (%)	EF (%)	EPSS (cm)
NORMAL PARAMETER	4.5-5.5	<2.7	1.3	<1.6	28-40	40-100	<0.6
PATIENT	6.58	2.95	NM	2.03	45	NM	WNL
CANINE CARDIAC	**HR** (BPM)	**AV VMAX** (m/s)	**PV MAX** (m/s)	**BODY WEIGHT** kg	**LA** 2D long axis Base view	**LVIDd** Avg; 2D and m-mode short axis	**LVIDs** Avg; 2D and m-mode short axis
NORMAL PARAMETER	50-100	0.7-1.7	0.7-1.6				
PATIENT		1.48	0.72	22.2	4.38	5.31	2.94

Adapted from June Boon, Veterinary Echocardiography, 1998
Sisson D et al. JVIM 1991; 5: 232, and Jacobs et al. Am J Vet Res 1985; 46:1705

Echocardiographic findings

Thorax

A heterogeneous, round, soft tissue structure with irregular contours is visualized cranial to the heart, in the region of the mediastinum. It measures 4.81 cm in diameter x 5.15 cm in length and consists of multiple, ill-defined, hypo and hyperechoic regions. An anechoic to hypoechoic nodular lesion is noted toward the center of the mass in one view. It is vascularized when evaluated with colour Doppler. Acoustic enhancement is noted, suggestive of inflammation

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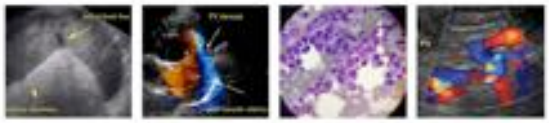

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Cardiac

Mitral valve

- Mild thickening and irregularity of both leaflets, consistent with myxomatous degeneration.
- Very mild prolapse of the posterior leaflet.
- Moderate to marked mitral regurgitation with one large posterior jet and a much smaller divergent jet (toward the interventricular septum).
- Moderate left auricular enlargement.
- LA: Ao ratio: Moderately increased
- LA normalized for BW (LAN = 1.5); moderate atrial enlargement
- LVIDd normalized for BW (LVIDND = 2.13); moderate left ventricular enlargement
- LVIDs normalized for BW (LVIDNs = 1.10); within normal limits (WNL)

Aortic valve

- No abnormalities
- No aortic insufficiency

Tricuspid valve

- Minimal thickening and irregularity of both leaflets.
- No prolapse.
- Mild to moderate tricuspid regurgitation with an eccentric jet.
- Borderline or mild pulmonary hypertension (if using 3 m/s vs. 2.7 m/s as cut-off).
- No obvious right ventricular or atrial enlargement (0.36 cm).

Pulmonic valve

- No abnormalities
- No pulmonary insufficiency.
- Main pulmonary artery within normal limits.
- Pulmonary artery - bifurcation, no abnormalities.
- No signs of heart worm.

Other

- No signs of pericardial or pleural effusion
- Pulmonary veins, no abnormalities.
- No evidence of pulmonary edema.

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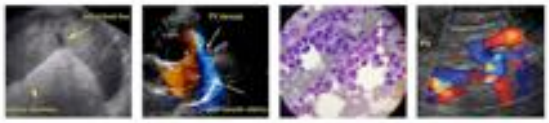

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ULTRASONOGRAPHIC EXAMINATION OF THE ABDOMEN

Urinary System

The urinary bladder is well distended with anechoic contents. The wall is smooth and regular. No abnormalities are noted with the trigone or proximal urethra, and there is no evidence of sediment, cystoliths, polyps or a mass.

Prostate

The prostate is homogenous and measures 1.17 cm; within normal limits for a neutered male.

Kidneys

The **left** kidney measures 6.99 cm. The capsule is smooth. The cortex is mildly hyperechoic and thickened with occasional pinpoint hyperechoic foci scattered throughout the parenchyma. A mild loss of the normal definition of the cortico-medullary junction is present. Mineralizations and very small nephroliths are present along the diverticulae and in the pelvis, without evidence of pyelectasia. Blood flow is within normal limits. The surrounding mesentery is not hyperechoic.

The **right** kidney measures 6.96 cm. The capsule is smooth. The cortex is mildly hyperechoic and thickened with occasional pinpoint hyperechoic foci scattered throughout the parenchyma. A mild loss of the normal definition of the cortico-medullary junction is present. Mineralizations and very small nephroliths are present along the diverticulae and in the pelvis, without evidence of pyelectasia. Blood flow is within normal limits. The surrounding mesentery is not hyperechoic.

Aortic bifurcation/trifurcation

No abnormalities observed.

Adrenal Glands

The **left** adrenal gland measures 1.51 cm at the cranial pole, 2.87 cm at the caudal pole. It measures 2.96 cm at its largest diameter x 4.66 cm in length. A mass effect at the caudal pole cannot be excluded. An ill-defined hyperechoic region is noted within the centre of the gland, suggestive of a “retracted” or “shrunken” medulla. Anechoic to hypoechoic foci and nodules are scattered amongst the hyperechoic parenchyma. The parenchyma at both poles is homogeneous and is similar to what is considered “normal”. The are no signs of thrombi or metastases in the surrounding vasculature and the mesentery is not hyperechoic.

The **right** adrenal gland measures 1.47 cm the caudal pole x 3.40 cm in length. An accurate measurement of the cranial pole is not possible due gas in the surrounding GI tract, however, it is approximately 0.98 cm. The caudal pole is enlarged, round and well-defined, suggestive of a nodule. The echotexture is homogeneous. The are no signs of thrombi or metastases in the surrounding vasculature and the mesentery is not hyperechoic.

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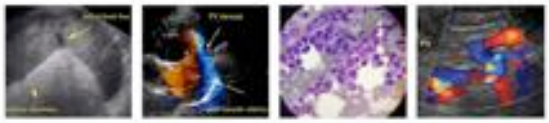

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Spleen

The spleen is within normal limits in size, architecture, echotexture, and echogenicity. The capsule is smooth. A mildly hyperechoic nodule (i.e. slightly hyperechoic to the normal parenchyma) is noted within the spleen. It has mildly irregular contours and mildly heterogeneous with a couple of hypoechoic nodules of variable size. The hyperechoic nodule appears encircled by a hypoechoic "halo". The nodule measures 1.26 cm x 1.43 cm. The parenchyma adjacent to the "halo" is miliary, causing a "reverse" target-like lesion. No abnormalities are observed with its vasculature, i.e. congestion and thrombi are not identified.

Liver

There are no obvious signs of hepatomegaly and its borders are smooth, but rounded. The liver is severely heterogeneous, consisting of multiple, moderate to large, relatively well-defined, heterogeneous masses (see images, below). The largest one 4.29 cm x 4.54 cm. Some of the masses disrupt the integrity of the capsule. The masses are characterized as round, or oval. Many of them have smooth borders and hypo- and hyperechoic nodules of variable size. No obvious abnormalities are noted with the hepatic vessels.

The gallbladder (GB) is markedly dilated (consistent with a fasted individual). A moderate amount of free floating, gravity-dependent and inspissated echogenic material (sludge) is present. The inspissated sludge also formed small nodules. The GB wall is not overtly hyperechoic, however, it is mildly thicker than normal at 2 mm. The cystic and common bile ducts are not visualized, however, signs suggestive of an obstruction are not appreciated.

Gastrointestinal

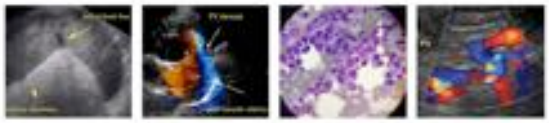
Gas is present within the lumen of the stomach. The gastric wall is within normal limits in thickness and the wall layers are well defined. No obvious abnormalities are observed with its peristalsis.

A large amount of ingesta and gas are present in the proximal duodenum, small intestines and transverse colon. The small intestinal wall thickness, including the duodenum, is within normal limits and the definition of the wall layers is preserved.

The colonic wall is not thickened and mural detail is considered normal. Well-formed stools and gas are present in the colon.

Pancreas

The **right limb** is mildly hypoechoic. The contours are curvilinear. In addition to the diffuse hypoechogenicity, a very subtle coarse echotexture is observed. Thus, abnormalities are suggestive of mild active pancreatitis, and what are, most likely, age-related changes. Overt signs of neoplasia are not noted.



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Other

Lymph nodes

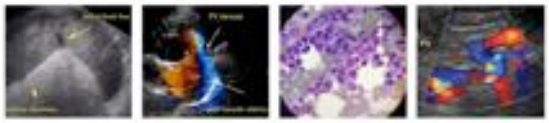
Two hepatic lymph nodes are noted dorso-medially to the liver. They are moderately heterogeneous with hypoechoic nodules of various size, some of which appear as "target"-like lesions.

The larger LN measures 2.48 cm in diameter x 2.99 cm in length. The smaller LN 1.54 cm in diameter x 1.63 cm in length. Additional hepatic LNs are observed in different views. Some appear to be the same node that is trilobed.

Abdominal effusion is not visualized.

ULTRASONOGRAPHIC FINDINGS

- Myxomatous degeneration of the mitral (mild) and tricuspid (very mild) valves, ACVIM stage B2, with moderate left atrial and ventricular enlargement. The degree of myxomatous degeneration of the tricuspid valve does not correlate with the tricuspid regurgitation and borderline/mild pulmonary hypertension. That is, an underlying pulmonary cause is suspected, in which the mediastinal mass may be playing a role.
- Twister's echocardiographic results meet the criteria from the EPIC study to begin treatment with pimobendan (Vetmedin) to help slow the progression of his heart disease. However, further diagnostics and/or improvement or stabilization of his general condition is recommended prior to considering cardiac medication.
- Please refer to the abdominal ultrasound report for further details regarding the thoracic mass.
- **Liver**: The appearance, number and size of the masses are highly suggestive of neoplasia. The masses are most consistent with metastatic disease. Therefore the mediastinal mass would be the primary tumour with hepatic metastases. Differential diagnoses include some form of carcinoma, for example, a thyroid carcinoma. Histiocytic sarcoma cannot be excluded despite not having the typical appearance. Lymphoma is also possible, however, the hepatic lesions are not classical either. Although not common, some individuals can have two different neoplasms concurrently.
- **Mediastinal mass**: As mentioned above, the most likely diagnosis is a thyroid carcinoma, however, other causes may include, undifferentiated carcinoma, histiocytic sarcoma or lymphoma.
- **Spleen**: Differential diagnoses for the hypoechoic nodules include nodular or lymphoid hyperplasia, as well as, extramedullary hematopoiesis. However, a "target like lesion" and occasional miliary regions are observed, which are more suggestive of neoplasia, for example, carcinomas.
- **Lymph nodes**: Neoplasia must be considered the primary differential diagnosis for the lymphadenomegaly. Reactive hyperplasia is considered much less likely .
- **Adrenal glands**: Multiple differential diagnoses could explain the abnormalities, i.e., adrenal hyperplasia secondary to chronic illness, stress, as well as, pituitary dependent hyperadrenocorticism. Nodular hyperplasia and other age-related changes are also evident.



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An adenoma of the right gland may be present. Although rare, bilateral adrenal neoplasia can occur, including pheochromocytomas, adenocarcinomas or carcinomas. Individual adrenal glands may also have different tumours. On a more positive note, it is possible that the changes observed are a result of trilostane administration. Large, abnormal appearing glands have been observed in association with treatment, for reasons still unknown. It is important to note that the phrenico-abdominal vein and surrounding vasculature do not show signs of tumour invasion or thrombi.

- **Pancreas**: A mild pancreatitis is suspected, in addition to age related changes. Some of the abnormalities may also be due to fibrosis secondary to previous episodes of pancreatitis.

- **Gallbladder**: There are no obvious signs of cholecystitis other than a mildly thickened wall. The latter cannot be excluded despite the absence of sonographic signs, including secondary bacterial infections. **Gallbladder sludge** is usually clinically insignificant. Some dogs may show clinical signs of gastroesophageal reflux disease (GERD), therefore, obtaining a history regarding signs of GERD from the client is suggested.

- **Kidneys:** Although some age related changes are observed, glomerulonephritis cannot be excluded. Pyelonephritis is considered much less likely.

- **Gastrointestinal tract**: Assuming that Twister was fasted, a delay in gastric emptying and a mild ileus is suspected based on the large amount of gas and ingesta present in the gastrointestinal tract. No significant abnormalities are observed.

INTERPRETATION OF THE FINDINGS & FURTHER RECOMMENDATIONS

Other suggestions/recommendations include:

- Monitoring of the resting (sleeping) respiratory rate (RRR) is highly recommended once a day. The RRR should NOT EXCEED 30 breaths per minute (bpm). If the respiratory rate is greater than 30 bpm, *or* if there is a gradual increase (over a day or two) toward 30 bpm, the patient should be evaluated immediately for congestive heart failure and the appropriate treatment initiated.

- Other clinical signs clients should monitor for include coughing (particularly at night), fatigue, lethargy, decreased exercise tolerance (i.e., not being able to walk for as long before becoming tired, or "running out of breath" while playing, or going up and down stairs, as well as syncope (collapsing or fainting spells). Restlessness, or agitation during the night, or being unable to find a comfortable position to sleep are also very common clinical signs.

- Mild salt restriction is suggested (less than 0.9 grams/1000 kcal of food). Monitor salt content in treats.

+/- Omega-3 fatty acids may be helpful (EPA = 40 mg/kg/day and DHA = 25 mg/kg/day); gradual uptitration of the dose is suggested to decrease risk of gastrointestinal effect

Seizure on June 16, 2022: possible brain metastases vs. stress of the visit to the veterinary hospital, and/or changes in barometric pressure.

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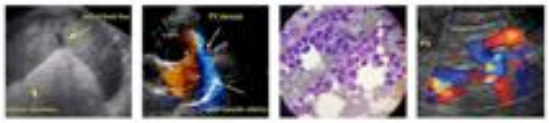

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Palpation of Twister's cervical area and entire neck (to the thoracic inlet) is suggested, although the absence of a mass does not exclude thyroid carcinoma.

Arterial blood pressure (already performed)

Performing fine needle aspirates of the hepatic lymph nodes and hepatic masses should provide a diagnosis with less risk compared to aspirates of the mediastinal mass. A coagulation profile and recent platelet count are recommended prior to the procedure, in addition to a discussion with the client regarding possible hemorrhaging, albeit low.

Ideally, a urine culture and sensitivity

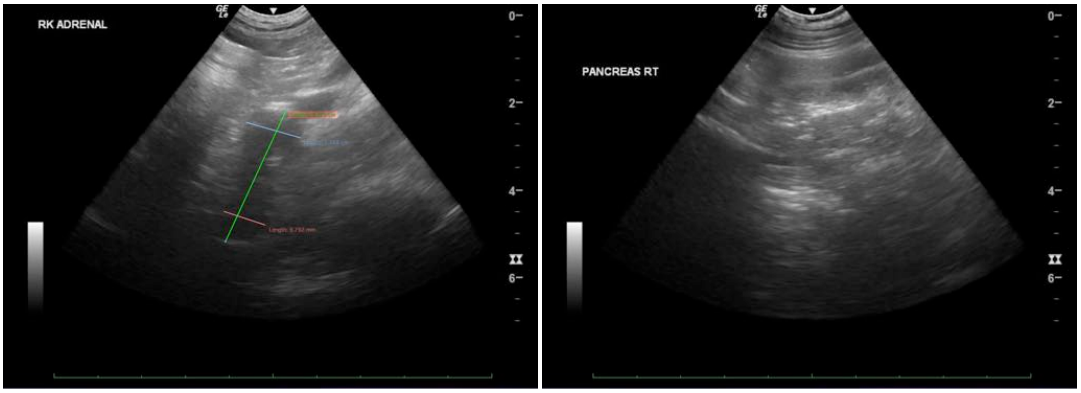
A urine protein: creatinine ratio (UPCR)

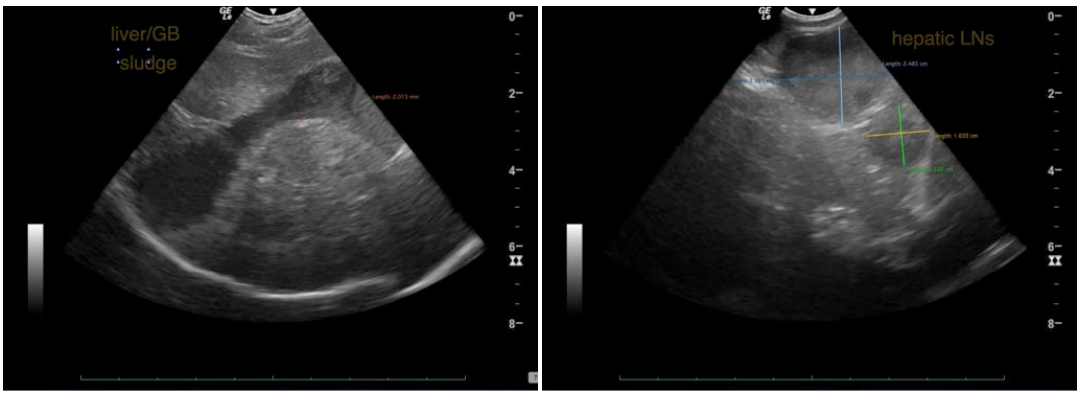
telmisartan may be indicated depending on the results of the UPCR

Obtaining a history regarding signs of gastro-esophageal reflux disease (GERD) from the client is suggested. Treatment with an anti-acid, or low dose of a proton pump inhibitor may be required (decrease dose as it is metabolized by liver).

Discontinuation, or adjustment of the dose of trilostane may be necessary to help improve Twister's appetite. This should not affect control of his hyperadrenocorticism as it is not well controlled at the moment (despite the reference range provided by the laboratory).

Twister has many co-morbidities. Referral to an internist or a consultation with an internist (who also performs cardiology) is suggested depending on the above results.





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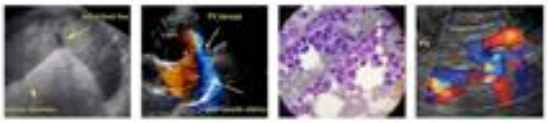

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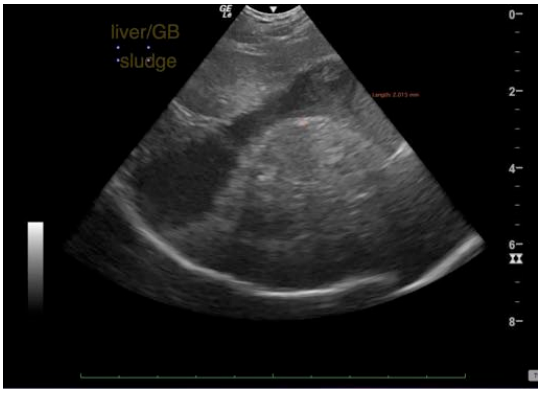

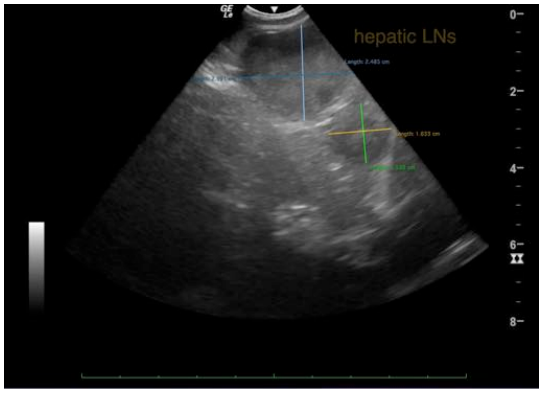

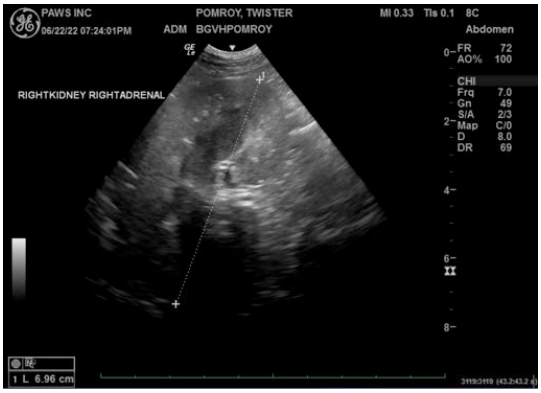

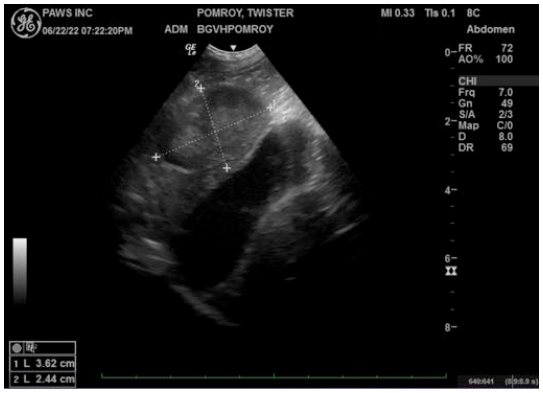

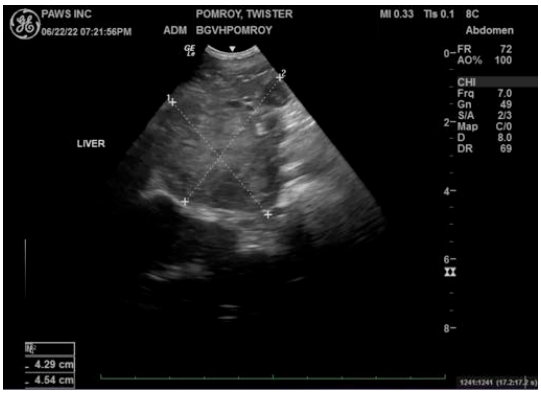

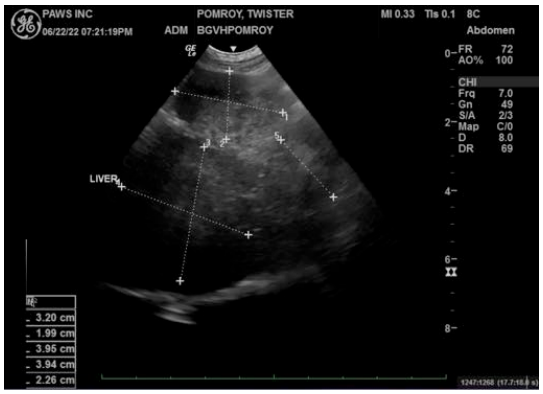

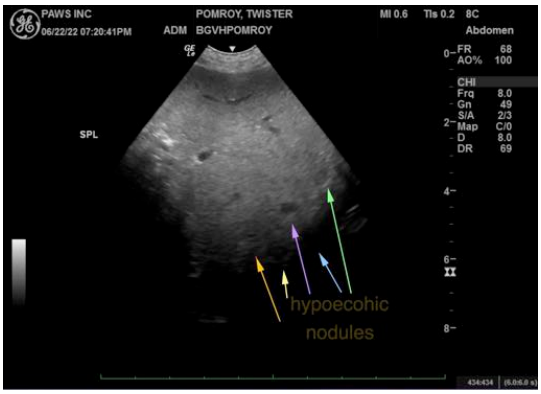

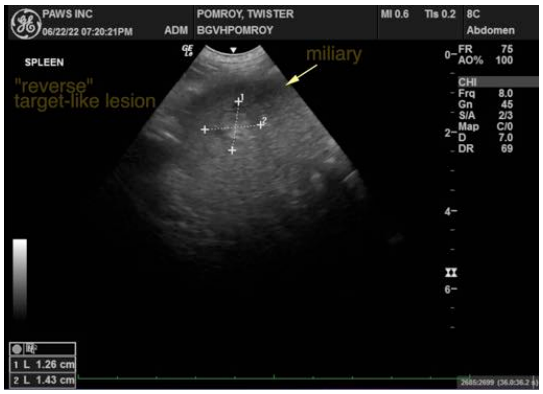

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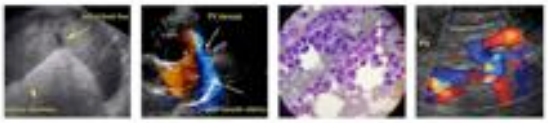


IMAGING PERFORMED BY
pawssonography@gmail.com 530-786-8340

PATIENT

Twister Pomeroy

SPECIES

Canine

BREED

Labrador Cross

SEX

Neutered Male

AGE

11 years

WEIGHT

48.8 lbs

INTERPRETED BY

Lisa Carioto, DVM, DVSc, Diplomate ACVIM

IMAGING PERFORMED BY

Loetitia Saint-Jacques, RVT

HOSPITAL NAME

Brighton Greens VH

REFERRING VET

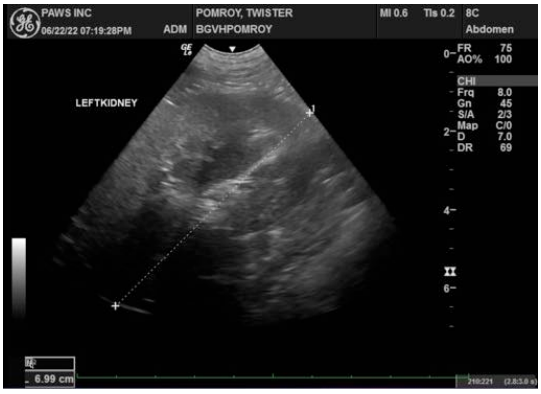
Dr. Janeway

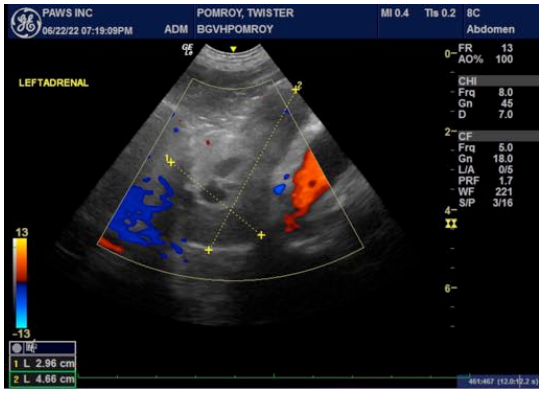
INVOICE

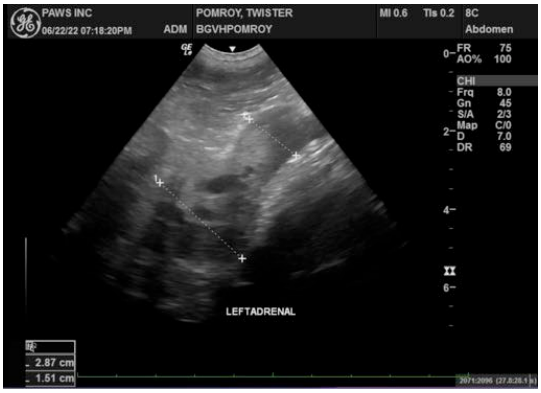
31242

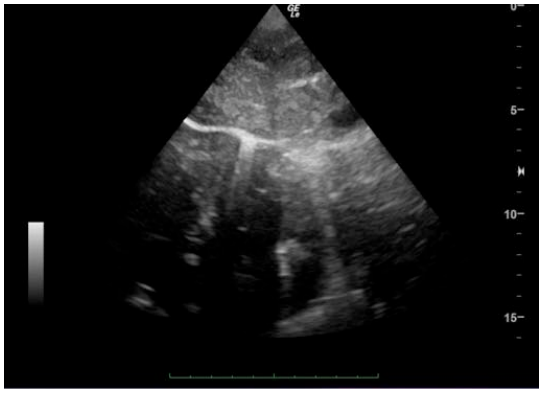
DATE

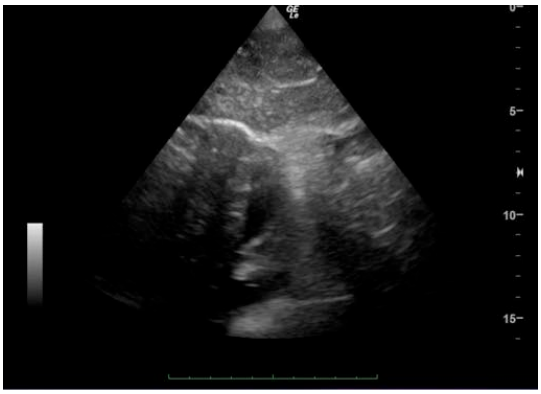
6/22/22

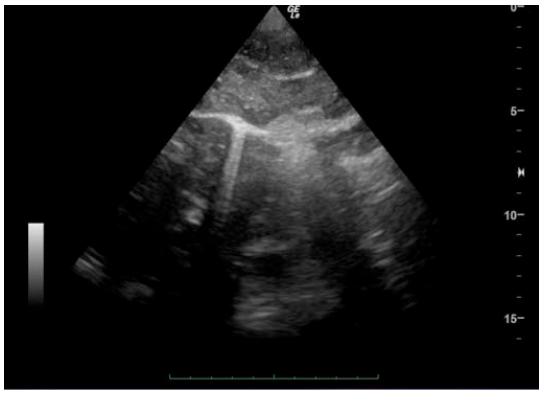


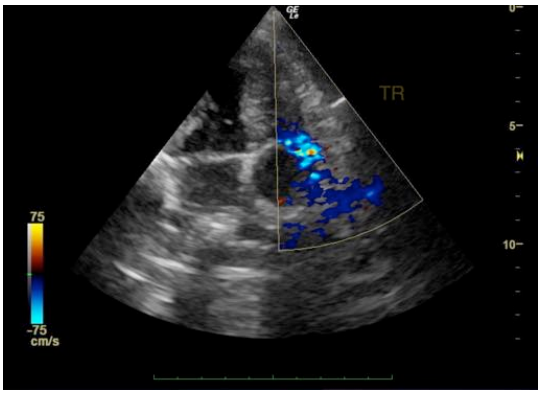


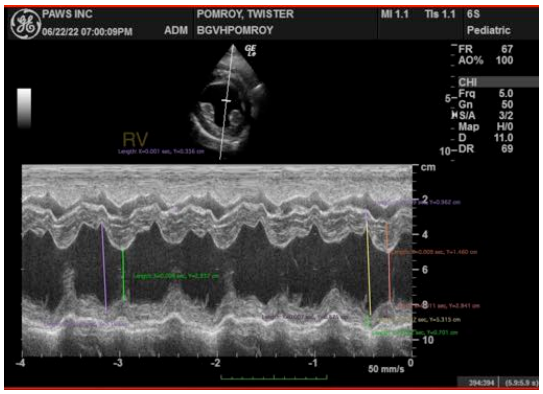












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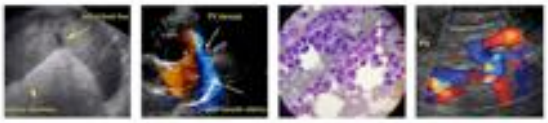

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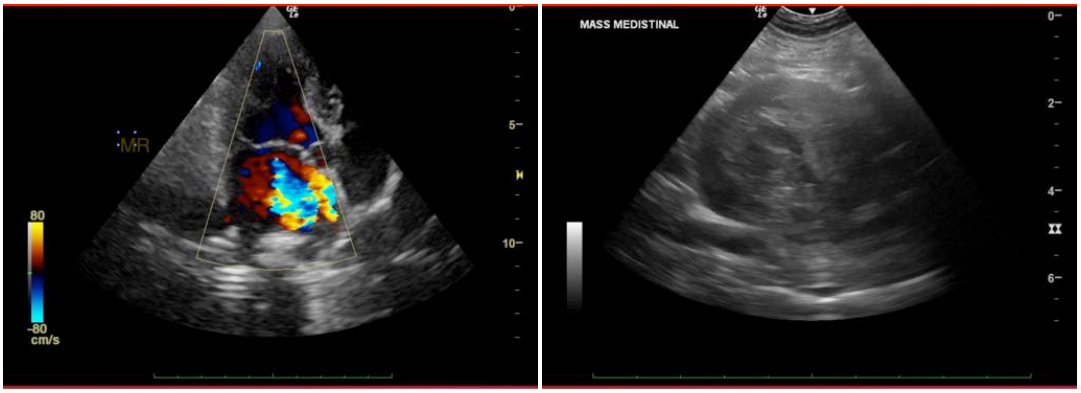

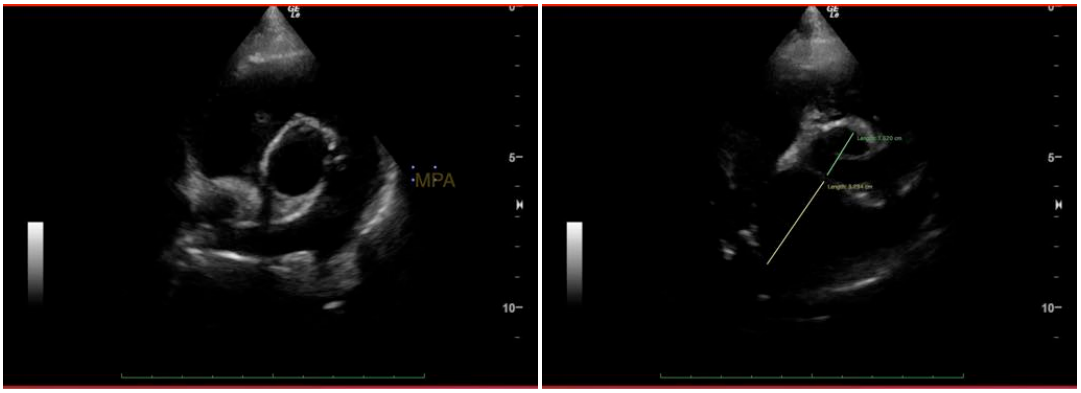

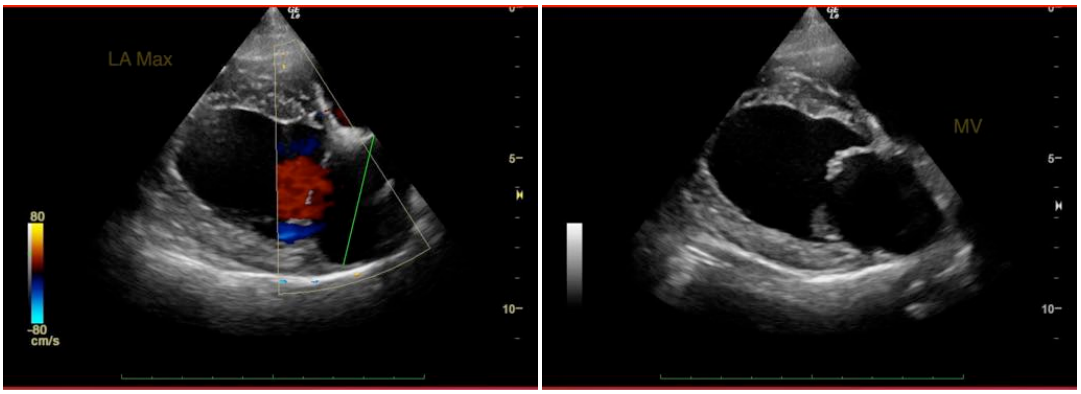

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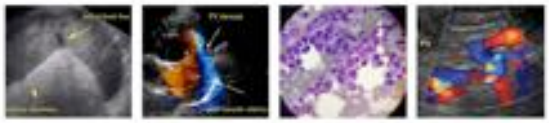

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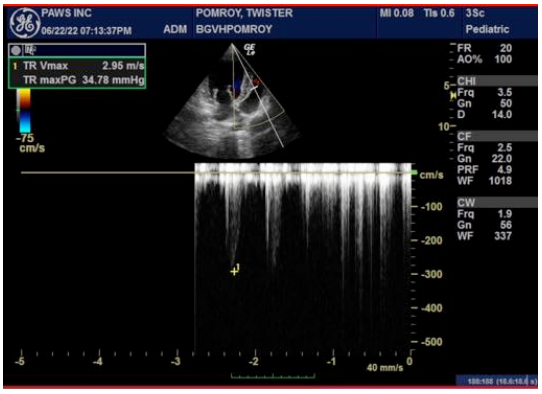

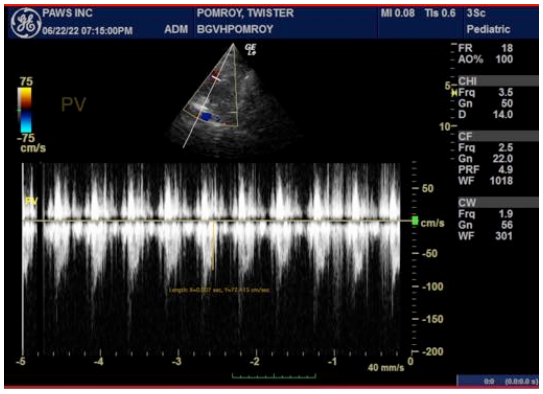

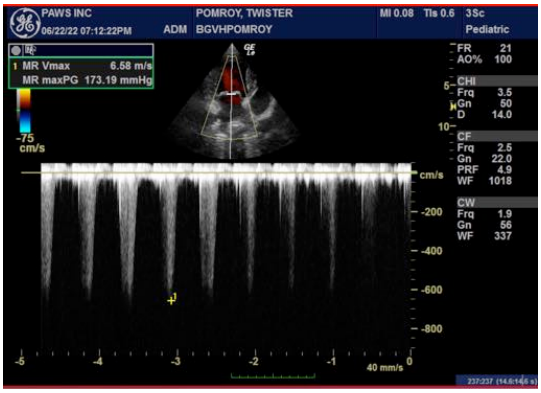

The information and recommendations provided are based on the images presented by the referring veterinarian/sonographer. No evaluation can be communicated regarding pathology that was not visible in the image/video clips provided.

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.

Lisa Carioto, DVM, DVSc, Diplomate ACVIM

Lisa.Carioto@sonopath.com