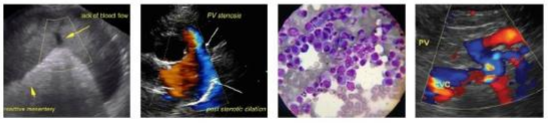

PATIENT

Calleigh Watson

SPECIES

Canine

BREED

ACD

SEX

Spayed Female

AGE

13 Years 11 Months

WEIGHT

61 Pounds

INTERPRETED BY

Lisa Carioto, DVM, DVSc, Diplomate ACVIM

IMAGING PERFORMED BY

Loetitia Saint-Jacques, RVT

HOSPITAL NAME

Tahoe Integrative Care

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PRESENTING CLINICAL SIGNS

History: 13year 11month old, F/S, Australian Cattle Dog mix weighing 61#. Ultrasound today is to monitor an adrenal tumor that was diagnosed 2 years ago. Previous records are from UC Davis. Calliegh is currently taking Gabapentin, Galliprant, Probiotics and CBD.

Abnormal PE/Chem/CBC/UA Results: 2020- An abdominal ultrasound revealed a large, heterogenously hyperechoic mass (~ 2.5 cm in diameter), most compatible with a malignant neoplasia. Our top differential is a pheochromocytoma. We have not ruled out adrenal hyperadrenocorticism. A urine cortisol: creatinine ratio was elevated (46.3),

ULTRASONOGRAPHIC EXAMINATION OF THE HEART

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	<1.3	28-40	40-100	<0.6
PATIENT	5.1	1.5	NM	2.02	35	NM	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				
PATIENT	--	1.53	1.27	27.7	4.38	5.37	3.49

Electrocardiogram (six-lead)

Heart rate 120 – 130 breaths per minute

Sinus arrhythmia with a few left sided premature ventricular contractions

Occasional supraventricular premature contractions (pages 10, 46)

Intermittent episodes of increased heart rate (between page 19 and 20), however, sinus rhythm maintained

Thoracic Radiographs (3 views)

Mild cardiomegaly with mild left atrial enlargement

Pulmonary vessels are equal in size

Moderate interstitial lung pattern

Mild to moderate peribronchiolar lung pattern

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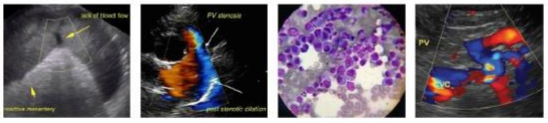

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Small amount of air in esophagus

Spondylosis (thoracic and thoraco-lumbar vertebrae)

Periosteal reactions dorsal to the dorsal vertebrae

Age-related changes affecting the sternabrae and costo-chondral junctions

Microchip

No overt changes to suggest pulmonary edema, however, chronic bronchitis cannot be excluded, as well as very mild pulmonary congestion

Echocardiographic findings

ECG during echocardiogram: Intermittent arrhythmia noted; both left sided premature ventricular contractions and supraventricular premature contractions

Mitral valve

- Mild (posterior) to moderate (septal) thickening and irregularity of leaflets, consistent with myxomatous degeneration
- Mild prolapse of septal leaflet.
- Marked mitral regurgitation with posterior jet.
- Moderate left auricular enlargement.
- Moderate rounding of the interventricular septum, i.e. left ventricular enlargement is present
- LA: Ao ratio: Marked increase
- LA normalized for BW (LAN = 1.4); moderate to marked enlargement
- LVIDd normalized for BW (LVIDND = 2.0); moderate to marked enlargement
- LVIDs normalized for BW (LVIDNs = 1.22); high normal

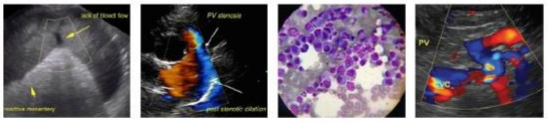
Aortic valve

- No abnormalities
- No aortic insufficiency

Tricuspid valve

- Very mild thickening and irregularity of the septal leaflet, consistent with myxomatous degeneration
- No prolapse of posterior leaflet.
- Trivial tricuspid regurgitation.
- No right ventricular or atrial enlargement.

Pulmonic valve



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

Other

- No signs of pericardial or pleural effusion
- No evidence of pulmonary edema.
- No obvious signs of a mass.

ULTRASONOGRAPHIC EXAMINATION OF THE ABDOMEN

Urinary System

The urinary bladder is well distended. The wall is smooth and regular, except for very mild irregularity at the apex. No abnormalities are present with the trigone or proximal urethra. A very small amount of free floating sediment is present, however, there is no evidence of cystoliths, polyps or a mass.

Kidneys

The **left** kidney measures 6.31 cm. The capsule is smooth. A thick hyperechoic band is observed along the medulla, traversing parallel to the corticomedullary junction, which accentuates the definition of the cortico-medullary junction. Very mild mineralization of the pelvis is observed. There are no signs of nephroliths or pyelectasia. Blood flow is within normal limits. The surrounding mesentery is not hyperechoic.

The **right** kidney measures 6.34 cm. Findings are similar to the left kidney.

Aortic bifurcation/trifurcation

No abnormalities observed.

Adrenal Glands

The **left** adrenal gland measures 0.51 cm at the cranial pole, 0.49 cm at the caudal pole. No abnormalities are noted with the gland's overall architecture, echogenicity or echotexture. The phrenico-abdominal vein and surrounding vasculature and mesentery are unremarkable.

The **right** adrenal gland is round to elliptical and replaced by a mass. It measures approximately 3.61 cm in diameter x 3.42 cm in length and 3.31 cm in diameter x 4.57 cm in length in a different view. It had a large anechoic to hypoechoic centre and the periphery is composed of soft tissue. Two additional hypoechoic areas are noted laterally ("facing the kidney"). There is no evidence of mineralization or calcification. There is no evidence of invasion of the phrenico-abdominal vein or surrounding vasculature. The surrounding mesentery is not hyperechoic.

Spleen

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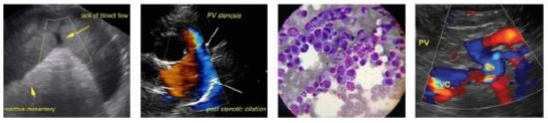

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The spleen is within normal limits in size, architecture, and echogenicity. The capsule is smooth. Two hypoechoic nodules, measuring 0.83 cm in diameter x 1.16 cm in length, and 0.75 cm in diameter x 1.02 cm in length, are noted mid-body. Neither nodule disrupts the integrity of the capsule. No abnormalities are observed with its vasculature, i.e. congestion and thrombi are not identified.

Liver

Mild hepatomegaly is suspected, however, this is better characterized at the time of the ultrasound or radiographically. The liver's borders are smooth, but mildly rounded. Its overall echotexture is homogeneous, other than the occasional hypoechoic nodule. It is mildly, but diffusely hyperechoic, i.e. it is isoechoic to the spleen.

A few hypoechoic nodules are observed scattered throughout the parenchyma. A hypoechoic nodule measuring 1.27 cm in diameter x 1.50 cm in length is noted in the left liver. Another measures 1.46 cm in diameter, and another measures 1.56 cm in diameter x 2.68 cm in length. The latter is ventral to the gallbladder (GB). A few other hypoechoic nodules are noted in the vicinity of the GB. A nodule with a subtle target-like appearance (i.e. hyperechoic centre and hypoechoic periphery) is visualized dorso medially to the GB. It measures 0.76 cm in diameter x 1.06 cm in length. No obvious abnormalities are noted with the hepatic vessels.

The gallbladder (GB) wall is within normal limits in thickness and echogenicity. A small amount of echogenic material is present within the GB. The portions of the cystic and/or common bile ducts observed are not dilated or tortuous, i.e. there are no signs of an obstruction.

Gastrointestinal

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

The small intestinal wall thickness, including the duodenum, is within normal limits and the definition of the wall layers is preserved. Abnormally dilated loops of bowel are not observed.

The colonic wall is not thickened and mural detail is considered normal.

There are no obvious signs of a mass, foreign body, infiltrative disease or an obstruction in the gastrointestinal tract.

Pancreas

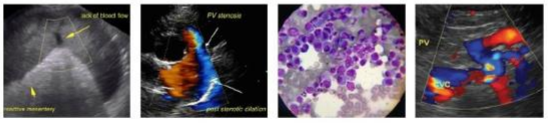
No abnormalities are observed with the architecture, contours, echogenicity or echotexture of the pancreas. There is no evidence of hyperechogenicity of the surrounding mesentery, i.e., signs of active pancreatitis are not present.

Other

Lymph nodes No abnormalities are observed

Abdominal effusion is not visualized.

ULTRASONOGRAPHIC FINDINGS



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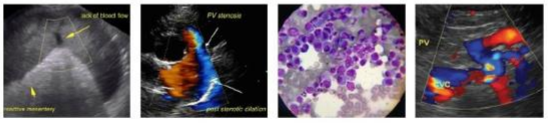
- Myxomatous degeneration of the mitral (moderate) and tricuspid (very mild) valves, ACVIM stage B2, i.e. moderate to marked left atrial and left ventricular enlargement are present, as well as increased effort in systole.
- Although obvious signs of congestive heart failure are not evident based on today's ultrasound findings, advanced changes are present. Therefore, treatment with pimobendan (Vetmedin) is recommended to help slow the progression of Calliegh's disease.
- **Adrenal glands**: The most likely differential diagnoses include an adenocarcinoma or pheochromocytoma. Although less likely, a benign adenoma is still possible, despite the size of the mass. A functional adenoma (adrenal tumour) causing hyperadrenocorticism (HAC) is possible depending on Calleigh's clinical signs, i.e. further diagnostics, such as a low-dose dexamethasone suppression test, may be pursued if she is demonstrating signs of hyperadrenocorticism. A pheochromocytoma may not cause clinical signs or may cause signs of agitation or lethargy, including syncope, due to elevations and decreases in blood pressure.
- **Liver**: A vacuolar hepatopathy is possible. Differential diagnoses for the hypoechoic nodules include nodular hyperplasia, a benign, age-related change. However, the one "target-like" lesion, albeit subtle, can be suggestive of neoplasia, for example, metastases associated with adenocarcinoma.
- **Gallbladder**: The gallbladder sludge is most likely clinically insignificant.
- **Spleen**: The hypoechoic nodules are suggestive of nodular and/or lymphoid hyperplasia. Obvious signs of neoplasia are not appreciated.
- **Kidneys**: The changes are suggestive of mild age-related degeneration. The medullary rim band may occur due to glomerulonephritis and proteinuria in some patients. The latter may occur with HAC.
- **Urinary bladder**: The sediment within the urinary bladder is likely clinically insignificant. The very mild irregularity of the mucosa of the bladder wall may be overinterpretation on my part, or Calleigh may have subclinical bacteriuria.

INTERPRETATION OF THE FINDINGS & FURTHER RECOMMENDATIONS

Suggestions/recommendations include the following:

- Evaluation of blood pressure
- Treatment with pimobendan (Vetmedin) at 0.25-0.30 mg/kg PO every 12 hours. To decrease the risk of GI side effects, the dose should be started at 0.10 mg/kg PO every 12 hours for 3 days prior to increasing to the full dose. Administer with a small amount of food to decrease nausea.
- Antiarrhythmic medication is not required unless tachycardic or hypertensive and suffering from syncope.
- spironolactone (0.5-1 mg/kg) has anti-fibrotic effects and may be helpful depending on response to pimobendan.



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- furosemide – A prescription available at home is suggested, in case of an emergency.
- 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.
- Moderate salt restriction is suggested (between 0.4-0.5 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 (every 3-5 days) to decrease risk of gastrointestinal effects. However, they should not be introduced at the same time as pimobendan.
- If benazepril, telmisartan or spironolactone are introduced: blood work PCV/TS, renal profile, SDMA and arterial blood pressure, are recommended 10-14 days after initiation.
- Blood work, CBC, serum biochemical profile, including a SDMA, and arterial blood pressure, are recommended at least twice a year to monitor renal parameters. If cost prohibitive, a PCV/TS may be performed instead of a full CBC.
- Re-evaluation of an echocardiogram is suggested in 6 months, or sooner depending on clinical signs.

The following are suggested/recommended:

Arterial blood pressure for cardiac disease, as well as adrenal tumour.

Metanephrine concentrations in the urine may help exclude a pheochromocytoma

A low-dose dexamethasone suppression test, may be pursued if she is demonstrating signs of hyperadrenocorticism.

Further diagnostics for the adrenal mass may not be necessary if Calliegh is not demonstrating clinical signs.

A urinalysis and urine culture are suggested

If the urine culture is negative, a urine protein: creatinine ratio is suggested to exclude proteinuria.

If proteinuric and not suffering from hyperadrenocorticism, one could consider telmisartan or benazepril. A slow introduction is suggested, e.g., 0.25 mg/kg PO once a day for 3 days, then 0.25 mg/kg PO every 12 hour thereafter.

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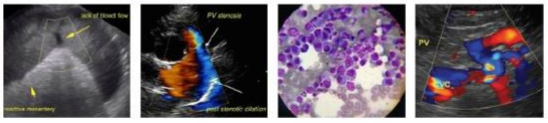

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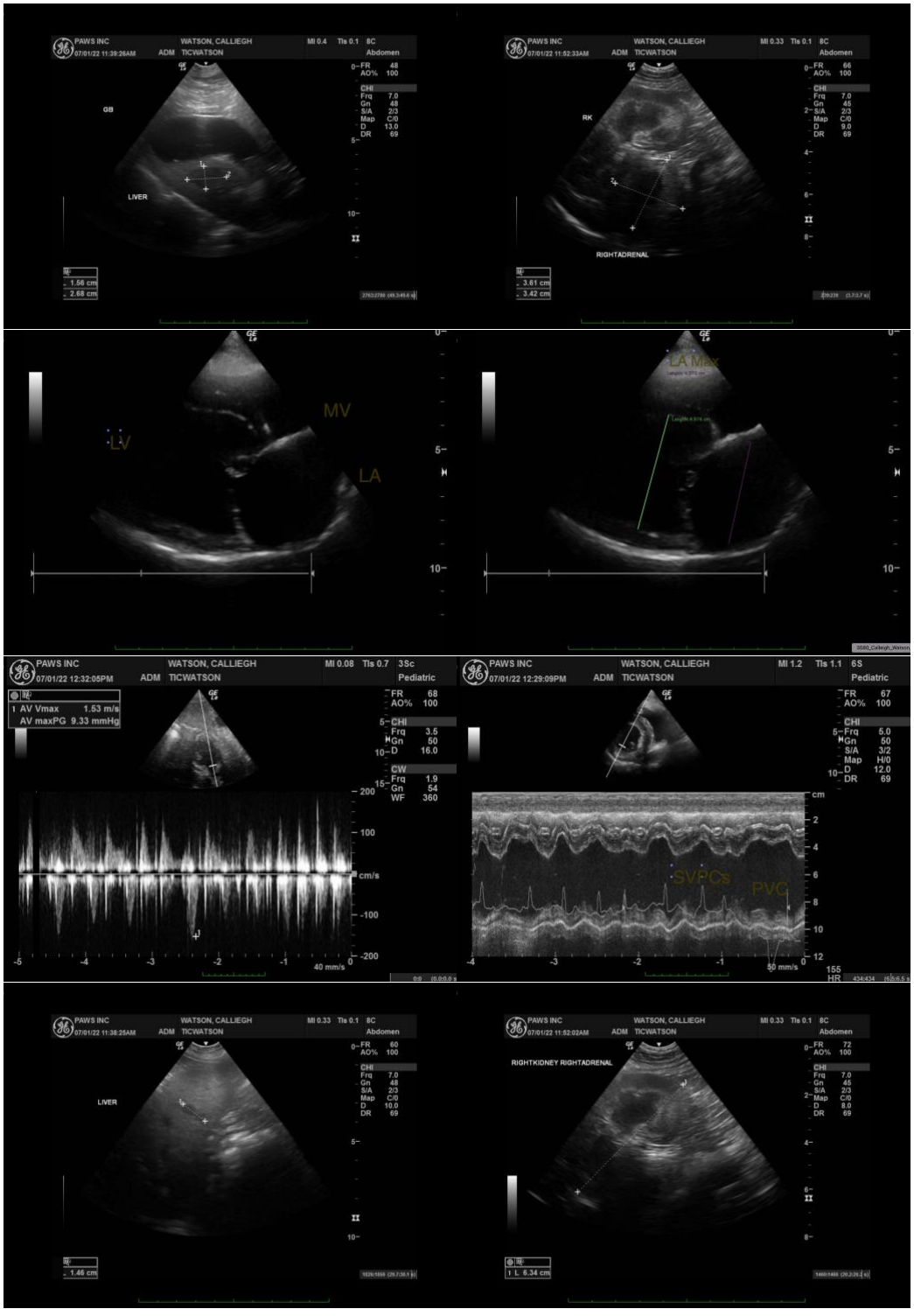
Please see echocardiogram report for further details.



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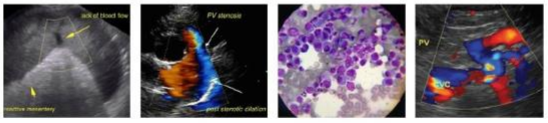

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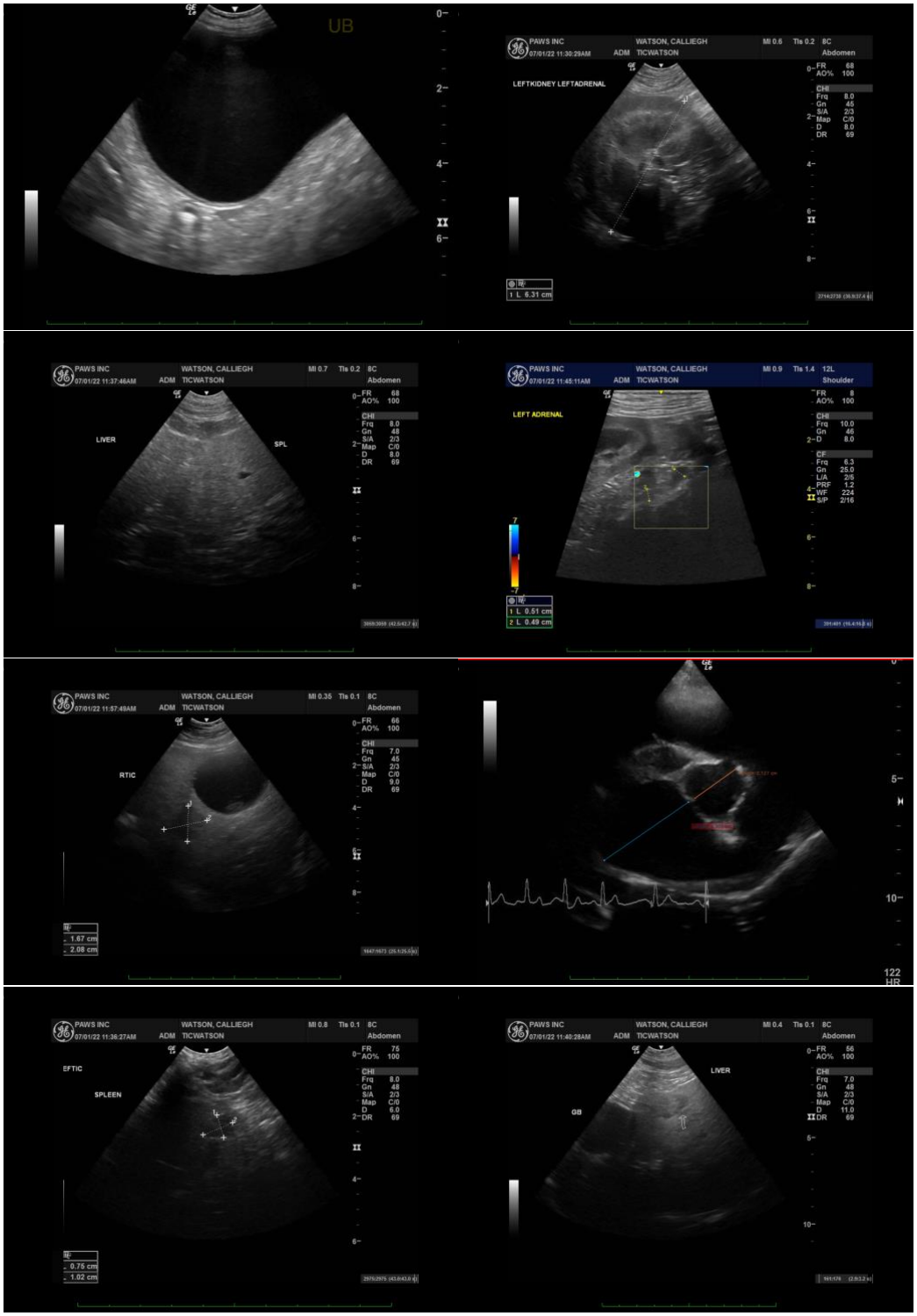

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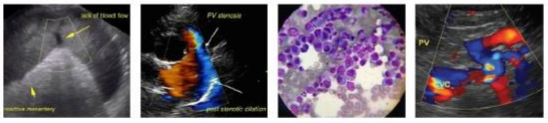

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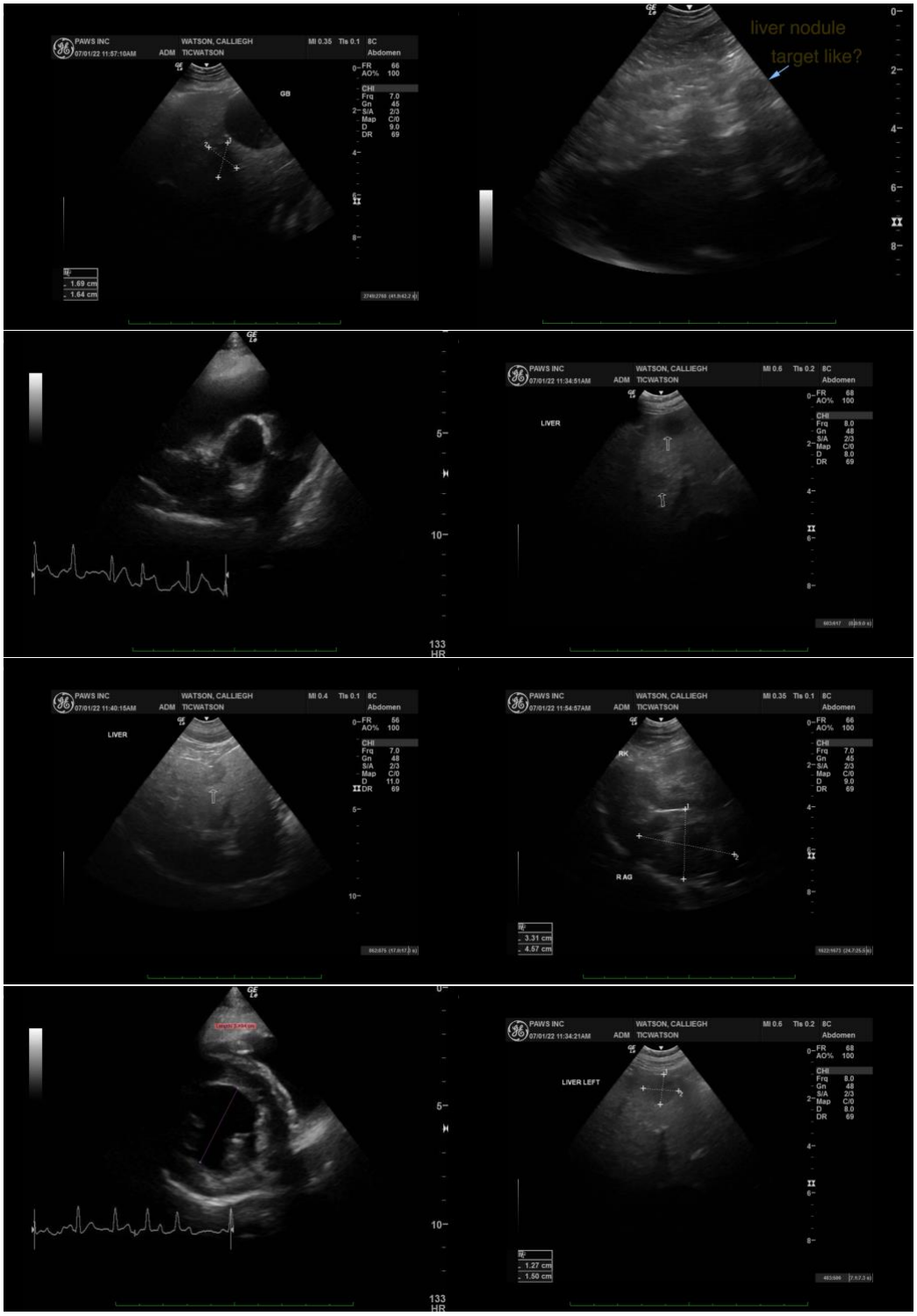

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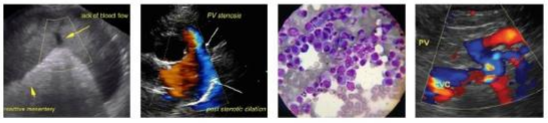

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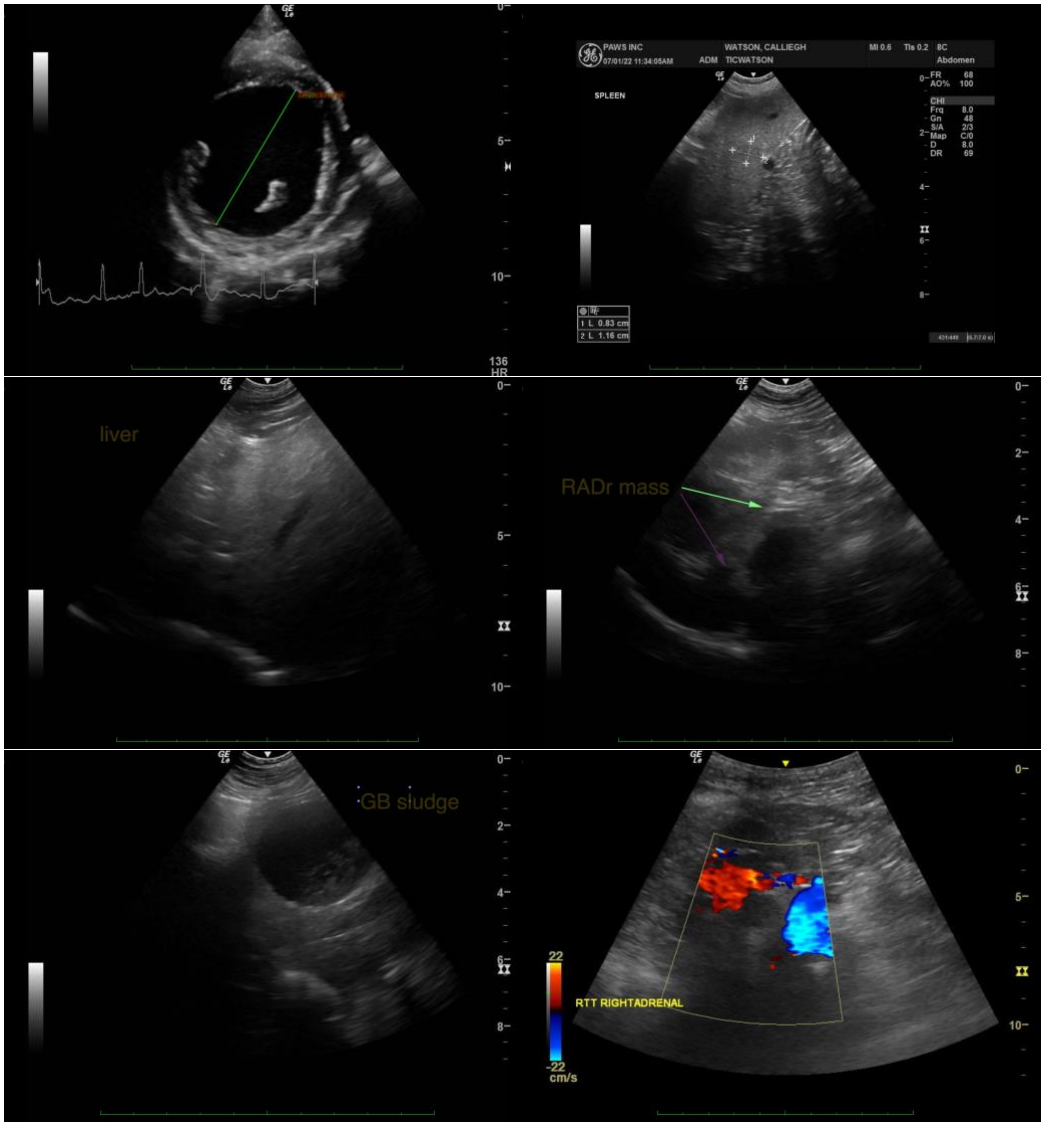

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Thank you for this referral. If the clinical or image interpretation does not parallel your findings or if I can be of any further assistance please contact me.

Lisa Carioto, DVM, DVSc, Diplomate ACVIM

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