



PATIENT PRESENTING CLINICAL SIGNS

Camden Sherman 8yo MN mixed breed History of acute on chronic vomiting, increasing in frequency. No change in appetite, thirst, urinations, energy, or bowel movements.
Abnormal PE/Chem/CBC/UA Results: mild ALP elevation

SPECIES

Canine

ULTRASONOGRAPHIC EXAMINATION OF THE HEART

BREED

Shih Tzu Mix

SEX

Neutered male

AGE

8 years

WEIGHT

19.1 lbs

INTERPRETED BY

Lisa Carioto, DVM, DVSc, Diplomate ACVIM

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	>2	0.71	1.4	1.78	49	Not measured	0.55
CANINE CARDIAC PARAMETERS	HR (BPM)	AV VMAX (m/s)	PV MAX (m/s)	BODY WEIGHT (kg)	LA (2D long 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		LAN	LVIDND	LVIDNS
PATIENT	Not measured	1.02	NM	8.64 kg	3.06-3.15	3.46 LVIDND = 1.83	1.76

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Dr. Petrone

HOSPITAL NAME

Long Branch AH

REFERRING VET

Dr. Petrone

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- Mild to moderate myxomatous degeneration of both leaflets. The anterior leaflet is more severely affected compared to the posterior leaflet.
- Severe prolapse of the anterior leaflet.
- Mild prolapse of the posterior leaflet.
- Severe mitral regurgitation.
- Severe left atrial enlargement
- Mild to moderate left auricular enlargement.
- Rounding of the interventricular septum, i.e. left ventricular enlargement is present
- Mild myxomatous degeneration of the tricuspid valve.
- No aortic insufficiency.
- Mild trivial tricuspid regurgitation.



PATIENT	<ul style="list-style-type: none"> Mild prolapse of the anterior leaflet. No right ventricular or atrial enlargement.
Camden Sherman	
SPECIES	<ul style="list-style-type: none"> Pulmonic valve, no abnormalities. Pulmonary veins, no abnormalities.
Canine	
BREED	<ul style="list-style-type: none"> Pulmonary artery - bifurcation, no abnormalities. Pulmonary artery: aortic ratio within normal limits. No obvious signs of pulmonary insufficiency. No signs of heart worm.
Shih Tzu Mix	
SEX	<ul style="list-style-type: none"> No signs of pericardial or pleural effusion No evidence of pulmonary edema. No obvious signs of a mass.
Neutered male	

AGE

8 years

ULTRASONOGRAPHIC EXAMINATION OF THE ABDOMEN

Urinary System

WEIGHT

19.1 lbs

The urinary bladder is well distended. A trivial amount of sediment is observed. It is difficult to accurately measure wall thickness, however, the wall is smooth and regular. No abnormalities are noted with the trigone or proximal urethra, and there is no evidence of cystoliths, polyps or a mass.

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Prostate

The prostate is homogeneous and within normal limits (1.00 cm) for a neutered male.

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Kidneys

The **left** kidney measures 4.83 cm. The capsule is smooth. The cortex is very mildly hyperechoic, i.e. it is isoechoic to the spleen. A mild loss of the normal definition of the cortico-medullary junction is present. A hyperechoic “band” is noted traversing along the medulla, at the junction of the cortico-medullary junction. Mineralizations of the diverticulae and pelvis are present, in addition to small nephroliths, i.e. acoustic shadowing is observed. One of the nephroliths measures 3.2 mm. There is no evidence of pyelectasia. An accumulation of intrapelvic fat is noted. The surrounding mesentery is mildly hyperechoic.

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The **right** kidney measures 5.06 cm. Findings are similar to the left kidney.

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Aortic bifurcation/trifurcation

No abnormalities observed.

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PATIENT

Adrenal Glands

Camden Sherman

The **left** adrenal gland measures 0.48 cm at the cranial pole and 0.50 cm at the caudal pole. The cranial pole is slightly “plump”, however there is no evidence of a nodule or a mass. No abnormalities are noted with the gland’s overall architecture, echogenicity or echotexture. The phrenico-abdominal vein and surrounding vasculature and mesentery are unremarkable.

SPECIES

Canine

The **right** adrenal gland measures 0.53 cm at the cranial pole and 0.46 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.

BREED

Shih Tzu Mix

SEX

Neutered male

Spleen

The spleen is within normal limits in size, architecture, echotexture, and echogenicity. The capsule is smooth. Occasional perivascular cuffing is observed, which is consistent with myelolipomas. This is considered clinically insignificant. No abnormalities are observed with its vasculature, i.e. congestion and thrombi are not identified.

AGE

8 years

Liver

WEIGHT

19.1 lbs

There are no obvious signs of hepatomegaly. The liver’s borders are smooth, but mildly rounded. A diffuse, very mildly coarse or granular echotexture is observed. It is very mildly and diffusely hyperechoic.

A few hypoechoic nodules are visualized

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1. 0.72 cm in diameter x 0.71 cm in length
2. 1.21 cm in diameter x 1.41 cm in length
3. 0.99 cm in diameter x 0.92 cm in length
4. 0.81 cm in diameter x 0.99 cm in length

Subjectively, the hepatic vessels may be slightly congested.

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Dr. Petrone

The gallbladder (GB) is moderately distended with a mild to moderate amount of free floating gravity dependent and inspissated, echogenic material. Multiple inspissated nodules are noted; 4.1 mm in diameter x 4.7 mm in length. The second nodule measures 8.6 mm in diameter x 9.6 mm in length. The GB wall is within normal limits in size and echogenicity. 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.

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Gastrointestinal

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Dr. Petrone

The lumen of the stomach is filled with ingesta, fluid and gas. The gastric wall is within normal limits in thickness and the wall layers are well defined. The submucosa and mucosa are very mildly prominent in some of the images. No obvious abnormalities are observed with its peristalsis.

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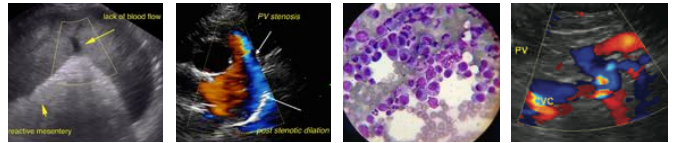
The duodenum is within normal limits in thickness. The definition of wall layers is preserved, however, subjectively, the mucosa is mildly thickened and fogging is present. Ingesta, fluid and gas are present within the lumen of the duodenum. A mild decrease in peristalsis is observed, with a “to and fro” motion.

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PATIENT	The small intestinal wall thickness is within normal limits and the definition of the wall layers is preserved. Fogging of the mucosa is present in some of the loops of bowel. No abnormalities are observed with peristalsis.
Camden Sherman	
SPECIES	Ingesta and gas are present within the transverse colon.
Canine	The colonic wall is not thickened and mural detail is considered normal.
BREED	Pancreas
Shih Tzu Mix	The pancreas has a mildly coarse echotexture, which is considered secondary to age related changes, however, previous episodes of pancreatitis cannot be excluded. There are no signs of active pancreatitis or neoplasia.
SEX	Other
Neutered male	Lymph nodes
AGE	No abnormalities are observed
8 years	
WEIGHT	Abdominal effusion
19.1 lbs	Fluid is not visualized.
INTERPRETED BY	ULTRASONOGRAPHIC ECHOCARDIOGRAM FINDINGS
Lisa Carioto, DVM, DVSc, Diplomate ACVIM	<ul style="list-style-type: none"> Myxomatous degeneration of the mitral valve, ACVIM stage B2 There are no obvious signs of congestive heart failure based on the ultrasound findings, however, severe left atrial enlargement is present, as well as signs of mild to moderate left ventricular enlargement.
IMAGING PERFORMED BY	ULTRASONOGRAPHIC ABDOMINAL FINDINGS
Dr. Petrone	<ul style="list-style-type: none"> The mild, but diffuse hyperechogenicity of the liver, and mildly coarse or granular echotexture may be due to vacuolar and reactive hepatopathies, respectively. A vacuolar hepatopathy may occur due to stress, chronic illness, such as chronic, intermittent vomiting. Other differential diagnoses for a diffusely hyperechoic liver such as, hepatitis, cholestasis and cholangitis/cholangiohepatitis are considered unlikely. The hypoechoic nodules are suggestive of nodular hyperplasia or regeneration, which are benign, age-related changes. Target lesions are not observed, i.e. neoplasia is considered unlikely. The presence of sludge in the gallbladder may be clinically insignificant, however, some dogs may show clinical signs of gastroesophageal reflux disease (GERD), including vomiting, therefore, obtaining a history regarding signs of GERD from the client is suggested. Treatment with an anti-acid, proton pump inhibitor or ursodeoxycholic acid may be required depending on the patient's history.
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PATIENT

Camden Sherman

SPECIES

Canine

BREED

Shih Tzu Mix

SEX

Neutered male

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- The gastrointestinal changes are non-specific and somewhat subjective. Esophagitis and gastritis may be present due to the increased frequency of vomiting. Inflammation secondary to chronic vomiting may be the cause, however, inflammation resulting from inflammatory bowel disease cannot be excluded. Infiltrative disease, such as lymphoma or other round cell tumour is considered highly unlikely based on the findings observed. As mentioned above, obtaining a history regarding signs of GERD, as well as pica, frequency of nausea, vomiting and diet, is suggested.
- A smoldering pancreatitis cannot be excluded despite the absence of sonographic abnormalities.
- The cranial pole of the left gland is slightly “plump”. There is no evidence of a nodule or a mass. This finding may be clinically insignificant, however, other possibilities include adrenal hyperplasia due to stress, chronic illness or development of a benign adenoma.
- Mild to moderate renal changes are present, which are suggestive of age related degeneration, addition to mild mineralization and very small nephroliths. There are no signs of an obstruction.
- The free floating sediment within the lumen of the urinary bladder is most likely composed of mucus, crystalline material and exfoliated cells. The debris is likely clinically insignificant given the lack of inflammatory changes to the bladder wall, however, findings should be correlated with clinical signs and a urinalysis.

INTERPRETATION OF THE FINDINGS & FURTHER RECOMMENDATIONS

Echocardiogram Recommendations

Treatment with pimobendan is indicated and recommended based on the results of the EPIC study (see below).

Other suggestions/recommendations include:

- Evaluation of blood pressure
- Treatment with pimobendan at 0.25-0.30 mg/kg PO every 12 hours, however, due to Camden’s vomiting episodes, the dose should be started at 0.10 mg/kg PO every 12 hours for 3 days prior to increasing to the full dose to help decrease the risk of GI upset. Administer with a small amount of food to decrease nausea.
- 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.
- Monitoring for progression of heart disease with a re-evaluation of an echocardiogram every 6 to 8 months, or sooner if clinical signs develop, is recommended.
- If general anesthesia is required, for example, to perform a dentistry or a endoscopy with biopsies due to increased vomiting episodes, the following protocol is suggested.

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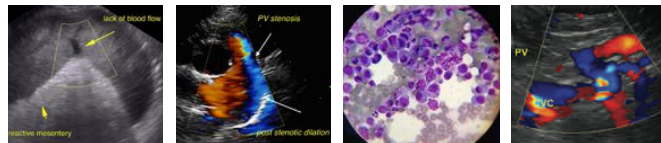
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PATIENT	
Camden Sherman	<ul style="list-style-type: none"> ○ Postponement of general anesthesia while pimobendan is being initiated, for approximately 2 weeks to stabilize the heart with pimobendan.
SPECIES	
Canine	<ul style="list-style-type: none"> ○ Example of general anesthesia protocol for a dentistry • Premedication with an opioid, such as hydromorphone, butorphanol, or methadone, +/- low dose of midazolam. Avoid dexmedetomidine (label indications).
BREED	
Shih Tzu Mix	<ul style="list-style-type: none"> • Avoid acepromazine, atropine and glycopyrrolate. The latter two drugs should only be considered if a patient becomes bradycardic during the procedure. • Preoxygenation for 10-15 minutes (minimum 5 minutes).
SEX	
Neutered male	<ul style="list-style-type: none"> • Induction with alfaxalone, or propofol, if alfaxalone is not available. Avoid ketamine, if possible. • Monitor arterial blood pressure during the procedure. The mean blood pressure should be between 90 - 100 mm Hg. If the patient's blood pressure is decreased, dobutamine is suggested, i.e. fluid boluses should <i>not</i> be administered to avoid volume overload and congestive heart failure.
AGE	
8 years	<ul style="list-style-type: none"> • The intravenous fluid rate should be approximately ¼ of the DAILY maintenance requirements, or 1.75-2 ml/kg/hour to avoid fluid overload.
WEIGHT	
19.1 lbs	<ul style="list-style-type: none"> • <i>Dental blocks are strongly recommended to decrease MAC and the amount of isoflurane necessary, as the latter tends to cause hypotension, particularly in cardiac patients.</i>
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Lisa Carioto, DVM, DVSc, Diplomate ACVIM	<ul style="list-style-type: none"> • *Two shorter procedures are preferable to performing one long procedure, if the dentistry will take longer than originally expected. • One could consider sending the patient home with <i>furosemide in case of an emergency.</i> • Monitoring the patient's resting respiratory (breathing) rate twice a day for 4-6 weeks following general anesthesia is suggested to monitor for signs of decompensation of heart disease.
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Dr. Petrone	<ul style="list-style-type: none"> • Do not administer the pimobendan (Vetmedin) the morning of general anesthesia.
HOSPITAL NAME	
Long Branch AH	<p>Abdominal Recommendations</p> <p>As mentioned above, obtaining a history regarding signs of GERD from the client is suggested. In addition to timing of vomiting episodes in relation to eating, etc.</p>
REFERRING VET	
Dr. Petrone	<p>A urinalysis, +/- urine culture and sensitivity, is suggested.</p> <p>A spec cPL may be considered despite the absence of sonographic signs of pancreatitis on today's abdominal ultrasound.</p>
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5/11/22	<p>Small, frequent meals are suggested, including a small snack prior to going to bed.</p>



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SPECIES

Canine

BREED

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Neutered male

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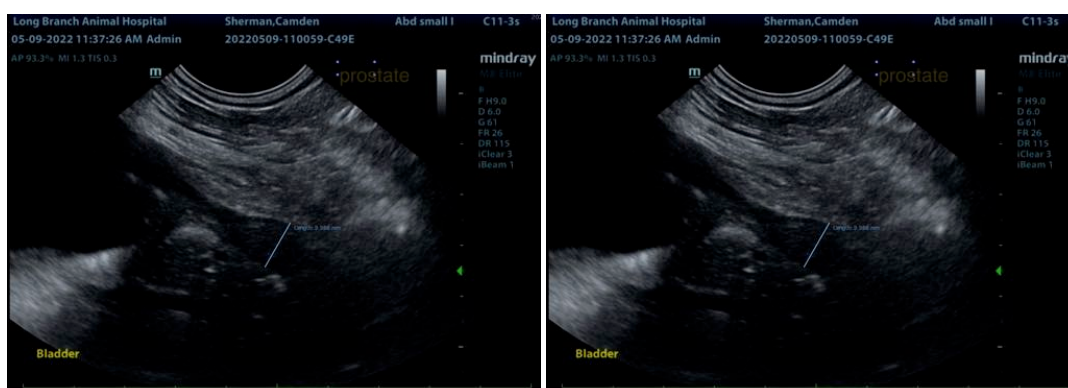
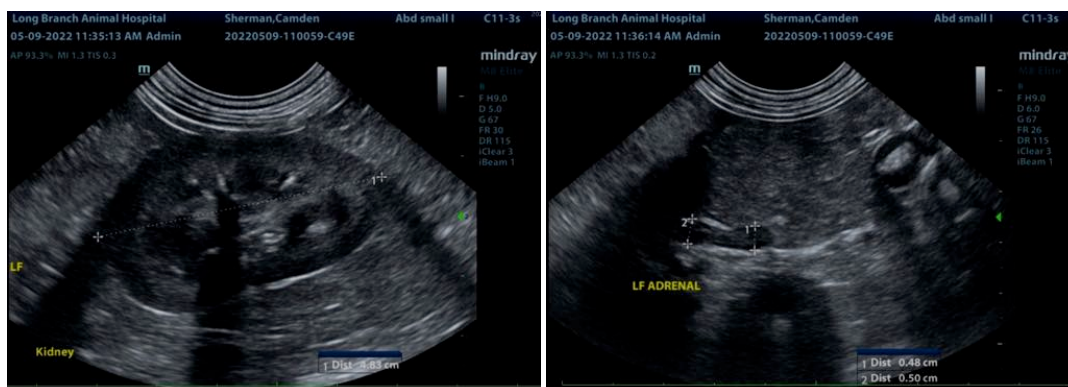
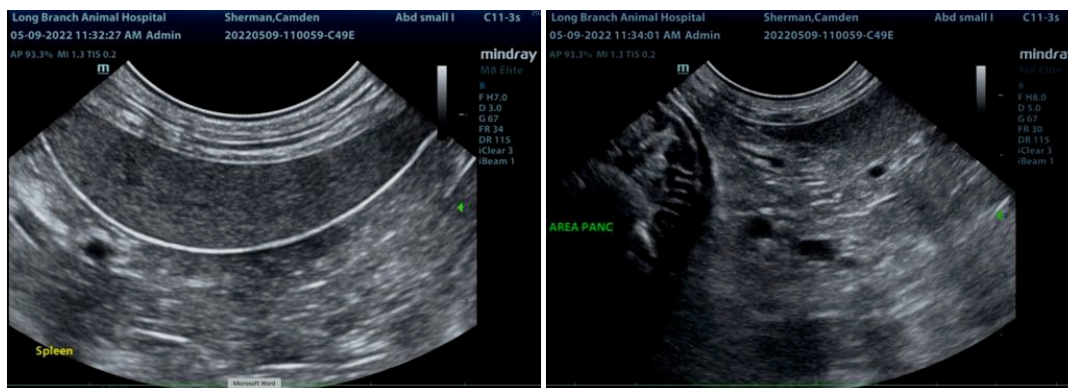
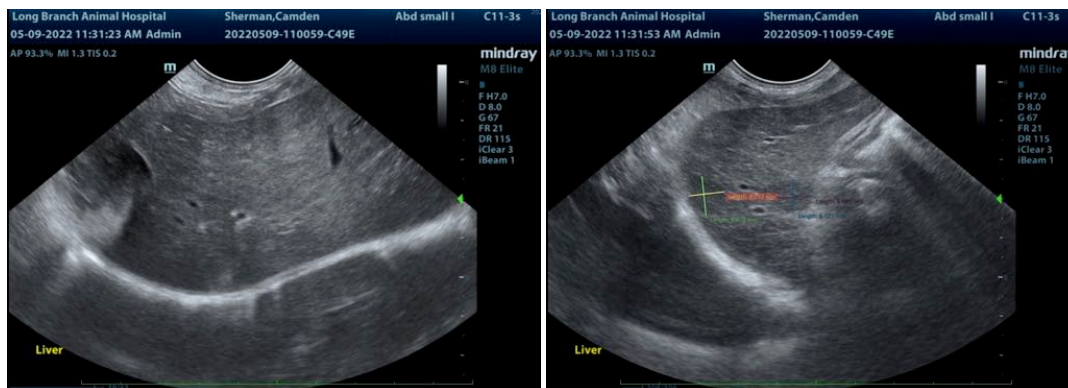
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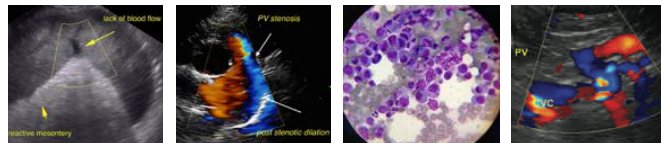
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SPECIES

Canine

BREED

Shih Tzu Mix

SEX

Neutered male

AGE

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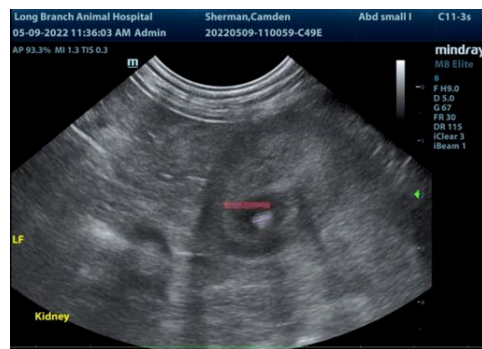
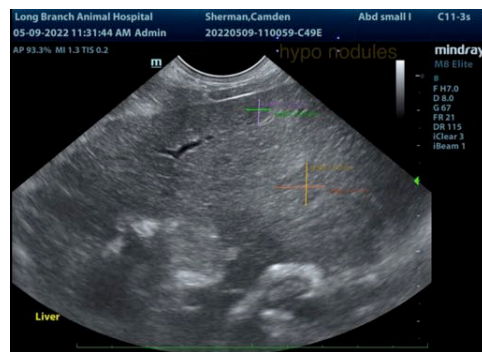
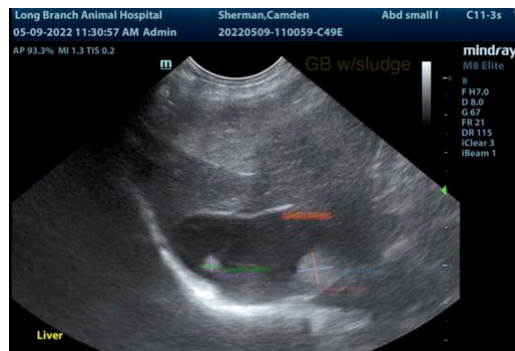
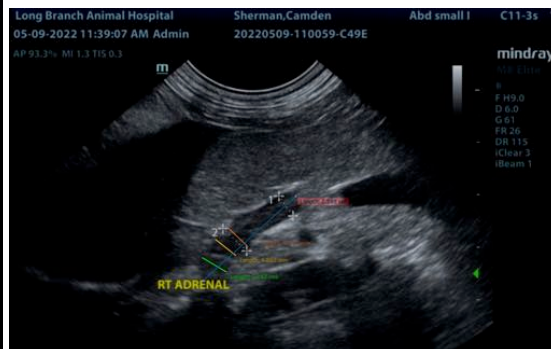
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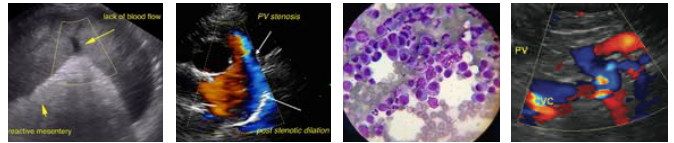
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Neutered male

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Dr. Petrone

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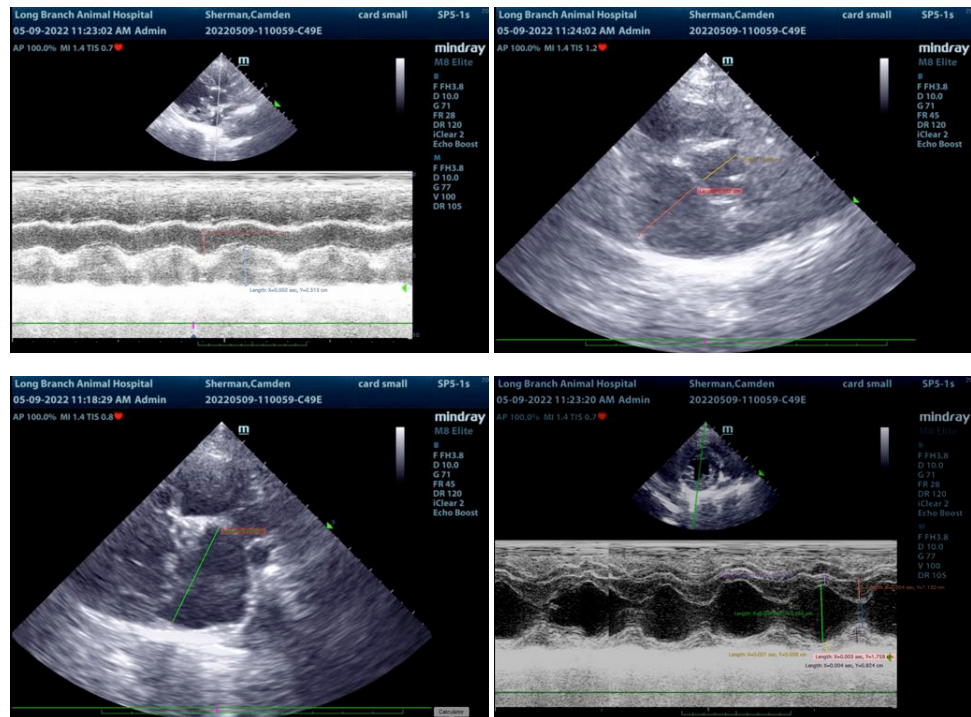
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The information and recommendations provided are based on the images presented by the referring veterinarian/sonographer. No evaluation can be communicated regarding pathology that was not visible in the image/video clips provided.

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

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