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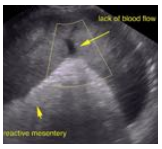
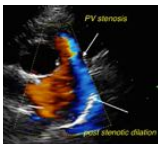
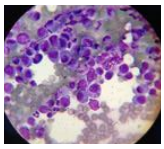
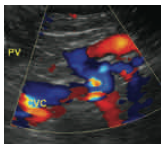
EDUCATIONAL TELECONSULTATION SERVICES™

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

**PATIENT**

Jake #2 Senior Dog Rescue

**SPECIES**

Canine

**BREED**

Australian Shepherd

**SEX**

Neutered male

**AGE**

11 years

**WEIGHT**

39.3 lbs

**INTERPRETED BY**

Lisa Carioto, DVM, DVSc, Diplomate ACVIM

**IMAGING PERFORMED BY**

Jessica Bailes

**HOSPITAL NAME**

All Creatures Great and Small Veterinary Clinic

**REFERRING VET**

Dr. Litalien

**INVOICE**

30946

**DATE**

6/8/22

## PRESENTING CLINICAL SIGNS

History: acute onset vomiting and diarrhea. Chronic hx of anxiety Hx of heart murmur, obesity and severe dental disease
Abnormal PE/Chem/CBC/UA Results: Obese, grade 2/6 systolic murmur, abnormal gait ( suspected generalized arthritis). Severe dental disease Thoracic/abdominal rads: 3 view abdo: - VHS: 11 with subjective R sided bulge on VD (9-12 O'clock) - spondylosis from L7-S1 - good serosal detail - hepatomegaly - caudal aspect extending beyond the costal arch and rounded border noted - spleen appears subjectively prominent - no obvious masses/mass effect - gas and a small amount of ingesta in the stool, stool in the transverse colon, gas in the some SI loops and descending colon - no obvious obstructive pattern or FB Bloodwork done 6/4/22: CBC: WNL Chem: WNL T4: WNL fT4: WNL UA: USG - 1.025, pH - 8.5, trace protein, quiet sediment

## 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.

### *Kidneys*

The **left** kidney measures 5.59 cm. The capsule is smooth. The cortex is mildly hyperechoic and a mild loss of the normal definition of the cortico-medullary junction is present. Pinpoint mineralizations are present throughout the cortex, while pinpoint to punctate mineralizations are observed within the diverticular and pelvis. Nephroliths are not visualized, however, pyelectasia 2.15 mm (longitudinal view) is present. Multiple, small, round to elliptical, anechoic structures with smooth, thin walls, most consistent with cysts, are visualized within the cortex. The largest one, located at the caudal pole, measures 2.3 mm in diameter x 4.8 mm in length. Blood flow is very good. The surrounding mesentery is very mildly hyperechoic.

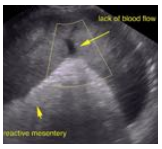
The **right** kidney measures 6.26 cm. The capsule is smooth. The cortex is moderate to markedly hyperechoic, i.e., it is hyperechoic to the liver, which is also hyperechoic comparted to normal. The cranial and caudal poles are markedly hyperechoic compared to the remainder of the cortex. Mild mineralization of the pelvis and diverticulae are noted. Nephroliths are not visualized, however, very mild pyelectasia 1.00 mm (longitudinal view) is present. A very small cortical cyst is noted. Blood flow is very good. The surrounding mesentery is mildly to moderately hyperechoic.

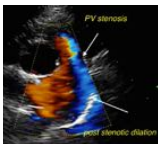
### *Aortic bifurcation/trifurcation*

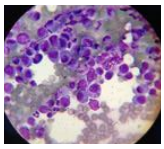
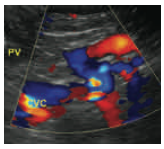
No abnormalities observed.

### *Adrenal Glands*

The **left** adrenal gland measures 0.71 cm at the cranial pole, 0.77 cm at the caudal pole and 2.19 cm in length. Both poles are round and “plump”. The cortico-medullary definition is well defined. An elliptical hypoechoic subcapsular region is observed at the periphery of the caudal pole. The hypoechoic region, measuring 2.44 mm in diameter and approximately 7.35 mm in length, follows the curvilinear border of the caudal pole. The area appears well-defined and encapsulated. The phrenico-abdominal vein and surrounding vasculature and mesentery are unremarkable.



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The **right** adrenal gland measures 0.58 cm at the cranial pole, 0.61 cm at the caudal pole and 2.39 cm in length. No abnormalities are noted with the gland's overall architecture, echogenicity or echotexture. The phrenico-abdominal vein and surrounding vasculature and mesentery are unremarkable.

### *Spleen*

The capsule of the spleen is smooth. It is within normal limits in architecture and echogenicity. Subjectively, mild splenomegaly is present and a very subtle granular, miliary echotexture is noted in certain views. Vascular congestion and thrombi are not identified.

### *Liver*

Hepatomegaly is suspected. The liver appears "swollen", and its borders are smooth, but rounded. It is diffusely hyperechoic, i.e. it is isoechoic to the spleen. A subtle, diffusely coarse/granular echotexture is observed. Focal lesions are not observed and no abnormalities are observed with the hepatic vessels.

The gallbladder (GB) is moderately distended with a severe amount of free floating, gravity dependent and inspissated echogenic material. The inspissated material has also formed nodules that are adhered to the intramural wall. The GB wall is mildly thickened (1.6 mm), but within normal limits in echogenicity. The cystic duct is dilated 3.6-3.9 mm and mildly tortuous. There is no evidence of an obstruction. The parenchyma surrounding the GB, cystic and common bile ducts is moderately to severely hyperechoic.

### *Gastrointestinal*

A small amount of gas is present within the lumen of the stomach. The pylorus is filled with gas and fluid. A mild ileus is observed. The gastric wall is within normal limits in thickness and the wall layers are well defined. The mucosa and submucosa are mildly prominent and the surrounding mesentery is severely hyperechoic.

Duodenum: Mild fogging and stippling of the mucosa are noted. Fluid and gas are present within its lumen. Wall thickness is within normal limits and definition of the wall layers is preserved.

No abnormalities are observed with wall thickness or definition of the wall layers of the small intestines, however, very mild fogging of the mucosa is suspected. A small amount of gas and fluid are present within the lumen. Abnormally dilated loops of bowel are not observed.

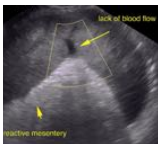
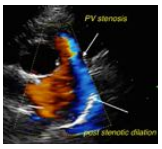
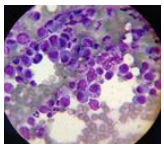
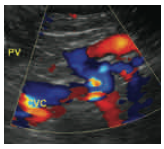
A large amount of gas and small amount of ingesta are present in the transverse colon.

The colonic wall is not thickened and mural detail is preserved, however, the submucosa is more prominent. Semi-formed stools are present in his colon.

### *Pancreas*

The **left limb** is mildly, but diffusely hypoechoic and mildly enlarged. Its contours are regular. Pinpoint and small punctate, hyperechoic foci are noted throughout the parenchyma, which are most likely due to fibrosis secondary to age-related changes, and possibly, previous episodes of pancreatitis, ischemia, mineralization, deposition of fat and amyloid. The surrounding mesenteric fat is moderately to markedly hyperechoic.

The **body** and **right limb** are enlarged, mildly hypoechoic and have a coarse and heterogeneous echotexture. Hypoechoic nodules of variable size and pinpoint to punctate hyperechoic foci are scattered throughout the

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parenchyma. These changes are suggestive of nodular hyperplasia and fibrosis, respectively. The surrounding mesentery is severely hyperechoic.

The above findings are suggestive of active pancreatitis, and age-related changes. Overt signs of neoplasia are not noted.

***Other***

***Lymph nodes***

No abnormalities are observed

**Abdominal effusion** is not visualized.

## ULTRASONOGRAPHIC EXAMINATION OF THE HEART

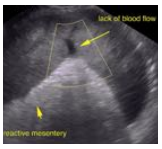
| CANINE CARDIAC PARAMETERS | MR VMAX (m/s) | TR VMAX (m/s) | LA/AO (Boon method) | LA/AO (Heart Base; Swedish) | FS (%) | EF (%) | EPSS (cm) |
|---|---|---|---|---|---|---|---|
| NORMAL PARAMETER | 4.5-5.5 | <2.7 | 1.3 | <1.6 | 28-40 | 40-100 | <0.6 |
| PATIENT | 5.17 | 2.26 | 1.60 | 1.60 | 26 and 28 | NM | 0.71 |
| **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 | NM | 1.54 | 0.66 | 17.9 | 2.86 | 3.29 | 2.42 |

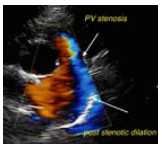
Adapted from June Boon, Veterinary Echocardiography, 1998
Sisson D et al. JVIM 1991; 5: 232, and Jacobs et al. Am J Vet Res 1985; 46:1705

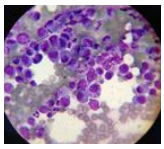
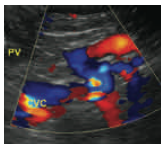
## Echocardiographic findings

*Mitral valve*

- Mild to moderate myxomatous degeneration of both leaflets.
- Mild prolapse of both leaflets.
- Moderate mitral regurgitation; three jets, a very small jet, followed by two larger divergent jets that are moderate in severity, one with turbulence and a posterior direction.
- Mild left auricular enlargement.
- Rounding of the interventricular septum, i.e. left ventricular enlargement is present



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- Very mild increase of LA: Ao ratio
- LA normalized for BW (LAN = 1.07); Mild enlargement
- LVIDd normalized for BW (LVIDND = 1.40); within normal limits (WNL)
- LVIDs normalized for BW (LVIDNs = 0.98); WNL

*Aortic valve*

- Valve leaflets are mildly thickened, but not hyperechoic or vegetative (i.e. not consistent with endocarditis)
- Trivial aortic insufficiency

*Tricuspid valve*

- Very mild myxomatous degeneration of both leaflets
- Very mild prolapse of both leaflets.
- Moderate tricuspid regurgitation with a posterior jet (toward septal wall).
- No right ventricular or atrial enlargement.

*Pulmonic valve*

- No abnormalities
- Trivial pulmonary insufficiency (0.64 m/s).
- Main pulmonary artery within normal limits.
- Pulmonary artery - bifurcation, no abnormalities.
- Pulmonary artery: aortic ratio within normal limits.
- No signs of heart worm.

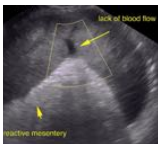
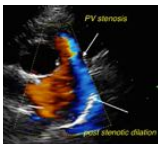
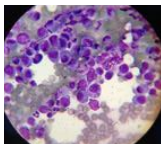
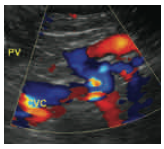
*Other*

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

## ULTRASONOGRAPHIC FINDINGS

### ABDOMINAL FINDINGS

- **Pancreas**: *Active pancreatitis* is suspected. Other changes noted are consistent with age-related changes. Overt signs of neoplasia are not appreciated.

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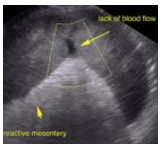
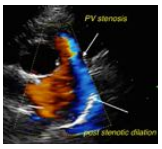
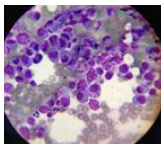
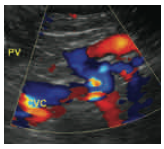
- **Gastrointestinal tract**: The gastrointestinal changes are non-specific and somewhat subjective. Although these findings may not be clinically significant, they have been associated with *GI inflammation*. A component of inflammation may be due to Jake's acute vomiting episode, as well as a *chronic enteropathy*, such as inflammatory bowel disease, food intolerance, dysbiosis, as well as, chronic, smoldering episodes of pancreatitis, etc.
- **Liver**: *Vacuolar and reactive hepatopathies* are suspected, in addition to *cholestasis*. Hepatitis is considered less likely, however, *cholangitis/cholangiohepatitis and cholecystitis with a suppurative component* must be considered given the appearance of the gallbladder.
- **Gallbladder**: The appearance of Jake's gallbladder is not consistent with a classical mucocoele, however, one may be in its early development or it may be a mucocele that does not have a typical appearance. Signs of *chronic cholangitis* are evident and *cholecystitis with a secondary bacterial infection* is suspected. Some dogs may show clinical signs of gastroesophageal reflux disease (GERD) as a result of the sludge. Therefore, obtaining a history regarding signs of GERD from the client/rescue is suggested. Treatment with an anti-acid, proton pump inhibitor or ursodeoxycholic acid may be required depending on his history.
- **Kidneys**: *Age-related degeneration* is suspected, in addition to *pyelonephritis*. The very mild pyelectasia may be due to pyelonephritis, polydipsia/polyuria, which is not noted in the history, as well as intravenous fluids (although not in Jake's history). Glomerulonephritis should not be excluded given the severe hyperechogenicity of the cortices and the proteinuria.
- **Spleen**: *Mild splenomegaly* with a subtle miliary appearance, which may occur due to splenitis (any antigenic stimulation, including immune-mediated inflammation), extramedullary hematopoiesis, and hypersplenism. However a "sensitive" ultrasound machine can "pick up" details that may not normally be seen and overinterpretation may occur. If the mottling is more apparent than usual, differential diagnoses other than extramedullary hematopoiesis and mild splenitis due to antigenic stimulation may include early infiltrative disease, such as lymphoma or other round cell tumour. *In conclusion*, the interpretation of the spleen should take into account the experience with one's machine; if there is any doubt that Jake's spleen is "more mottled" compared to other "normal spleens", a FNA is warranted.
- **Adrenal glands**: The **left** adrenal is very mildly enlarged, round and "plump". This may occur due to hyperplasia secondary to chronic illness and stress. Emerging pituitary-dependent hyperadrenocorticism cannot be excluded, but is not considered clinically significant for the moment. The hypoechoic subcapsular region may represent nodular hyperplasia. Its current appearance is not suggestive of neoplasia. No abnormalities are noted with the right gland.

## ECHOCARDIOGRAM FINDINGS

- Myxomatous degeneration of the mitral (mild to moderate) and tricuspid (very mild) valves, ACVIM stage B2, with mild left atrial enlargement. The left ventricle is within normal limits.
- Hemoconcentration or hypovolemia due to vomiting and diarrhea may be playing a role in the size of Jake's left atrium and fractional shortening.
- An evaluation of Jake's diet is suggested.
- Cardiac medication is not necessary for the moment, however, a re-evaluation is recommended in 3 months.
- Very mild thickening of the aortic leaflets, likely secondary to age-related changes, with trivial aortic insufficiency. There is no evidence of a vegetative lesion.



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- Pulmonary insufficiency is trivial and not clinically significant.

## INTERPRETATION OF THE FINDINGS & FURTHER RECOMMENDATIONS

The following are suggested/recommended

Analgesia to exclude visceral pain (buprenorphine, methadone, gabapentin)

Urine culture and sensitivity to exclude pyelonephritis

If negative, consider urine protein: creatinine ratio approximately 4-6 weeks following recovery of current illness to avoid false positive results (systemic inflammation).

Arterial blood pressure, once analgesia addressed.

Evaluation of fasting triglycerides to exclude hyperlipidemia as cause of gallbladder sludge. Consider freezing serum to perform a baseline (random) cortisol if little improvement observed with suggested treatment). Hypoadrenocorticism unlikely, but best to exclude considering waxing and waning GI episodes (despite size of adrenals on ultrasound).

Differential diagnoses include cholecystitis, cholangitis/cholangiohepatitis, and a secondary ascending bacterial infection. Although indiscriminate use of antibiotics is not recommended, consider broad-spectrum antibiotic with reassessment of liver enzymes, including GGT, in a few weeks, while *still receiving* the antibiotics. If an improvement is observed, continue antibiotic for *an additional* two to four weeks.

Note, ideally, fine needle aspirates of the liver (preferably a tissue biopsy) and culture of the bile would be performed. Also, cholecystectomy may be considered in the future depending on the severity and frequency of recurring episodes.

Obtaining a history regarding signs of GERD. Treatment with an anti-acid, proton pump inhibitor or ursodeoxycholic acid may be required. If ursodeoxycholic acid (Ursodiol) is pursued, a total dose of 10-15 mg/kg divided twice daily is suggested. However, the dose should be gradually uptitrated (over a few weeks) until the maximum dose is achieved to avoid gastrointestinal side effects. Administer with a meal to decrease risks of GI side effects. A sonographic re-evaluation of the gallbladder is strongly suggested 2-4 months following the initiation of ursodeoxycholic acid to ensure it is effective. Note, Ursodiol should not be initiated for *at least 2 weeks* after he has recovered from this current episode of vomiting and diarrhea.

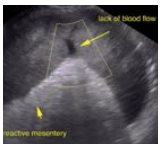
If signs of GERD, 10-14 day trial with famotidine or omeprazole (0.7-1 mg/kg PO **q12h**)

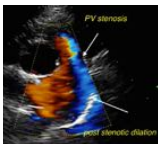
Diet trial (veterinary prescription *low fat*, hypoallergenic, hydrolyzed or novel protein), for example, Purina HA. Royal Canin Hypo HP possible, but is higher in fat. Low fat, hypoallergenic diets also available through Rayne. If necessary, prioritize low fat diet rather than hypoallergenic. Ensure appetizing to prevent sarcopenia and cachexia.

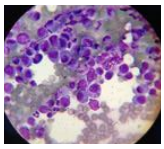
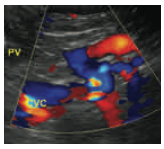
Small, frequent meals

Supplementation with psyllium (soluble fibre) may be required, particularly if hydrolyzed hypoallergenic diet is fed

Serum cobalamin, folate. If cost prohibitive, supplement with cobalamin. +/- spec cPL (as confirmation, however, finances better invested in other diagnostics and treatment)



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**WEIGHT**

39.3 lbs

**INTERPRETED BY**

Lisa Carioto, DVM, DVSc, Diplomate ACVIM

**IMAGING PERFORMED BY**

Jessica Bailes

**HOSPITAL NAME**

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A clay based paste, containing montmorillonite and a synbiotic, may be administered during episodes of acute diarrhea.

Treatment with pimobendan is not necessary for the moment.

Other suggestions/recommendations include:

- Evaluation of blood pressure
- An evaluation of Jake's diet
- A re-evaluation of his echocardiogram is recommended in 3 – 6 months.
- 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, <u>or</u> 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.
- Although omega-3 fatty acids may be helpful (EPA = 40 mg/kg/day and DHA = 25 mg/kg/day), *very gradual uptitration* of the dose (every 5-7 days) is suggested to decrease risk of gastrointestinal effects. They should not be introduced for a few weeks, i.e., at least 2-4 weeks following resolution of his current GI signs.

**Example of a general anesthesia protocol if required in the future**

- Premedication with an opioid, such as hydromorphone, butorphanol, or methadone, +/- *low dose* of midazolam. Avoid dexmedetomidine (label indications).
- 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).
- 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 *not* be administered to avoid volume overload and congestive heart failure.
- The intravenous fluid rate should be approximately ¼ of the DAILY maintenance requirements, or 1.75-2 ml/kg/hour to avoid fluid overload.
- Local blocks, where applicable, are strongly recommended to decrease MAC and the amount of isofluorane necessary, as the latter tends to cause hypotension, particularly in cardiac patients.
- *Two shorter procedures are preferable to performing one long procedure, for example, if a dentistry should take longer than originally expected.
- One could consider sending the patient home with *furosemide in case of an emergency*.
- 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.
- Do **not** administer the pimobendan (Vetmedin) the morning of general anesthesia.

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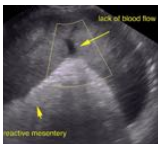
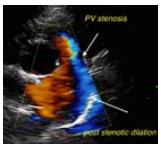
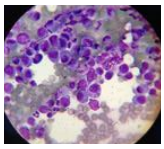
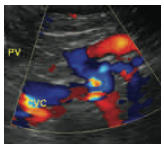

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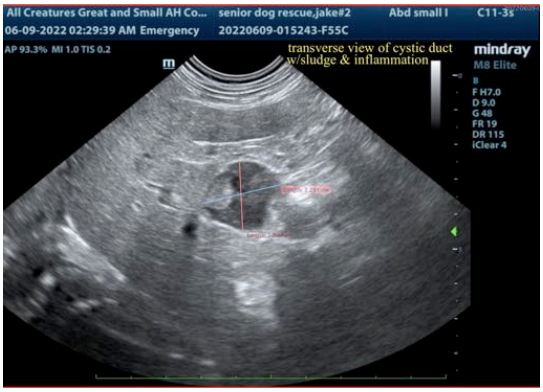

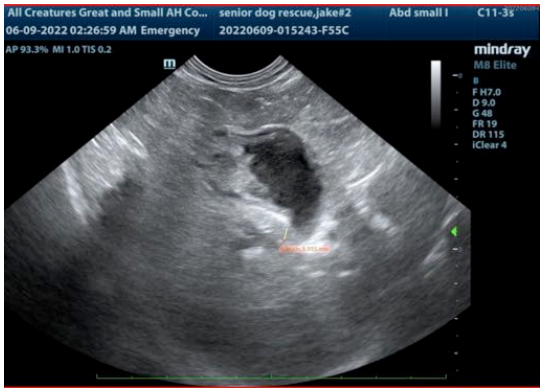
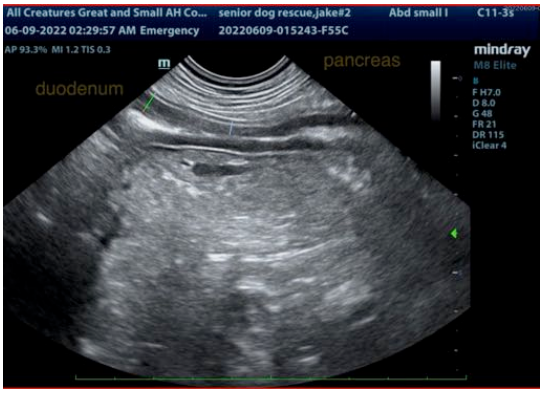

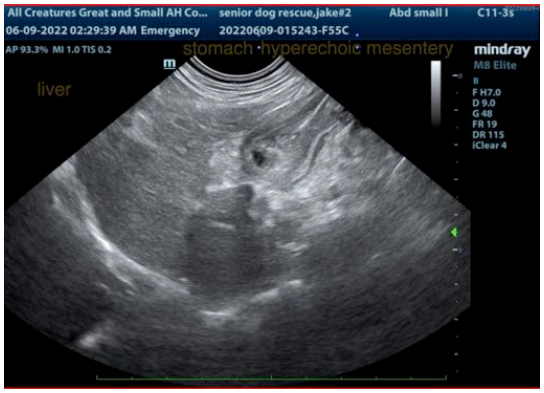

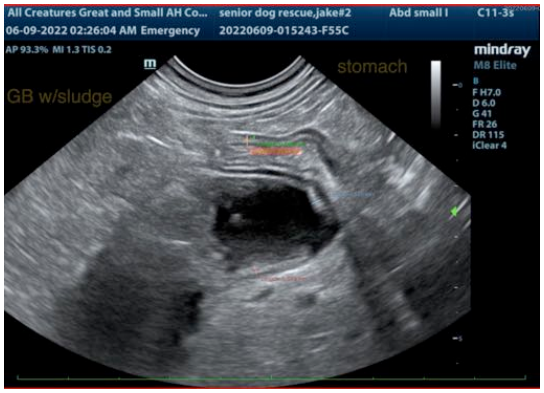

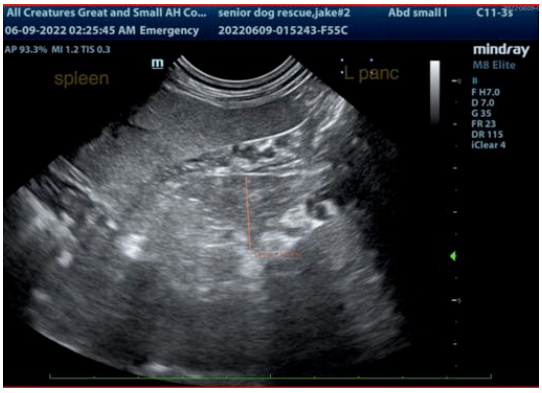

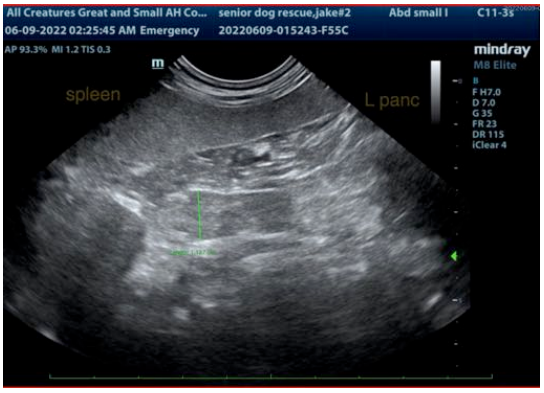

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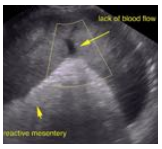
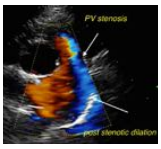
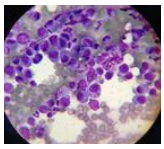
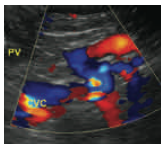

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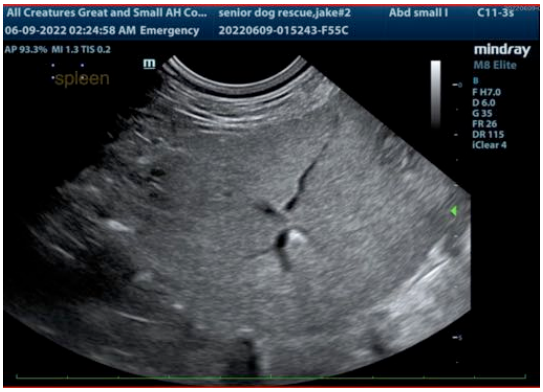

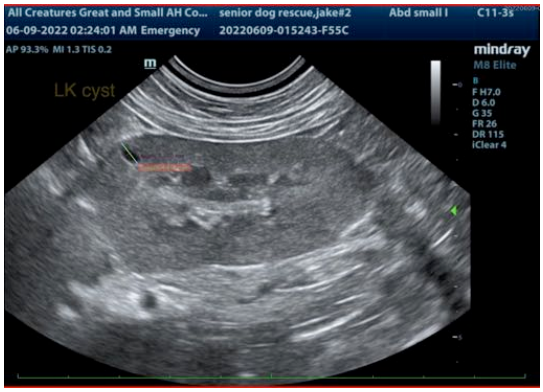

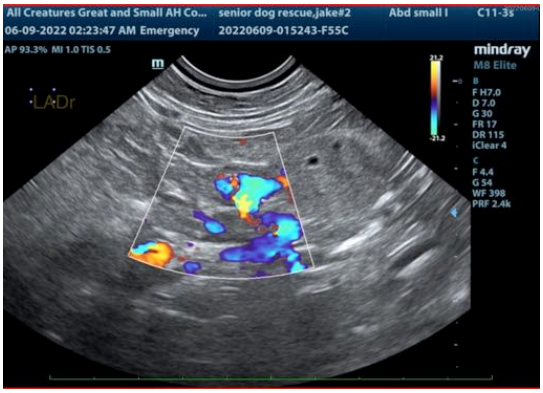

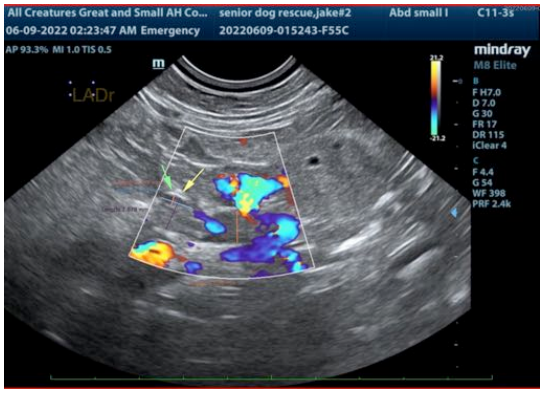

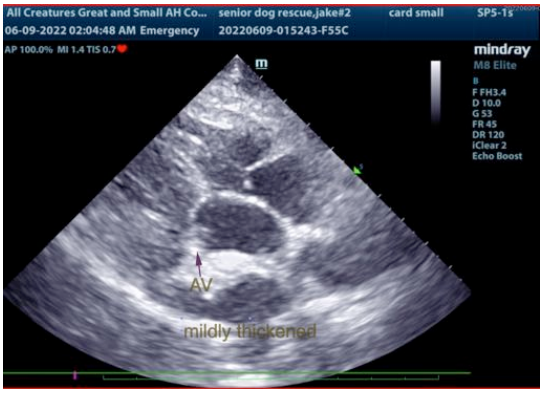

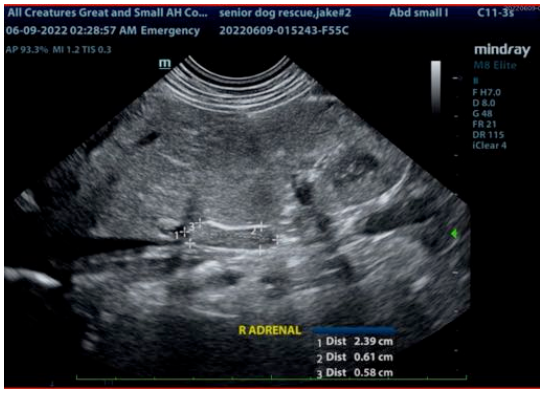

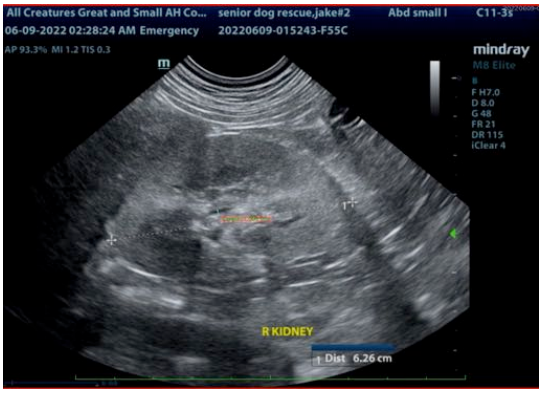

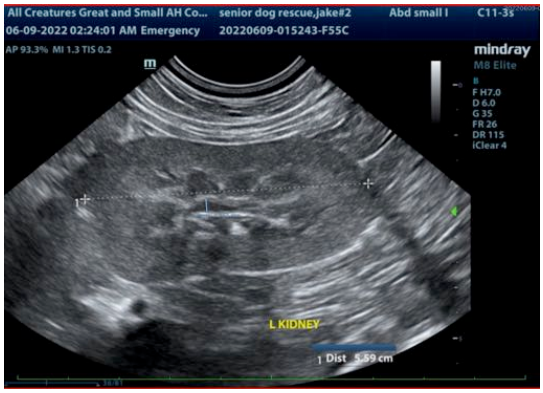

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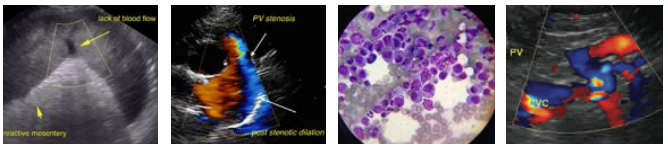


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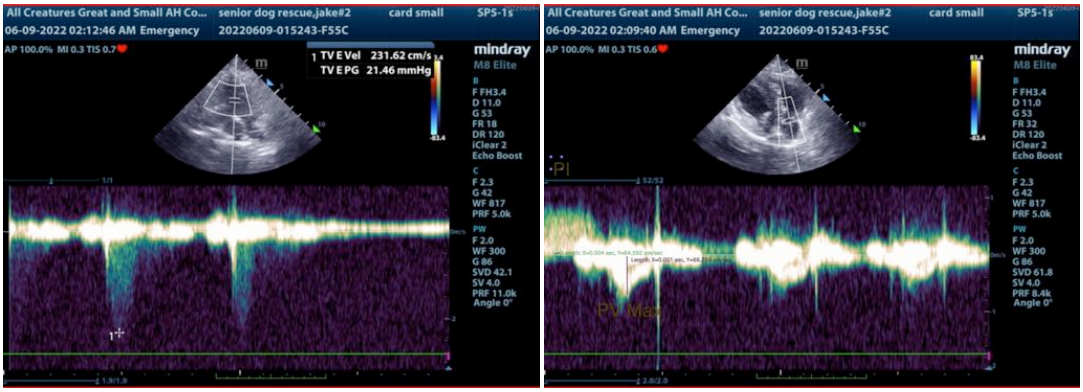


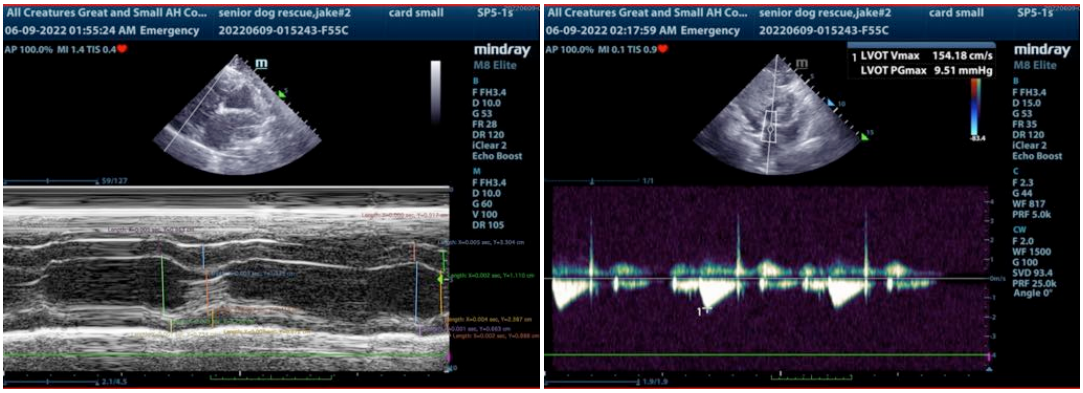


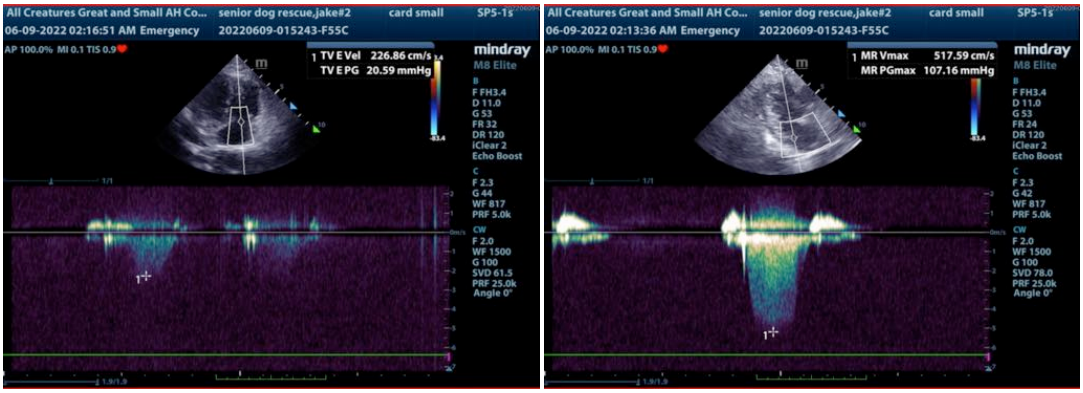


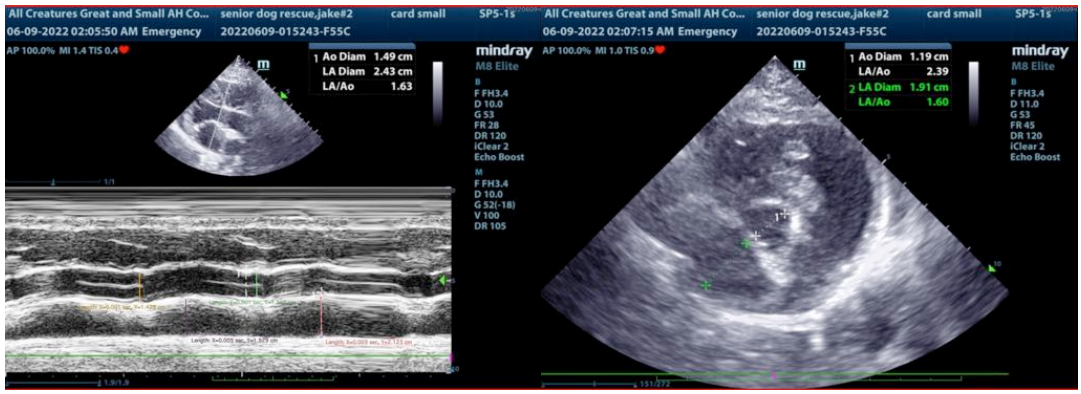

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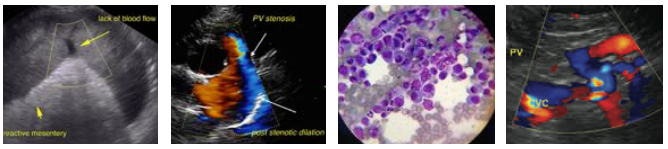

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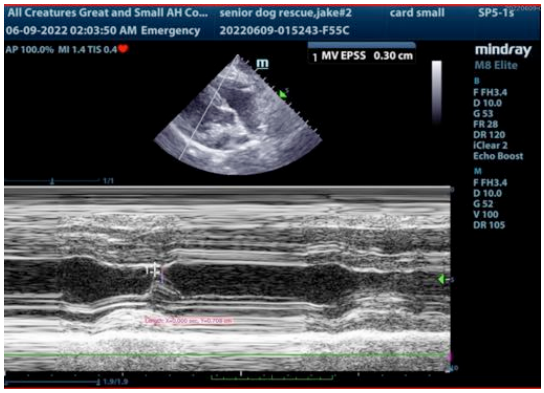


**The information and recommendations provided are based on the images presented by the referring veterinarian/sonographer. No evaluation can be communicated regarding pathology that was not visible in the image/video clips provided.**

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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