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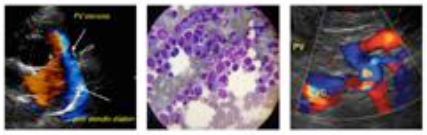

SonoPath
Clinical Sonography & Telecytology
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PATIENT

Jack Moore

SPECIES

Canine

BREED

Goldendoodle

SEX

Neutered Male

AGE

12 years

WEIGHT

94 Pounds

INTERPRETED BY

Lisa Carioto, DVM, DVSc, Diplomate ACVIM

IMAGING PERFORMED BY

Amy Mayhew LVT

HOSPITAL NAME

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INVOICE

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PRESENTING CLINICAL SIGNS

In June 2021, patient originally presented to AEC Novi due to vomiting. Patient was hospitalized due to severely elevated liver enzymes, leukocytosis and severe thrombocytopenia. Patient was tentatively diagnosed with leptospirosis due to a positive Lepto SNAP test and a positive Lepto gripptyphosa titer of 1:400 (all others negative). Patient has been boostered with leapt vaccine in November 2020. Patient was treated with doxycycline and clavamox. Recheck lepto titers after treatment were identical. In October 2021, bloodwork revealed a recurrence of severe thrombocytopenia. Patient was treated with repeat clavamox and doxycycline with no improvement before treating for immune mediated thrombocytopenia with prednisone. Platelet values returned to normal but persistent leukocytosis with a left shift and markedly elevated liver enzymes have persisted despite weaning prednisone dose. Patient is currently on Prednisone 10mg PO EOD. At most recent bloodwork on March 28, 2022, patient also had a mild non-regenerative anemia.

ULTRASONOGRAPHIC EXAMINATION OF THE ABDOMEN

Urinary System

The urinary bladder is not fully distended, thereby affecting the ability to accurately measure wall thickness. However, subjectively, it appears thicker than normal, and the wall is very mildly irregular. No abnormalities are present with the trigone or proximal urethra. A trivial amount of free floating sediment is present, however, there is no evidence of cystoliths, polyps or a mass.

Prostate

The prostate is homogenous and measures 1.44 mm, which is within normal limits for a neutered male.

Kidneys

The **left** kidney measures 6.70 cm. The capsule is smooth. The cortex is mildly hyperechoic, i.e., the cortex is isoechoic to the spleen. The definition of the cortico-medullary junction is preserved. Mineralizations of the diverticulae and pelvis are present, without evidence of nephroliths or pyelectasia. A normal accumulation of intrapelvic fat is noted. The surrounding mesentery is very mildly hyperechoic.

The **right** kidney measures 6.91 cm. Findings are similar to the left kidney, however, the surrounding mesentery is moderately hyperechoic.

Aortic bifurcation/trifurcation

No abnormalities observed.

Adrenal Glands

The **left** adrenal gland measures 0.52 cm at the cranial pole, 0.48 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.

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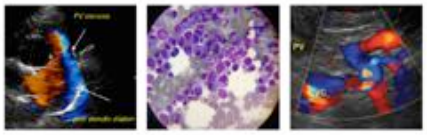

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The **right** adrenal gland measures 0.57 cm at the cranial pole, 0.43 cm at the caudal pole. No abnormalities are noted with the gland's overall architecture, echogenicity or echotexture. The phrenico-abdominal vein and surrounding vasculature and mesentery are unremarkable.

Spleen

The overall size, architecture, echotexture, and echogenicity of the spleen are within normal limits. The capsule is smooth. A few ill-defined, mildly hypoechoic nodules an regions scattered throughout the body, i.e., the parenchyma appears mildly moth eaten in certain areas.

Hypoechoic nodule is observed at the head of the spleen, with a slightly hyperechoic semi-lunar "halo" (hyperechoic to the center nodule, but hypoechoic to the remainder of the splenic parenchyma). The ill-defined nodule in the "center" measures 1.9 cm in diameter x 1.2 cm in length. The surrounding ill-defined "halo" measures 1.6 cm in diameter x 1.5 cm in length. In another view, it appears more well defined, measuring 0.84 cm in diameter x 1.1 cm in length.

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 and sharp to mildly rounded. The liver is homogeneous and has a mildly coarse, granular echotexture. It is very mildly hyperechoic, but remains hypoechoic to the falciform fat. Focal lesions are not visualized. Perivascular cuffing of multiple vessels is present, which may be due to a combination of fat, fibrosis and mineralization. No abnormalities are observed with the hepatic vessels visualized.

The gallbladder wall is within normal limits in thickness and echogenicity. There is no evidence of echogenic material within the GB or edema surrounding it. 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

The gastric wall is within normal limits in thickness and the wall layers are well defined. The muscularis of the pyloric region is thicker than normal and mild fogging is present. Obvious erosions and ulcers are not noted. 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 overt abnormalities are observed with the parenchymal echogenicity or echotexture. There is no evidence of hyperechogenicity of the surrounding mesentery, i.e., signs of active pancreatitis are not present.

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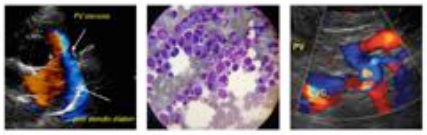

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Other

Lymph nodes No abnormalities are observed

Abdominal effusion is not visualized.

ULTRASONOGRAPHIC FINDINGS

- Differential diagnoses for the splenic nodules observed include nodular or lymphoid hyperplasia and extramedullary hematopoiesis. Other possibilities for the more diffuse mottled appearance include splenitis, due to antigenic stimulation and secondary inflammation, or immune mediated induced inflammation. Extramedullary hematopoiesis, hypersplenism and reactive hyperplasia must also be considered. Neoplasia, such as lymphoma, mast cell tumour, histiocytic sarcoma, or other round cell tumor are considered much less likely, but cannot be excluded. A fine needle aspirate would be required to achieve a definitive diagnosis.

- The mild, diffuse hyperechogenicity of the liver is highly suggestive of a vacuolar hepatopathy, which may occur due to the administration of glucocorticoids, stress and chronic illness. There are no obvious signs of neoplasia. Although a vacuolar hepatopathy is the most likely cause for the hepatic changes noted on today's sonogram and Jack's blood work, one cannot exclude the possibility of cholestasis, and cholangitis/cholangiohepatitis, including a secondary infection ascending from the GI tract, as steroids can predispose an individual to infections.

- The muscularis of the pyloric region is thicker than normal and mild fogging is present. Although obvious erosions and ulcers are not noted, intermittent gastrointestinal hemorrhage may still be occurring (see below). The changes observed with the muscularis may be consistent with inflammation, including irritation secondary to prednisone, as well as inflammatory bowel disease.

- Very mild mineralization is present with both kidneys; this is not considered clinically significant. The renal cortices are mildly hyperechoic and the surrounding mesentery is mildly hyperechoic compared to normal. These changes may be due to glomerulonephritis, which may occur secondary to the administration of glucocorticoids. Pyelonephritis cannot be excluded, despite the absence of overt sonographic signs, particularly in an individual who is receiving long-term steroids.

- Subclinical bacteriuria and a urinary tract infection cannot be excluded based on the very mild irregularity of the bladder mucosa. This may be present as a result of the glucocorticoid administration.

- Jack's blood work showed the following abnormalities
    - CBC
        - Mild, poorly regenerative anemia, that is normocytic and normochromic, which may be due to chronic inflammation or chronic disease, however, low grade, intermittent, yet chronic gastrointestinal hemorrhage secondary to prednisone cannot be excluded, particularly with the urea at the high end of the normal reference range

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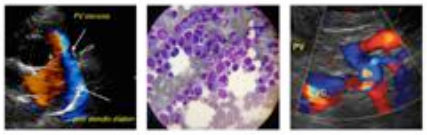

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- Moderate neutrophilia with a left shift, a slightly toxic appearance and very mild monocytosis are highly suggestive of leukemoid response secondary to the administration of prednisone. Some individuals are very sensitive to prednisone, which is not dose related.
- Eosinopenia and low normal lymphocyte count consistent with stress leukogram
- Reactive lymphocytes
- Absence of spherocytes, agglutination and Coombs' test negative

- Serum biochemical profile
  - Albumin at the low end of the normal reference range
  - Mild elevation of the ALT enzyme activity
  - Marked increase of the ALP enzyme activity
  - Elevated liver enzyme activities are most likely secondary to the administration of prednisone. A GGT, cholesterol and total bilirubin may help determine the degree with which the steroids are contributing to the elevation of the liver enzyme activities.

INTERPRETATION OF THE FINDINGS & FURTHER RECOMMENDATIONS

Although neoplasia is considered unlikely to explain the splenic changes, a fine needle aspirate (FNA) of the spleen would be required to achieve a definitive diagnosis.

A FNA of the liver may be pursued to confirm a vacuolar hepatopathy and signs of inflammation. It should be noted that a tissue biopsy is required to evaluate the hepatic architecture. The latter is not recommended at this time.

A coagulation profile is suggested prior to performing a FNA as prednisone may affect coaglation. Administration of vitamin K (0.5 mg/kg SQ q8-12h for 1-3 doses) is suggested even if the results of the PT/PTT are within normal limits.

Although indiscriminate use of antibiotics is not recommended, another option, instead of pursuing FNAs immediately, could be to include starting treatment with a broad-spectrum antibiotic and reassessing liver enzyme activities in approximately 4 weeks, while Jack is *still receiving* the antibiotics. If an improvement is observed, the antibiotic should be continued for an additional two weeks. A fasting cholesterol and total bilirubin would also be helpful, as mentioned above.

Due to the long term side effects of prednisone, a second immunosuppressive drug may be initiated, with the goal of weaning the dose of prednisone to the minimum effective dose. Drugs to consider include chlorambucil, cyclosporine, and mycophenylate.

A urinalysis and urine culture are recommended. If negative, a urine protein: creatinine ratio is recommended.

An arterial blood pressure is recommended to rule out hypertension, ideally in the presence of the client to minimize the effects of stress.

A SNAP 4Dx is also suggested.

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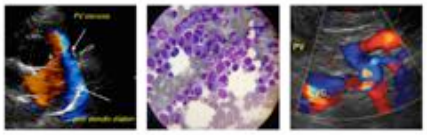

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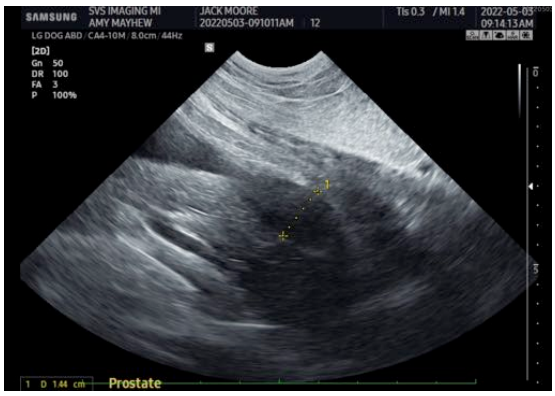

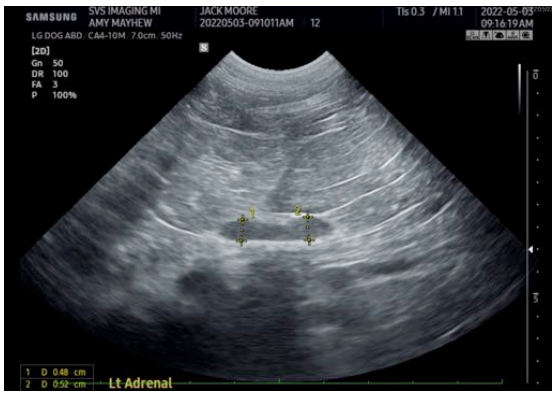

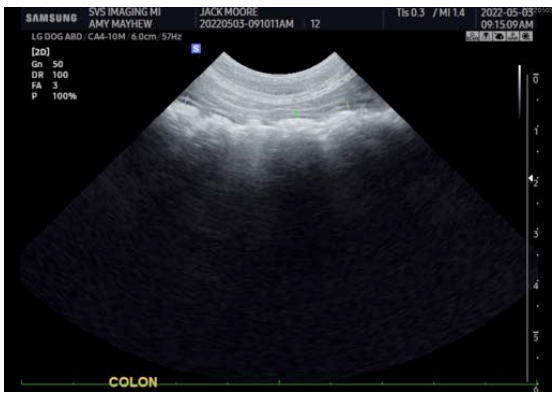

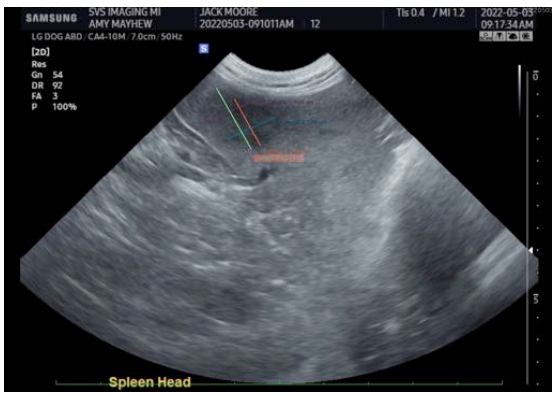

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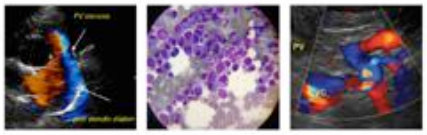

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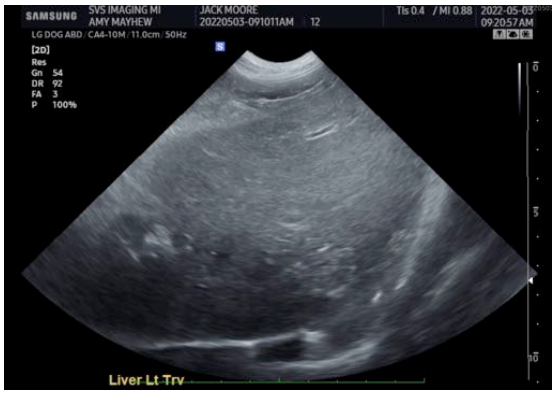

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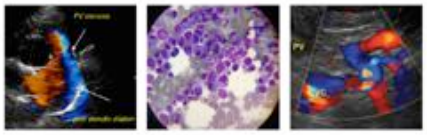

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The information and recommendations provided are based on the images presented by the referring veterinarian/sonographer. No evaluation can be communicated regarding pathology that was not visible in the image/video clips provided.

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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