

PATIENT

Avery Mudd

SPECIES

Canine

BREED

Beagle Cross

SEX

Spayed female

AGE

5 years

WEIGHT

29 Pounds

INTERPRETED BY

Lisa Carioto, DVM,
DVSc, Diplomate
ACVIM

IMAGING PERFORMED BY

Sarah Pender, CVT

HOSPITAL NAME

SVS Imaging QC

REFERRING VET

Dr. Hartmann

INVOICE

32054

DATE

7/28/22

PRESENTING CLINICAL SIGNS

History: PU/PD - chronic

Abnormal PE/Chem/CBC/UA Results: Treated for UTI 7/9/22. Recheck UA 7/26/22 - blood still present, significant nonhyaline casts, hematuria, proteinuria Prior workup done for possible Cushing's in 2021. LDDST and ACTH test were not supportive of Cushing's in April 21. 4/7/22 ALT 123, ALP 509. 7/28/22 ALT 229, ALP 559 CBC WNL

ULTRASONOGRAPHIC EXAMINATION OF THE ABDOMEN

Urinary System

The **urinary bladder** is well distended. The wall is not thickened and it is smooth and regular. No abnormalities are present with the trigone or proximal urethra. A trivial to small amount of free floating sediment is present, however, there is no evidence of cystoliths, polyps or a mass.

Kidneys

The **left kidney** measures 5.81 cm. The capsule is smooth. The cortex is mildly hyperechoic, i.e. it is isoechoic to the spleen, however, its overall architecture, including the definition of the cortico-medullary junction, is preserved. Occasional mineralizations of the diverticulae and pelvis are present, without evidence of nephroliths. Pyelectasia is noted (transverse view: 0.37 cm). The surrounding mesentery is not hyperechoic.

The **right kidney** measures 5.56 cm. The capsule is smooth. Its overall architecture, including the definition of the cortico-medullary junction, is preserved. A couple of mineralizations of the diverticulae and pelvis are present, without evidence of nephroliths. Pyelectasia is noted (transverse view: 0.28 cm). An accumulation of pelvic fat is noted. The surrounding mesentery is not hyperechoic.

Aortic bifurcation/trifurcation No abnormalities observed.

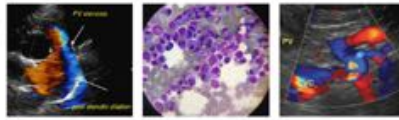
Adrenal Glands

The **left adrenal gland** measures 0.57 cm at the cranial pole, 0.46 cm at the caudal pole and 2.33 cm in length. The cranial pole is longer and more "plump", however, no abnormalities are noted with the echogenicity or echotexture. Subtle changes consistent with nodular hyperplasia, fat, and/or fibrosis. An ill-defined hyperechoic nodule is noted. The phrenico-abdominal vein and surrounding vasculature and mesentery are unremarkable.

The **right adrenal gland** measures 1.10 cm at the cranial pole, 0.54 cm at the caudal pole and 2.17 cm in length. The cranial pole is enlarged and nodular, however, a discrete mass is not observed. No abnormalities are noted with the gland's echogenicity or echotexture. The phrenico-abdominal vein and surrounding vasculature and mesentery are unremarkable.

Spleen

The spleen is within normal limits in size, architecture, echotexture, and echogenicity. The capsule is smooth. No abnormalities are observed with its vasculature, i.e. congestion and thrombi are not identified.

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Liver

Although there are no obvious signs of hepatomegaly, subjectively, it appears “generous” and slightly “swollen”. Its borders are smooth, but mildly rounded. The liver’s echotexture is homogeneous and it is within normal limits in echogenicity (it is isoechoic to the cortex of the right kidney). Focal lesions are not observed and no abnormalities are observed with the hepatic vessels.

The **gallbladder (GB)** is mildly dilated (consistent with a fasted individual). A moderate amount of free floating, gravity-dependent and inspissated, immobile echogenic material (sludge) is present, some of which has formed nodules. Sludge is also adhered to the intramural wall and thick strings of mucus and sludge are observed extending from the wall to the sludge. There is no evidence of edema surrounding the GB. The GB wall is within normal limits in thickness 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.

Gastrointestinal

The gastric wall is within normal limits in thickness and the wall layers are well defined. However wild stippling of the mucosa is observed. No abnormalities are noted with the pylorus. Peristalsis appears normal.

Duodenum and jejunum: Wall thickness is within normal limits and the definition of the wall layers is preserved. However, subjectively, the mucosa of the jejunal segments evaluated is more prominent than usual. Gas and fluid are present within the lumen of the small intestines.

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

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

Pancreas

The **right and left limbs** are not enlarged, but mildly hypoechoic with smooth borders. Hypoechoic nodules of variable size and pinpoint hyperechoic foci are scattered throughout the parenchyma. The former abnormalities are suggestive of active pancreatitis, while the latter are most likely due to age-related changes, such as nodular hyperplasia and fibrosis, respectively. Fibrosis may occur secondary to age, previous episodes of pancreatitis, mineralization, as well as amyloid deposition. The surrounding mesenteric fat is not overtly hyperechoic. Signs of neoplasia are not noted.

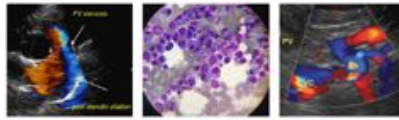
Other

Lymph nodes No abnormalities are observed

Abdominal effusion is not visualized.

ULTRASONOGRAPHIC FINDINGS

- **Gallbladder (GB):** Marked amount of gallbladder **sludge**. Although classical sonographic signs of a mucocele are not evident, a mucocele in development cannot be excluded. Obvious signs of cholecystitis are not evident, however, suppurative cholecystitis may still be present, in addition to cholangitis/cholangiohepatitis. Obtaining a history regarding signs of GERD from the client is suggested as gallbladder sludge may cause signs of gastroesophageal reflux disease

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(GERD), and abdominal pain, in some patients. Treatment with an anti-acid, proton pump inhibitor and ursodeoxycholic acid, may be indicated.

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- **Liver:** Cholangitis/cholangiohepatitis, and cholestasis cannot be ruled out despite the absence of severe sonographic abnormalities. Hepatitis remains a possible cause of the subtle changes observed.

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- **Pancreas:** A mild, smoldering pancreatitis cannot be excluded, in addition to changes associated with age and possible previous episodes of pancreatitis. Signs of neoplasia are not appreciated.

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- **Kidneys:** Very mild mineralizations may be due to genetics and diet. Pyelectasia is likely due to pu/pd, however, underlying pyelonephritis cannot be excluded despite the absence of classical sonographic signs.

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- **Adrenal glands:** Enlargement and rounding of the cranial pole of the right gland. The cranial pole of the right gland is often larger than the left. An obvious mass or nodule is not visualized. A benign adenoma may be developing. Hyperplasia due to chronic stress cannot be excluded. Pituitary-dependent hyperadrenocorticism is considered less likely.

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- **Gastrointestinal tract:** no major abnormalities are observed. The changes noted with the small intestines are subtle and subjective, however, they may be associated with inflammation in some patients, i.e. subclinical inflammation cannot be ruled out.

INTERPRETATION OF THE FINDINGS & FURTHER RECOMMENDATIONS**INTERPRETED BY**

Lisa Carioto, DVM,
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ACVIM

Analgesia to exclude visceral pain (gabapentin, +/- methadone), in case pu/pd is behavioral (secondary to abdominal discomfort or nausea)

Urine culture and sensitivity to exclude pyelonephritis

If negative, consider urine protein: creatinine ratio

Arterial blood pressure, once analgesia addressed

Obtaining a history regarding signs of GERD from the client

If history of signs of GERD,

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- Evaluation of fasting triglycerides to exclude hyperlipidemia as underlying cause of or contributor to gallbladder sludge

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- Treatment with an anti-acid, proton pump inhibitor (0.7-1 mg/kg PO q12h)

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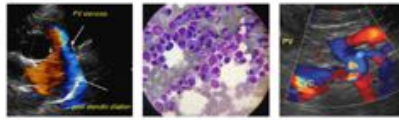
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- ursodeoxycholic acid is suggested. However, the dose should be gradually uptitrated (over a few weeks) until the maximum dose (10-15 mg/kg *divided* twice daily) is achieved to avoid GI side effects. For example, 3 mg/kg PO once a day for 5-7 days, then 5 mg/kg PO once a day for 5-7 days, then 7.5 mg/kg PO once a day for 5-7 days, then 10 mg/kg PO once a day for 5-7 days. Always 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.

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Differential diagnoses include cholecystitis, cholangitis/cholangiohepatitis, and a secondary ascending bacterial infection. Although indiscriminate use of antibiotics is not recommended, consider broad-



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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.

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*Note, ideally, fine needle aspirates of the liver (preferably a tissue biopsy) and culture of the bile would be performed prior to treating with antibiotics (pending a coagulation profile).

Small, frequent meals, including a small snack prior to going to bed

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A cholecystectomy may be considered in the future depending on the evolution of Avery's clinical signs and response to Ursodiol.

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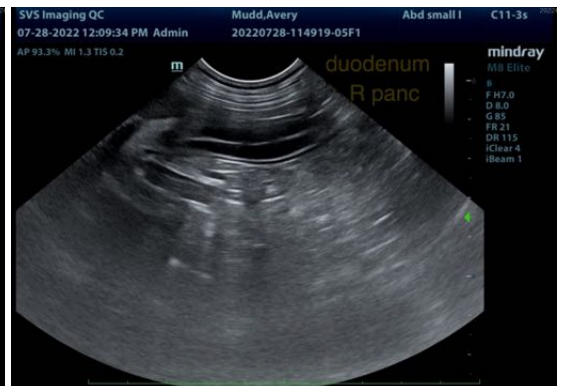
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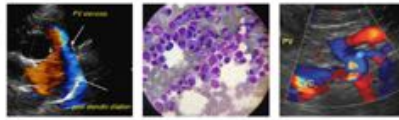
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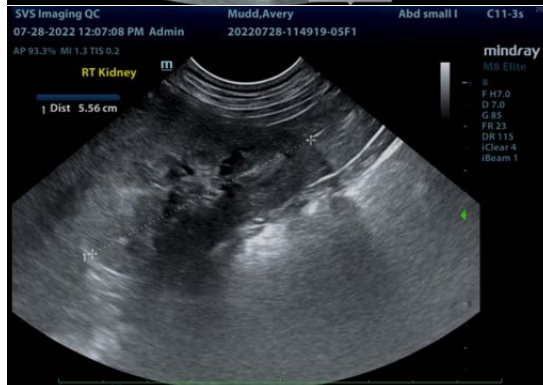
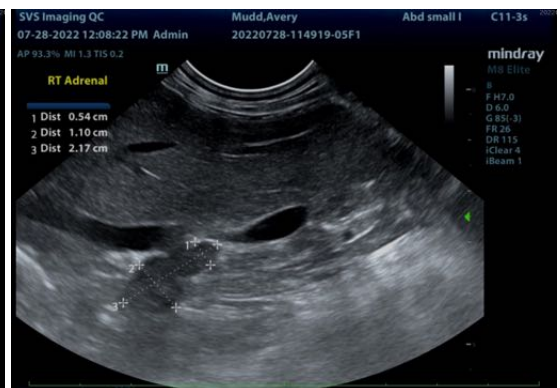
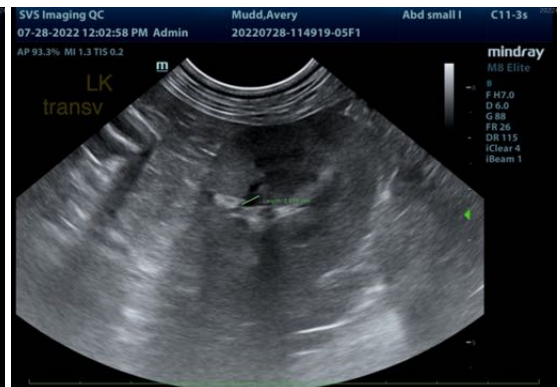
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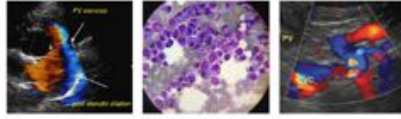
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The information and recommendations provided are based on the images presented by the referring veterinarian/sonographer. No evaluation can be communicated regarding pathology that was not visible in the image/video clips provided.

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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.

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