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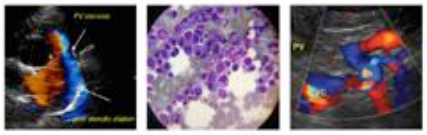

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PATIENT

Twix Peace

SPECIES

Canine

BREED

Dachshund Mix

SEX

Neutered Male

AGE

13 years

WEIGHT

16 lbs

INTERPRETED BY

Lisa Carioto, DVM, DVSc, Diplomate ACVIM

IMAGING PERFORMED BY

Amy Mayhew LVT

HOSPITAL NAME

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Wixom Family Pet Practice

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PRESENTING CLINICAL SIGNS

Current Medications: Enrofloxacin 22.7mg 1.5 PO SID Patient History: Decreased appetite and weight loss over the past few weeks. Was having diarrhea and was diagnosed and treated for giardia, appetite did not improve, stools are improving. After recent treatments, patient is still hyporexic. Concern for pyelonephritis and hepatopathy.
Abnormal PE/Chem/CBC/UA Results: haziness to lenses OU, moderate diffuse tartar, mild gingivitis, left sided grade 3/6 heart murmur; left lateral thorax has large soft sq mass, right lateral thorax has small 2cm soft sq mass; abdomen is soft non-painful, intestines feel fluidy, no masses palpated Leukocytosis 23.12, neutrophilia 18.93, HCT 25.4, BUN 70.6, Creat 2.1, IP 5.1, Glob 4.9, ALT 128, ALP 473, T4 <0.5 UA-USG 1.025 **Please see attached labs

ULTRASONOGRAPHIC EXAMINATION OF THE ABDOMEN

Urinary System

The **urinary bladder** is not fully distended, thereby affecting the ability to evaluate wall thickness. The wall is smooth and regular. An in-depth evaluation of the trigone and proximal urethra is hindered by gas in the colon. A trivial amount of free floating sediment is present, however, there is no evidence of cystoliths, polyps or a mass.

Kidneys

The **left** kidney measures 5.17 cm. The capsule is smooth. The cortex is mildly to moderately hyperechoic and a mild loss of the normal definition of the cortico-medullary junction is present. Small mineralizations of the diverticulae and pelvis are present, without evidence of nephroliths or pyelectasia. Blood flow is within normal limits. The surrounding mesentery is very mildly hyperechoic. Multiple, small, round to elliptical, anechoic structures with smooth, thin walls, most consistent with cysts, are visualized within the cortex. The largest ones measure 1.03 cm and 0.89 cm in diameter. Some of the cysts, all similar in size to the one at the caudal pole (0.94 cm in diameter x 1.36 cm in length), contain echogenic material, which appears inspissated along septae. Polycystic kidney disease cannot be excluded based on the number of cysts present, with possible abscessation of some cysts vs. age-related changes.

The **right** kidney measures 5.22 cm. Findings are similar to the left kidney.

Aortic bifurcation/trifurcation

No abnormalities observed.

Adrenal Glands

The **left** adrenal gland measures 0.60 cm at the cranial pole, 0.55 cm at the caudal pole. The cranial pole is slightly “plump” and rounded, without signs of a discrete mass or nodule. No abnormalities are noted with the gland’s overall echogenicity or echotexture. The phrenico-abdominal vein and surrounding vasculature and mesentery are unremarkable.

The **right** adrenal gland measures 0.74 cm at the cranial pole, 0.61 cm at the caudal pole in length. The gland’s overall architecture is more “plump” along its entire length. The cranial pole is slightly “plump”, rounded and nodular in a slightly oblique view. No abnormalities are noted with the echogenicity or

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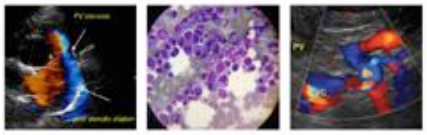

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echotexture. The phrenico-abdominal vein and surrounding vasculature and mesentery are unremarkable.

Spleen

The spleen is within normal limits in size, architecture, echotexture, and echogenicity. The capsule is smooth. A hypoechoic, mildly heterogeneous, slightly ill-defined nodule is noted toward the head. No abnormalities are observed with its vasculature, i.e. congestion and thrombi are not identified.

Liver

There are no obvious signs of hepatomegaly. The liver's borders are smooth, but mildly rounded. It is homogeneous, but diffusely hyperechoic, i.e., the liver is isoechoic to the falciform fat and spleen. A hyperechoic nodule, measuring 1.31 cm in diameter x 1.12 cm in length, is noted in the porta hepatis. No abnormalities are observed with the hepatic vessels.

The gallbladder (GB) is significantly distended with a large amount of inspissated echogenic material that is immobile. Strings of mucus are noted arising from the luminal wall and attaching to the inspissated debris, yielding a "stellate" appearance. The GB wall is within normal limits in thickness and echogenicity. Although there are no signs of dilation or tortuosity of the cystic and/or common bile ducts, the parenchyma surrounding the cystic duct is hyperechoic. There are no signs of an obstruction.

Gastrointestinal

A large amount of gas is present within the lumen in the stomach. The gastric wall is within normal limits in thickness and the wall layers are well defined. Both the muscularis and submucosa are prominent. Possible stippling of the muscularis is observed in certain views. Peristalsis appears decreased based on the "to and fro" motion of the gas pattern.

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

The colonic wall is at the high end of the normal reference range. Although mural detail is conserved, the submucosa is prominent. A large amount of gas is present within the lumen.

Pancreas

The **left limb** is not enlarged, but is mildly hypoechoic. Its contours are regular. Pinpoint hyperechoic foci are scattered throughout the parenchyma. The former is suggestive of mild active pancreatitis, while the latter is likely due to fibrosis. Fibrosis may occur secondary to age, previous episodes of pancreatitis, mineralization, as well as amyloid deposition. The surrounding mesenteric fat is very mildly hyperechoic. Overt signs of neoplasia are not noted.

Similar findings are noted with the **right limb**.

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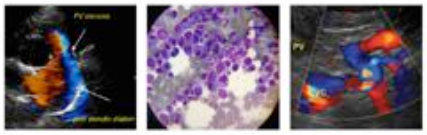

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Other

Lymph nodes

No abnormalities are observed.

Abdominal effusion is not visualized.

ULTRASONOGRAPHIC FINDINGS

- **Gallbladder (GB)**: Although not consistent with all the "classical" sonographic signs of a mucocoele, Twix's GB is highly suggestive of one. There are no obvious signs of rupture or risk of rupture at this time, however inflammation is present based on the hyperechogenicity surrounding the cystic duct. Some dogs may show clinical signs of gastroesophageal reflux disease (GERD) and abdominal pain as a result of the sludge. Therefore, obtaining a history regarding signs of GERD from the client is suggested. Treatment with an anti-acid, proton pump inhibitor may be required depending on the patient's history. See below re treatment with ursodeoxycholic acid).

- **Liver**: The hyperechoic nodule in the porta hepatis is likely due to fibrosis, mineralization, nodular regeneration, or a combination of these benign processes. A vacuolar hepatopathy is suspected, however, cholangitis/cholangiohepatitis, cholestasis and cholecystitis, including a suppurative component, must also be considered based on the blood work results. Chronic hepatitis is considered less likely as the ALT enzyme activity is not severely elevated. Having said that, it is still prudent to investigate the history with the client regarding possible exposure to medications, including natural supplements as well as, leptospirosis and other vector borne diseases given the renal changes.

- **Kidneys:** Although age-related changes are present, pyelonephritis and glomerulonephritis cannot be excluded. Furthermore, polycystic kidney disease cannot be excluded based on the number of cysts present, with possible abscessation of some cysts vs. age-related changes.

- **Urinary bladder:** The small amount of free floating sediment within the lumen of the urinary bladder is most likely clinically insignificant, however, subclinical bacteriuria or a urinary tract infection and pyelonephritis cannot be excluded based on the sonographic findings of the kidneys.

- **Spleen**: Nodular or lymphoid hyperplasia and extramedullary hematopoiesis are the most likely differential diagnoses for the hypoechoic nodule, all of which are benign processes. Neoplasia is considered unlikely.

- **Pancreas**: Signs suggestive of mild active pancreatitis are present, for example, a smoldering pancreatitis. Fibrosis is also noted, which may occur secondary to age, previous episodes of pancreatitis, mineralization, as well as amyloid deposition. Overt signs of neoplasia are not noted.

- **Gastrointestinal tract**: Major abnormalities are not observed. The changes observed are somewhat subjective and may not be clinically significant, however, they have been associated with GI inflammation. A *chronic gastroenteropathy*, such as inflammatory bowel disease, parasitism, e.g. giardiasis, dysbiosis, etc., may be present. The *colonic* changes are also

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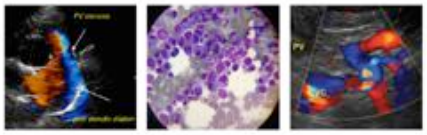

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suggestive of inflammation, which may be due to the recent episode of diarrhea. The evaluation of Twix's history of vomiting, diarrhea, pica and GERD is suggested (prior to recent bout). A *mild ileus* of the stomach is present. There are no obvious signs of neoplasia.

- **Adrenal glands**: Slightly "plump" and rounded cranial pole of the left gland. The left gland is at the high end of the normal reference range for a dog of Twix's stature (0.60 cm). The right is mildly enlarged. There are no signs of neoplasia. Adrenal hyperplasia secondary to chronic illness/stress is possible. A benign adenoma in early development is also possible. Pituitary dependent hyperadrenocorticism is much less likely given the absence of clinical signs, yet occult HAC cannot be excluded. Further diagnostics are *not* recommended.

INTERPRETATION OF THE FINDINGS & FURTHER RECOMMENDATIONS

Suggestions/recommendations include

A fine needle aspirate of one of the renal cysts may be considered for cytology and culture, however the cyst should be fully drained to avoid contamination of the abdomen if this is an abscess.

+/- fine needle aspirate of the liver, however tissue biopsies are much more informative. Stabilization of Twix's renal function is recommended prior to considering general anesthesia.

Intravenous fluids to correct and improve pre-renal and renal azotemia, respectively.

Analgesia, for example, CRIs consisting of opioids (fentanyl), with lidocaine and ketamine, if hospitalized. Oral therapy at home should consist of methadone two to three times a day and gabapentin three times a day. Slow up titration to avoid sedation, ataxia and nausea.

Obtaining a history regarding signs of GERD from the client is suggested. Treatment with an anti-acid, proton pump inhibitor (0.7-1 mg/kg IV or PO q12h)

A urine culture and sensitivity. False negatives are possible due to the current use of enrofloxacin. Addition of a broad-spectrum antibiotic may also be performed if a culture is not possible.

+/- spec cPL

Vitamin B_{12} and folate to exclude malabsorptive, maldigestive diseases and dysbiosis.

If negative, a urine protein: creatinine ratio (note, false positives are possible due to systemic inflammation).

An arterial blood pressure

Vitamin K (0.5 mg/kg SQ q8-12h for 1-3 doses), due to cholestasis

A low fat diet that is appetizing may be used to stimulate Twix to eat

Small frequent meals

Anti-emetics, if signs of nausea

A cholecystectomy and liver biopsy may be required in the future, however, stabilization of Twix's renal function is recommended prior to considering this option.

If ursodeoxycholic acid (Ursodiol) will be administered, it should be introduced judiciously and at a very low dose. The dose should be up-titrated slowly to decrease the risk of GI side effects and possible GB obstruction. 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,

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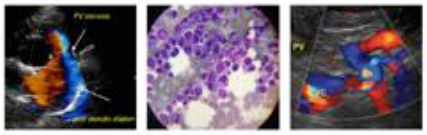

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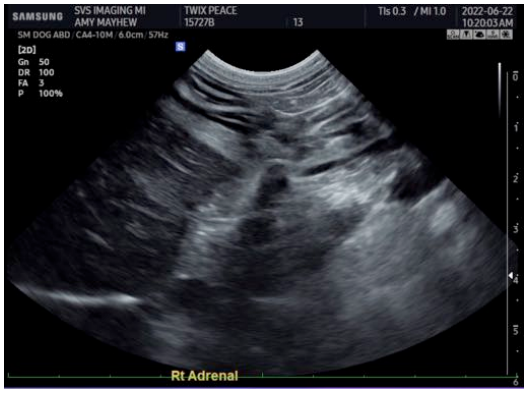
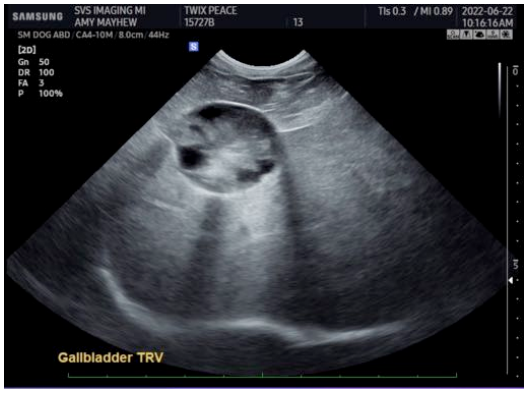
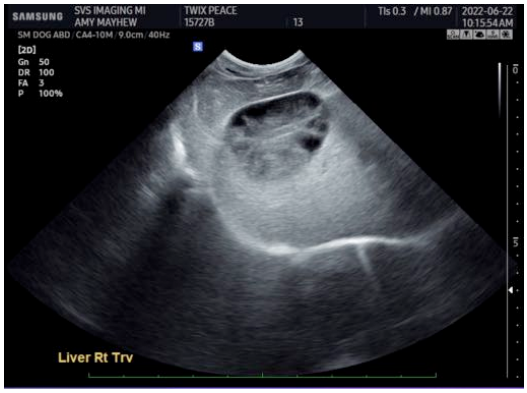
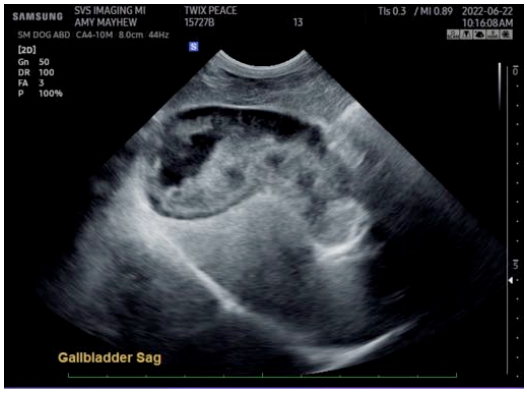
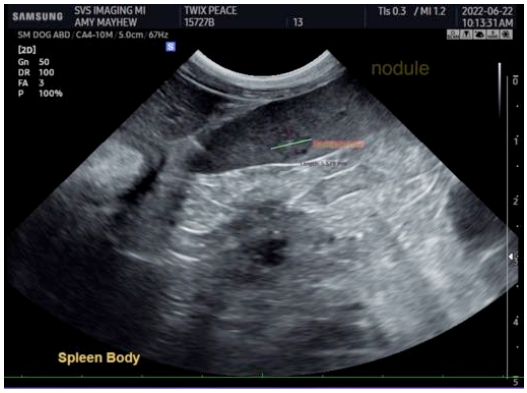
then 7.5 mg/kg PO once a day for 5-7 days, then 10 mg/kg PO once a day for 5-7 days. The dose should be divided BID and given with a meal to decrease the risk of nausea, cramps, vomiting and diarrhea. This medication should not be introduced at the same time as other drugs.

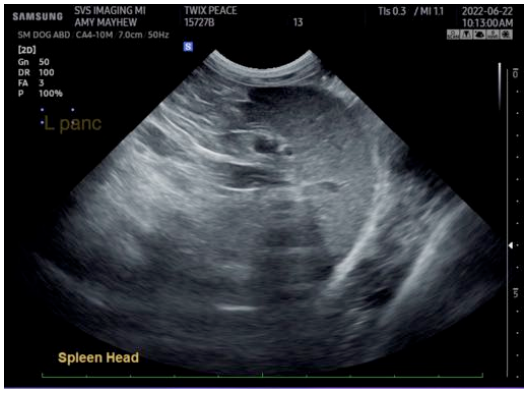












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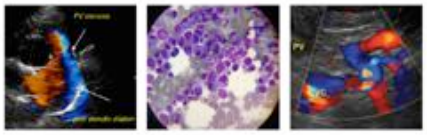

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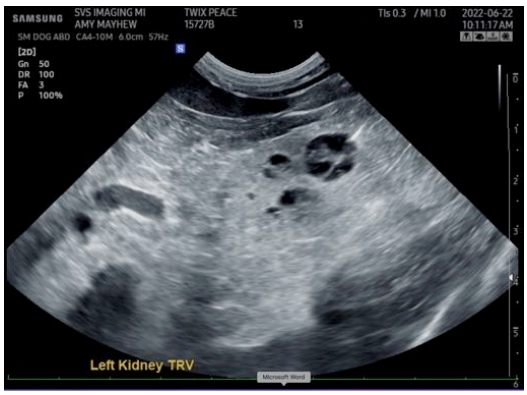

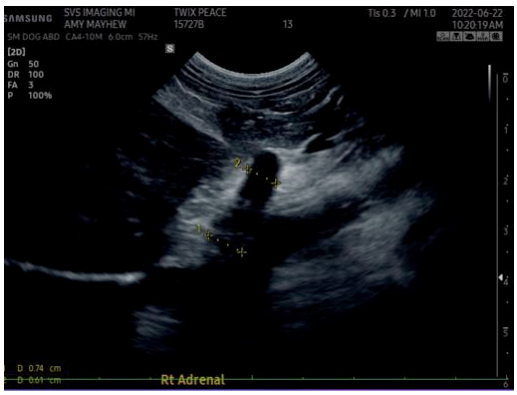

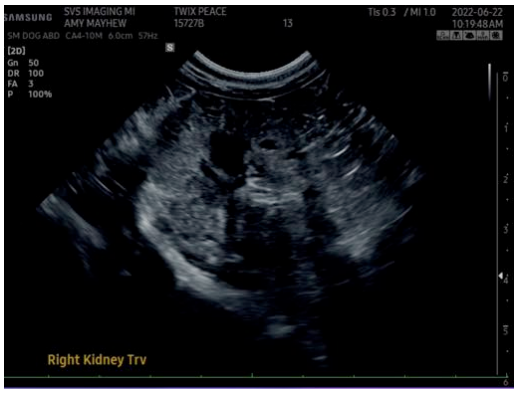

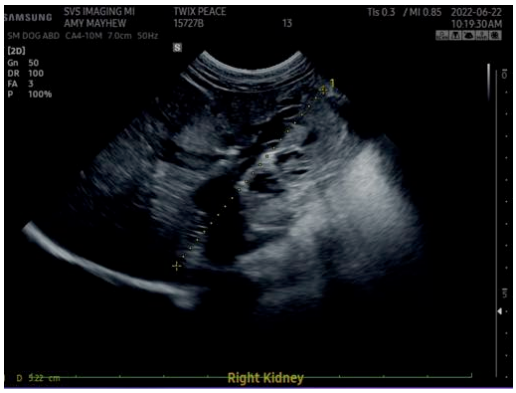

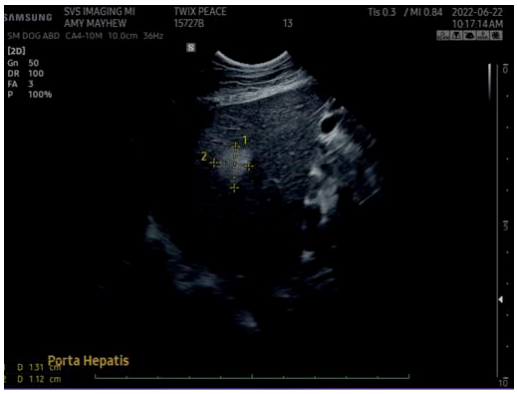

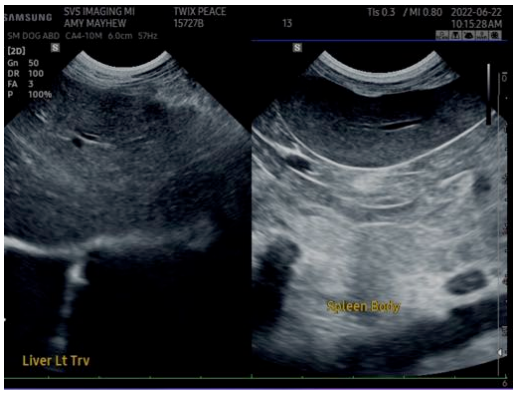

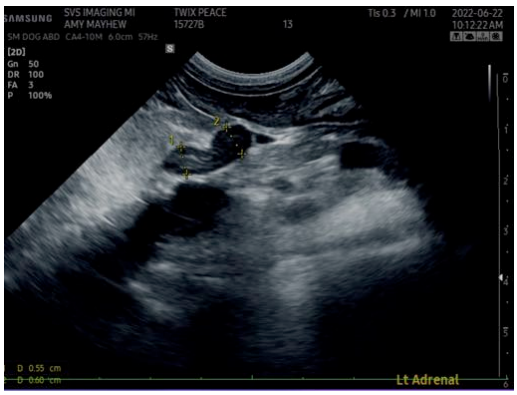

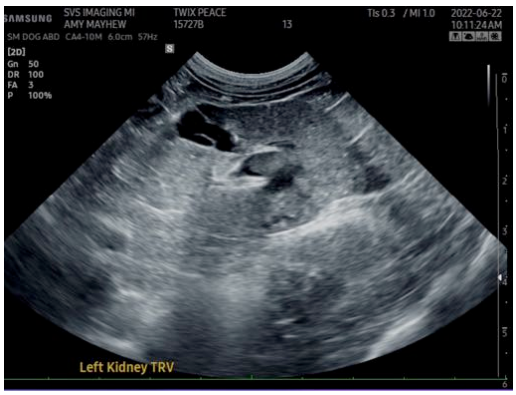

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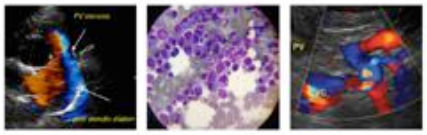

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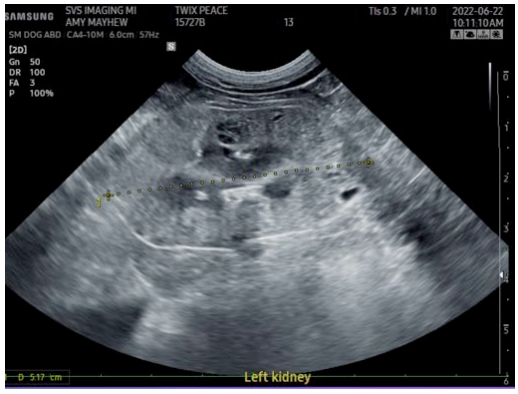

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Thank you for this referral. If the clinical or image interpretation does not parallel your findings or if I can be of any further assistance please contact me.

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