



**PATIENT**

Buddy Morgan

**SPECIES**

Canine

**BREED**

Yorkie

**SEX**

Neutered Male

**AGE**

12 Years

**WEIGHT**

10 Pounds

**INTERPRETED BY**

Eric Lindquist, DMV

DABVP, Cert. IVUSS

**IMAGING PERFORMED BY**

Dr. Danielle Lanz

**HOSPITAL NAME**

New Holland VH

**REFERRING VET**

Dr. Danielle Lanz

**INVOICE**

42350

**DATE**

10/26/22

**PRESENTING CLINICAL SIGNS**

1mo history of frank bloody liquid diarrhea about every 2 days will get bloody diarrhea but then will improve for a few weeks. No improvement on metronidazole. HX of stage 1 CKD, grade 2 systolic HM historic. Eating ok except on days that has bloody diarrhea, then will not eat breakfast. Drinking normally. No vomiting. Abdomen appears distended on PE

Abnormal PE/Chem/CBC/UA Results: RBC 5.07, Hemoglobin 13, WBC 19.5, Neutrophils 13.47K, Platelets 1093, SDMA 16, BUN 50, Creat 1.1, TP 7.9, Globulin 4.3, Alt 288, ALP 1275, GGT 15, Triglyceride 171, Amylase 2202, Lipase >1800

**ULTRASONOGRAPHIC EXAMINATION OF THE ABDOMEN**

**Urinary System**

The **urinary bladder** revealed an apical polyp measuring 5.0 mm. The remainder of the bladder was unremarkable to the level of the cystourethral junction.

The **kidneys** revealed largely normal size and structure, corticomedullary definition and ratio (cortex 1/3 of medulla) were essentially maintained with some age-related loss of curvilinear patterns regarding the capsule and C/M junction. The cortices presented largely uniform texture with some increased echogenicity expected for his age patient. Medullary structure differed distinctly from that of the cortex and no evidence of pelvic dilation was present. Corticomedullary mineralization noted in both kidneys, non-obstructive. The left kidney measured 3.94 cm. The right kidney measured 4.66 cm.

**Adrenal Glands**

The **left adrenal gland** was enlarged at the caudal pole, measuring 0.80 cm. Cranial pole measured 0.50 cm.

The **right adrenal gland** was mildly enlarged, irregular and slightly heterogeneous.

**Spleen**

The **spleen** presented discrete and diffuse hypoechoic micronodular parenchyma. The capsule was generally smooth without noticeable impingement from within the spleen or from pathology in the adjacent abdomen. The splenic vasculature demonstrated normal volume without signs of congestion or significant contraction. These changes are consistent with age related benign nodular hyperplasia. However, early hemangiosarcoma, lymphoma or mast cell neoplasia could not be entirely ruled out. Fine needle aspirate or biopsy following coagulation panel would be ideal especially if any weight loss is an issue. Otherwise, follow up ultrasound in 3-4 weeks to track these changes would be a more conservative approach.

**Liver**

The **liver** revealed diffuse nodular and cystic changes with expansive left-sided mass measuring 6+ cm. Significant disruption of architecture noted. The mass appeared to enter into the right mediadorsal liver and approach the gastroesophageal inlet. Calculi noted as well. Minor areas of free fluid noted, and a significant amount of inflammation associated with the mass. The gallbladder was deviated ventrally.

**Gastrointestinal**

The **gastrointestinal** presentation revealed mild uniform prominence of the gastric mucosa as well as areas of "ropey" small intestinal wall with slight disruption of the normal 1:3 muscularis/mucosal ratio. The intestinal submucosa was slightly irregular, thickened and hyperechoic suggestive of low grade, chronic disease. No concerning lymphadenopathy was visible. No evidence of obstruction was present.



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Chronic inflammatory bowel disease is likely with a low possibility of an early neoplastic event such as lymphoma. Full thickness tissue biopsies via open laparotomy, ideally guided by intraoperative ultrasound in order to obtain the most representative mural sample, would be necessary to rule out this possibility.

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**Pancreas**

The base and limbs of the **pancreas** were observed to be largely isoechoic to surrounding omental fat. Pancreatic duct and capsular contour were acceptably normal and parenchyma respected normal curvilinear patterns. No overt evidence of active inflammatory or neoplastic disease was noted.

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**ULTRASONOGRAPHIC FINDINGS**

**SEX**

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- Left medial liver mass – does not appear overtly resectable.
- Bilateral adrenal enlargement with irregular contour
- Diffuse intestinal thickening – likely underlying inflammatory bowel.
- Micronodular hyperplasia splenic pattern
- Age related renal changes with mineralization

**AGE**

12 Years

**INTERPRETATION OF THE FINDINGS & FURTHER RECOMMENDATIONS**

Three separate issues in this patient. Suspect biliary carcinoma or hepatocellular carcinoma of the liver. CT evaluation for potential surgical planning could be considered. However, given the invasive pattern, clean resection is unlikely. Renal calculi present, non-obstructive. The immediate issue is the liver mass and associated inflammation. However, concurrent GI disease is evident. Prognosis is guarded to poor.

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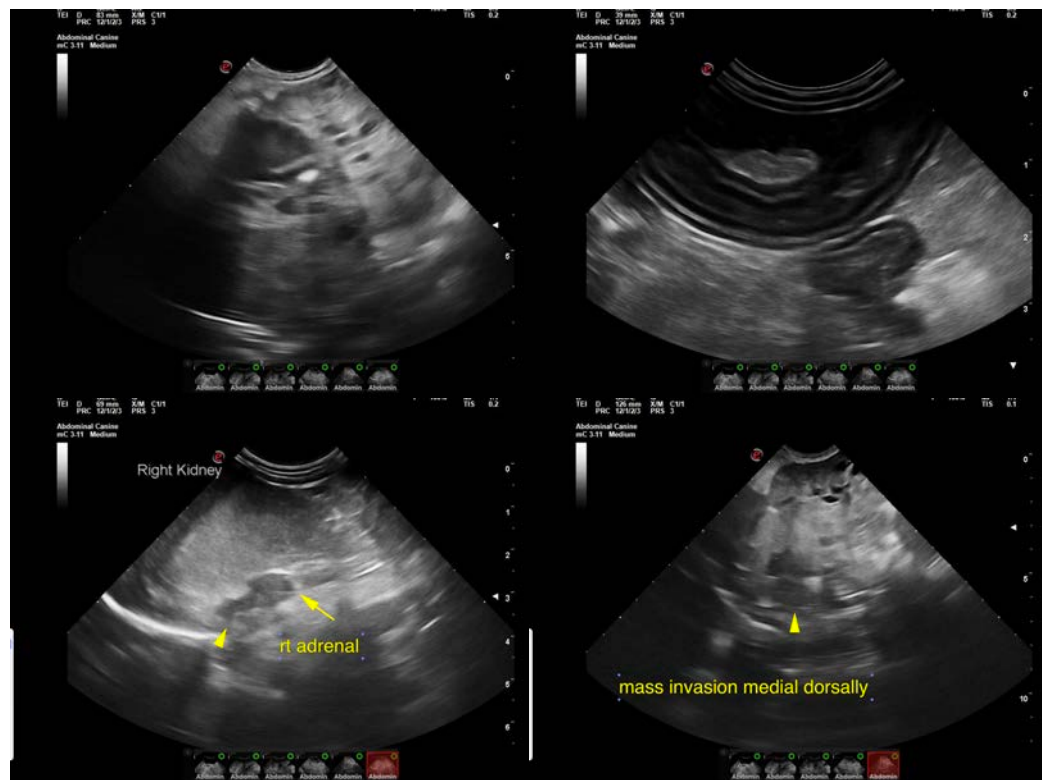
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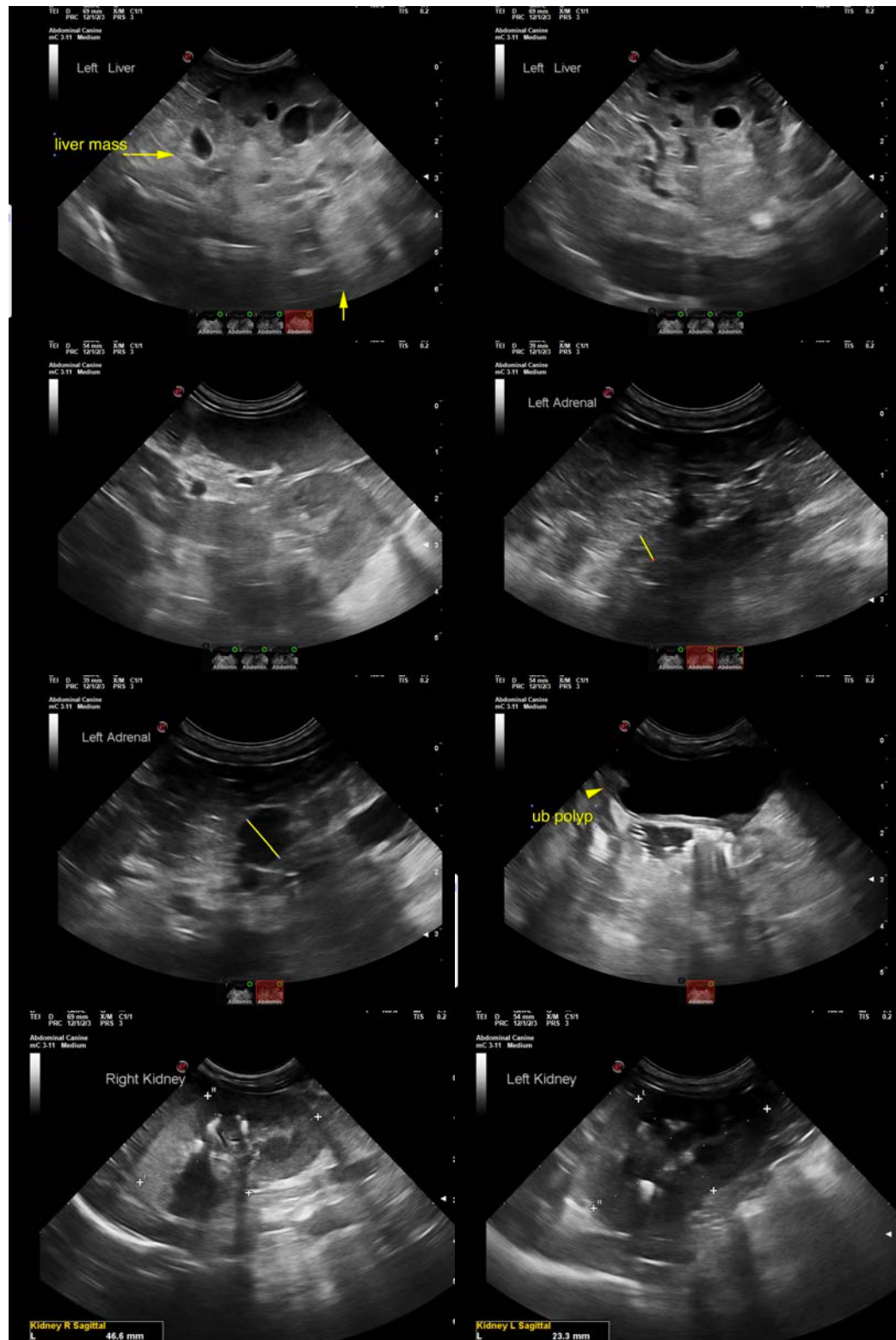
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The information and recommendations provided are based on the images presented by the referring veterinarian/sonographer. No evaluation can be communicated regarding pathology that was not visible in the image/video clips provided.

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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.

**Eric Lindquist, DMV, DABVP, Cert. IVUSS, CEO of SonoPath.com**

[info@SonoPath.com](mailto:info@SonoPath.com)

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**Hepatic Masses, Biliary Adenoma, and Biliary Adenocarcinoma**

**SEX**

Neutered Male

<http://www.sonopath.com/HepaticMasses>

**AGE**

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**Description:** Hepatocellular carcinoma typically manifests in the liver's left lateral lobes, yet may cross over to the right lobes should it derive from the hilus. These masses often present cavitating, necrotic cores that are difficult to distinguish from hepatic abscesses. Vascular channels may also be involved, and bile duct obstruction is often present. Older felines often present solitary or multiple fluid-filled cysts within the hepatic parenchyma. The latter are typically benign cystadenomas and should be differentiated from: cystic adenocarcinoma; hepatic lymphoma (usually diffusely hyperechoic +/- FIV/FeLV association); metastatic neoplasia (diffuse hyper- to hypoechoic nodules secondary to mammary adenocarcinoma, splenic hemangiosarcoma, or pancreatic or intestinal adenocarcinoma); benign nodular hyperplasia (accompanied by minimal to no symptoms); hepatic cirrhosis (regenerative nodules); or rare carcinoids, fibrosarcomas, leiomyosarcomas, and osteosarcomas.

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**Clinical Signs:** Possible clinical signs and physical exam findings include cranial abdominal organomegaly, sudden collapse associated with mass rupture, vomiting, ascites, jaundice (severe cases), and hypoglycemia secondary to a paraneoplastic syndrome. Sepsis and fever associated with secondary abscessation of the mass may also occur. Cats usually present with anorexia and lethargy.

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**Diagnostics:** Routine biochemical analysis primarily shows liver enzyme elevation (i.e., ALT for cellular necrosis; SAP for hepatic congestion; elevated bilirubin for stasis/obstruction; bile acids > 75-100uM/L for significant function impairment). Staging of the disease with 3-view thoracic radiographs is essential, as is conducting a CBC, serum biochemistry, urinalysis, as well as abdominal and possibly also thoracic ultrasounds in order to provide the owner with adequate and well-informed options. Surgical and oncological referral is recommended after a coagulation panel has been assessed and ultrasound-guided biopsies of both normal and pathological tissue have been performed such that the disease is adequately characterized. In cases where surgical resection is impossible, direct chemoembolization of the tumor blood supply could be considered; however, this procedure is only performed at specific tertiary referral locations. Placement of palliative stents into the caudal vena cava (CVC) can be considered as well if compression by an unresectable tumor causes excessive ascitic fluid accumulation. Serum alpha-fetoprotein (AFP) has been shown to reemerge in dogs with malignant hepatobiliary adenocarcinoma. Ultrasound is

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important to localize the mass in relation to the portal hilus and gallbladder. The portal vein, CVC, aorta, gallbladder, and bile duct should all be identified with respect to the location of the mass to determine resectability. Ultrasound also allows for an examination of possible metastatic sites in the abdomen and, to some degree, in the thorax.

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**Treatment:** Hepatic adenoma, hepatoma, and adenocarcinoma are usually amenable to surgical resection via hepatic lobectomy should the pathology be isolated to single-lobe progression. Multi-lobar presentation may be amenable to lobectomy and debulking; this will be determined further during surgical consultation. These tumors tend to displace unaffected parenchyma, allowing for relatively straightforward surgical resection. Up to 80% of the liver can be removed without long-term functional deficits. Blood transfusions may be necessary during surgery. The development and implementation of the LDS™ stapler has helped to streamline the procedure. Most carcinomas have metastasized by the time of diagnosis yet tend to be slow-growing; thus, it may be possible for a certain quality of life to be attained via surgical resection. Hepatic hemangiosarcoma has usually metastasized at the time of diagnosis and carries a much poorer prognosis. Surgical resection and chemotherapy are recommended, but considered by many to be an “aggressive” approach.

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Preliminary trials have shown that gemcitabine is well tolerated and yields good responses in cases of hepatic as well as pancreatic, colonic, and gastric carcinomas. Myelosuppression, however, remains the key issue. Doxorubicin, cyclophosphamide, and fluorouracil combinations have also proven fruitful.

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Nonsteroidal anti-inflammatory drugs (NSAIDs) have been demonstrated to have an anti-neoplastic effect due to their inhibition of COX-2 in certain tumor cells. The end product of the cyclooxygenase cascade is prostaglandin E2, which, when expressed in tumor cell lines—and not expressed in normal cells of that particular cell line—results in inhibited apoptosis, immunosuppression, and increased angiogenesis, proliferation, and invasiveness. Inappropriate increases in COX-2 expression have been documented in certain neoplasias, including squamous cell carcinoma, mammary carcinomas, prostatic carcinoma, malignant melanoma, and transitional cell carcinoma.

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Metronomic chemotherapy is currently being investigated and compared to traditional chemotherapy protocols; it is thought to be at least as effective as the latter with substantially less toxic side effects. Metronomic chemotherapy is the practice of uninterrupted administration of low-dose cytotoxic drugs at regular and frequent intervals, as opposed to high-dose, shorter-term protocols characteristic of traditional chemotherapeutic practices. The lower dose allows for long-term administration without toxic side effects, and has been postulated as providing longer remission intervals. Moreover, it has the benefit of minimizing the intervals between drug regimens—the period during which tumor cells may repopulate the area—as well as the chance of developing multi-drug resistant genes. Metronomic chemotherapy has been used successfully in human patients who have undergone previous chemotherapy administration. It is thought to destroy endothelial cells, thereby retarding angiogenesis and targeting regulatory T cells. To date, there have only been a few small clinical trials in veterinary patients, and these have focused on animals that have hemangiosarcoma and soft tissue sarcomas.

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**Conclusion:** With respect to hepatic neoplasia, many surgical and chemotherapeutic options exist; however, it is best to consult with a local board certified oncologist who can help determine the best course of action.

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**References:**

Biller BJ. Teaching T cells to target tumors: towards the design of more effective cancer vaccines. Proceedings from the American College of Veterinary Internal Medicine Forum, Denver, CO, June 15-18, 2011.

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Biller BJ, Guth A, Burton JH, Dow SW. Decreased ratio of CD8+ T cells to regulatory T cells associated with decreased survival in dogs with osteosarcoma. *J Vet Intern Med* 2010;24(5):1118-23.

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Elmslie RE, Glawe P, Dow SW. Metronomic therapy with cyclophosphamide and piroxicam effectively delays tumor recurrence in dogs with incompletely resected soft tissue sarcomas. *J Vet Intern Med* 2008;22(6):1373-79.

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Lana S, U'Ren L, Plaza S, et al. Continuous low-dose oral chemotherapy for adjuvant therapy of splenic hemangiosarcoma in dogs. *J Vet Intern Med* 2007;21(4):764-69.

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Milner RJ. Do NSAIDs make a difference in cancer? Proceedings from the American College of Veterinary Internal Medicine Forum, Denver, CO, June 15-18, 2011.

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