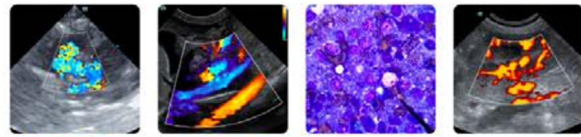

PATIENT

Miles Pekarsky

SPECIES

Canine

BREED

Australian Shepherd x

SEX

Neutered Male

AGE

14 Years 9 Months

WEIGHT

39.2 lbs

INTERPRETED BY

Eric Lindquist, DMV, DABVP (CFM), Cert. IVUSS

IMAGING PERFORMED BY

Rebecca Hamilton

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PRESENTING CLINICAL SIGNS

Evaluate elevated liver values- patient had hepatocellular carcinoma and liver lobectomy in 2/2024. Came in 1 week ago skipped meal, lab work consistent w/ pancreatitis and elv. liver values. only treated w/ 1 dose of Panoquel b/c a day later spike in kidney values which have since resolved. Want to u/s to r/o recurrence of neoplasia

Meds: Clavamox, Metro, Enroflox, Reglan, Cerenia. chronic: Denamarin, Ursodiol, Enalapril, Visbiome

Abnormal PE/Chem/CBC/UA Results: Mild lymphopenia. ALT 1205 (1629 on 1/27, 399 on 1/23) ALP 704 (1145 on 1/27, 1038 on 1/23) Creat went from 1 to 2.2 to 1.3. Lepto pending. Urine: Occ. granular casts, otherwise quiet, Culture pending, USG 1.013

ULTRASONOGRAPHIC EXAMINATION OF THE ABDOMEN

Urinary System

The **urinary bladder**, trigone, and pelvic urethra presented normal thicknesses and normal tone. The ureters were not visible which is normal. No uroliths or sediment were visualized and anechoic urine was present. No evidence of inflammatory or neoplastic changes were noted. Ureteral papillae were normal. The pelvic urethra was imaged 4.0 cm beyond the cystourethral junction.

The residual prostate measured 1.2 cm. The post-prostatic urethra was unremarkable.

The iliac trifurcation was unremarkable.

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. Slight microcystic changes noted in both kidneys. The right kidney measured 6.9 cm. The left kidney measured 6.1 cm.

Adrenal Glands

The **left adrenal gland** was uniformly enlarged, measuring 3.2 cm x 1.19 cm at the cranial pole and 1.26 cm at the caudal pole. Loss of structural detail, nebulous corticomedullary definition, and capsular expansion noted. Mild enhanced pericapsular fat noted.

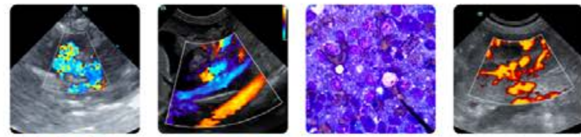
The right adrenal gland presented normal size and contour, measuring 2.0 cm x 0.80 cm at the cranial pole and 0.57 cm at the caudal pole.

Spleen

The **spleen** presented normal size and contour yet was displaced dorsally owing to the caudal left liver mass.

Liver

The caudal left **liver** revealed an expansive mass with microcystic parenchymal changes and periserosal inflammation. Some vascular congestion noted in the left liver leading to the hepatic mass, with some significant disorganization was noted. The mass is somewhat pedunculated. Vascularity was solid within the mass. There is no evidence of torsion. However, some regional inflammation and reactive mesentery noted. Maximum width of the mass appeared to measure approximately 8.0 cm x 8.0 cm. The left cranial



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liver revealed some micronodular and slight cystic changes yet subjectively benign. The right liver and caudate process appeared unremarkable with minor remodeling/age related type changes. The gallbladder was unremarkable.

Gastrointestinal

Examination of the **gastrointestinal tract** revealed a stomach and intestine free of stasis, of normal wall thickness, acceptable curvilinear mural detail, and peristaltic activity. Small and large intestine demonstrated normal luminal chyme and stool consistency respectively. No obstructive or overt infiltrative disease was noted. No associated abnormal lymphatic activity was noted.

Pancreas

The base and limbs of the **pancreas** were observed to be largely isoechoic to surrounding omental fat. Some parenchymal remodeling, however, with mild deviation from curvilinear normalcy was observed. Pancreatic duct and capsular irregularities were present consistent with age related changes. If pain upon imaging (+ Murphy sign) was present or if the patient is focally painful in subxyphoid palpation then low-grade smoldering chronic pancreatitis should be suspected.

Other

Rapid view of the heart revealed normal right auricle and pericardium.

ULTRASONOGRAPHIC FINDINGS

- Left caudal pedunculated liver mass – differentials include carcinoma, complex hepatoma, hemangiosarcoma less likely, granulomatous disease possible.
- Left adrenal enlargement – differentials include emerging carcinoma, pheochromocytoma, benign adenoma or hyperplasia.
- Displaced spleen owing to mass effect from the left liver.
- Age related pancreatic remodeling.
- Age related renal changes.

INTERPRETATION OF THE FINDINGS & FURTHER RECOMMENDATIONS

There are two separate morbidities in this patient, the pedunculated liver mass and the left adrenal gland. CT evaluation for surgical planning warranted. Left liver lobectomy and left adrenalectomy would be justified. Ultrasound guided FNA or core biopsy of the liver mass could also be considered. However, given its pedunculated position, I strongly recommend surgical removal. Serial blood pressures warranted. If hypertension is an issue, urine metanephrine level would be indicated, given the left adrenal presentation. In addition, surgical removal of the liver mass is recommended given the elevated ALT values, which would be consistent with necrosing or inflamed left liver mass. Given the patient history of hepatocellular carcinoma, recurrence is a strong potential.

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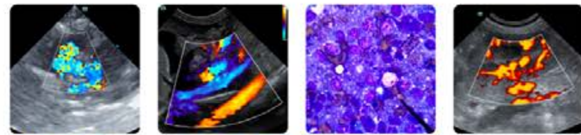

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The information and recommendations provided are based on the images presented by the referring veterinarian/sonographer. No evaluation can be communicated regarding pathology that was not visible in the image/video clips provided.

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.

Eric Lindquist, DMV, DABVP(CFM), Cert. IVUSS,
CEO, Owner, Founder -- SonoPath.com
info@SonoPath.com

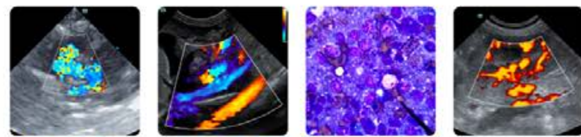
Hepatic Masses, Biliary Adenoma, and Biliary Adenocarcinoma

http://www.sonopath.com/HepaticMasses

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.

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.

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;



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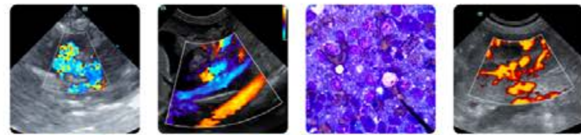
however, this procedure is only performed at specific tertiary referral locations. Placement of palliative stents into the caudal vena cava (CVC) can be considered as well if compression by an unresectable tumor causes excessive ascitic fluid accumulation. Serum alpha-fetoprotein (AFP) has been shown to reemerge in dogs with malignant hepatobiliary adenocarcinoma. Ultrasound is 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.

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.

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.

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.

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



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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.

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.

References:

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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.