



**CASE OF THE MONTH**  
**February 2022**

**Julie Pearson, DVM**  
**Sonopaws, LLC**  
**Springfield, VA, USA**

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### History:

Rigs is a 2-year-old male neutered Labrador Retriever. He was seen by his primary care veterinarian on January 6, 2022, for severe weight loss (10 pounds), acute vomiting and decreased appetite after boarding. There was no known ingestion of foreign material while boarding. Rigs was current on all vaccines, including Leptospirosis and Lyme. He was adopted from a breeder in California in Sep 2020 but had no other recent travel history. Rigs' dam died a week before at 5 years of age in California after liver failure and complications (hemo-abdomen) of her liver biopsy.

On presentation, Rigs was QAR, grade 2/4 dental calculus, normal hydration, dry pink mucous membranes, normal heart and lungs, non-painful abdomen, normal rectal exam, P=120, R=30, T=100.0 F, BCS 4/9, W 71.4 pounds. He was not NPO for the ultrasound.

### Significant findings on bloodwork:

HCT 43.9 % (37.3 – 61.7%)  
Monocytes 1.32 K/ $\mu$ L (0.16 - 1.12K/ $\mu$ L)  
Glucose 147 mg/dL (74 – 143mg/dL)  
ALP 259 U/L (23 – 212 U/L)  
Chloride 107mmol/L (109 – 122 mmol/L)

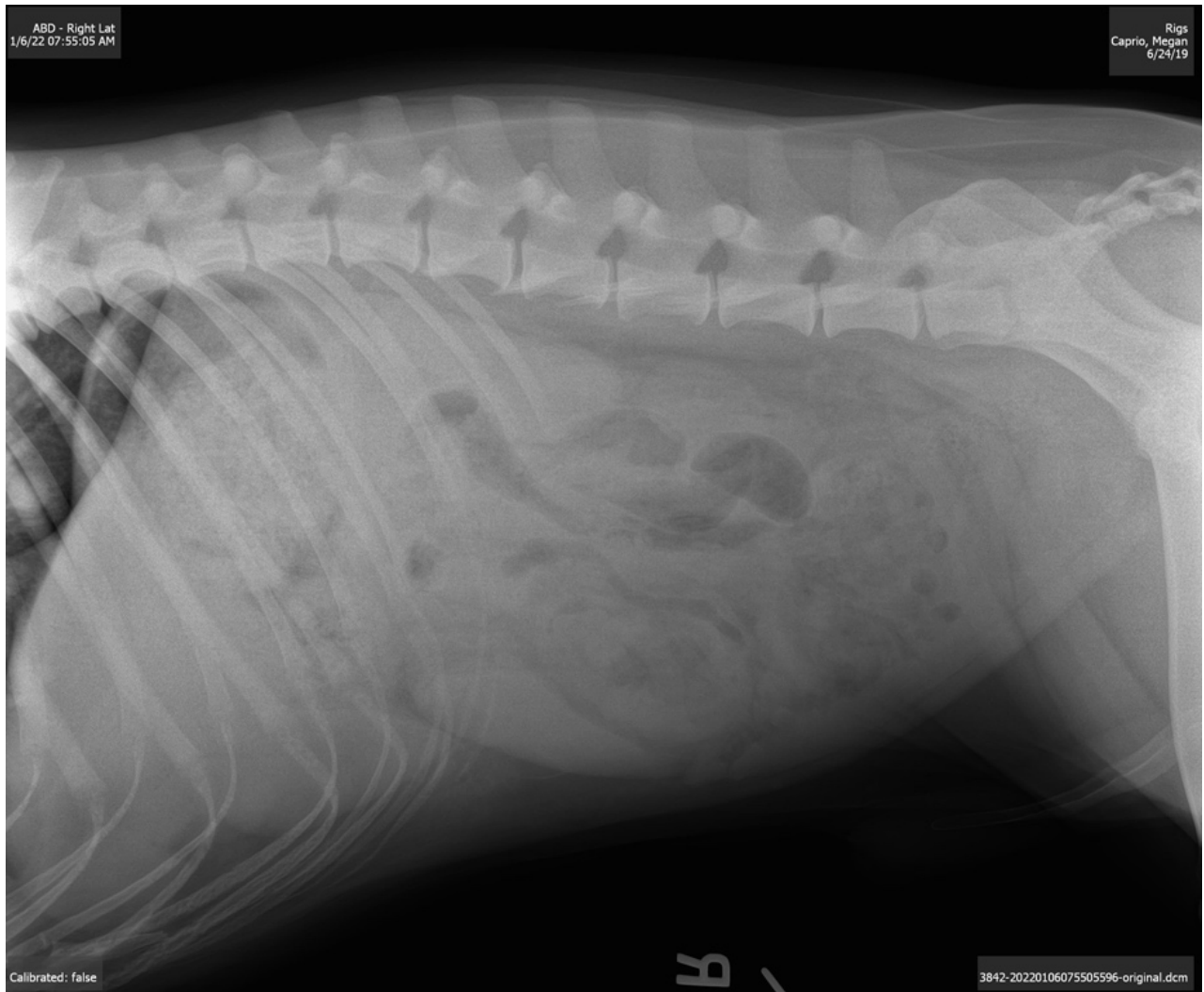
### Abdominal radiographs (radiologist review):

In the stomach is a mild amount of stippled, heterogeneous, soft tissue content. The small intestines are of uniform diameter, however there is moderately decreased peritoneal serosal detail in the abdomen, making complete evaluation of the gastrointestinal tract challenging. At times there are punctate to linear gas opacities throughout the peritoneal space that cannot be definitively placed within the intestine. Seen only in the right lateral projection, superimposed with the mid aspect of the eighth ribs there is a circular, smoothly marginated, soft tissue opacity nodule. The liver, spleen, kidneys, urinary bladder, and musculoskeletal system are normal.

Conclusions:

1. Moderately decreased peritoneal serosal detail with questionable multifocal free gas. This could indicate peritoneal effusion and/or fat edema/steatitis. Free fluid could be due to inflammatory or infectious causes of peritonitis, pancreatitis, and/or trauma to the gastrointestinal tract by foreign material. Free gas in the abdomen is not definitive, however, further imaging is warranted to ensure it is not present. Ultrasound or computed tomographic examination of the abdomen would be useful to fully evaluate the patient for a cause for this finding.
2. Mild gastric content. This could indicate normal ingesta or foreign material.
3. Questionable pulmonary nodule, caudo-dorsal lung. This is unusual given the age of the patient and could indicate a metastatic neoplastic process or fungal infection (such as blastomycosis). Given the location of this finding at the edge of the radiograph, artifact of

superimposition is not entirely excluded. 3 view radiographs of the thorax would be useful for further evaluation.



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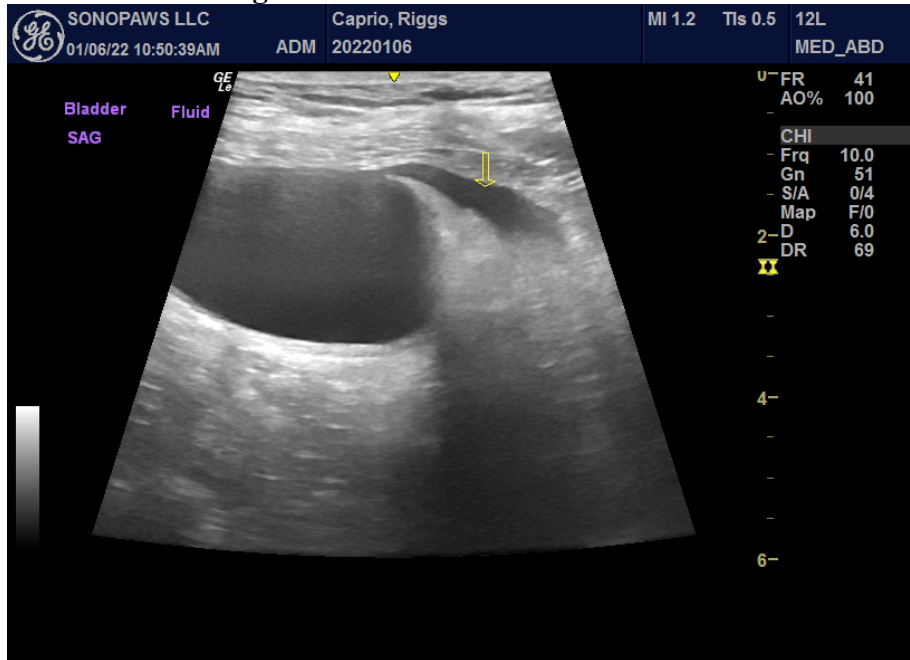
Rigs  
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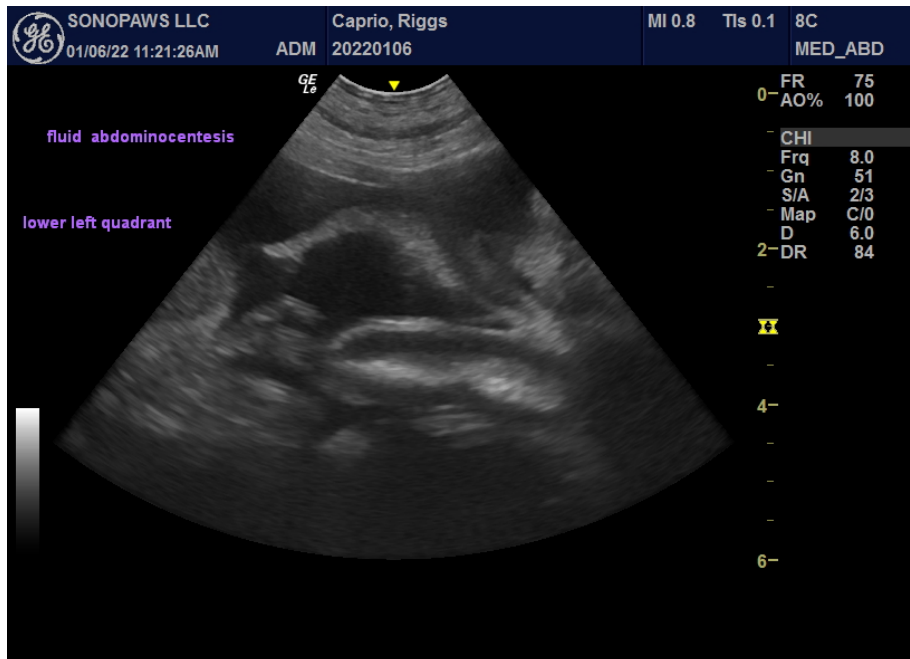
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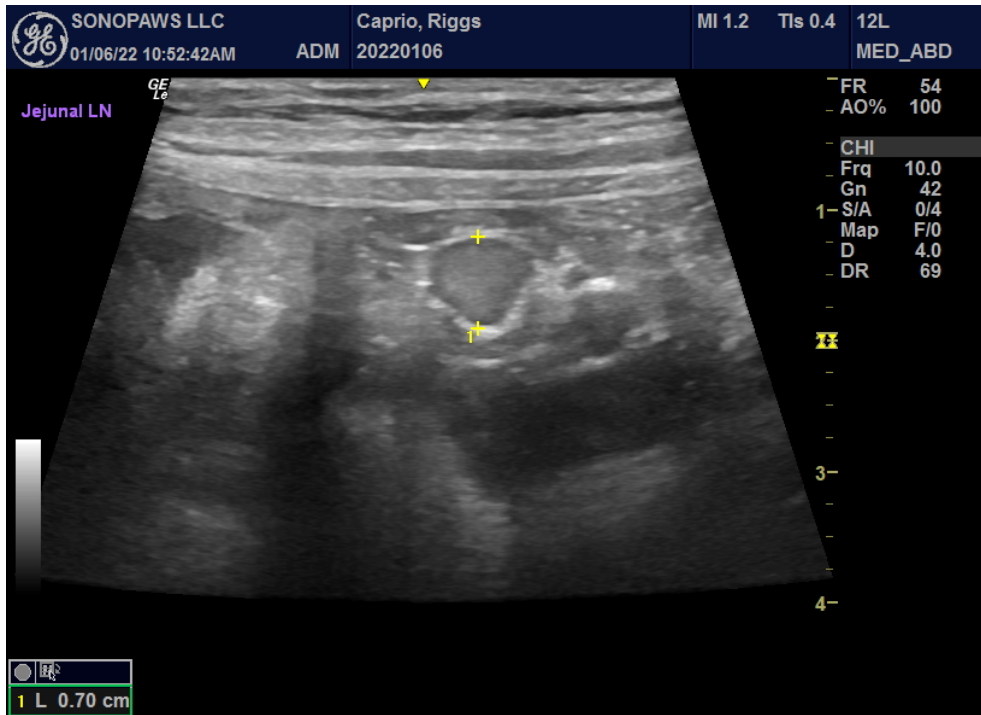
**Ultrasound findings:**



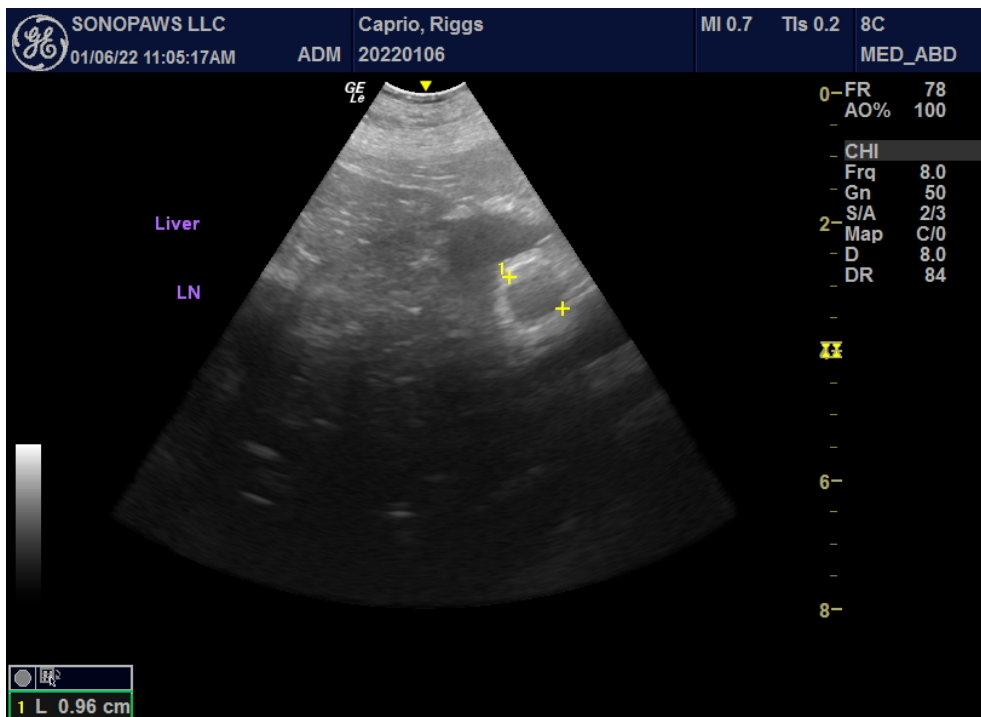
Small amount of anechoic fluid caudal to the bladder. Ascites due to liver disease vs systemic fungal disease vs peritonitis vs neoplasia. The mesenteric fat is diffusely thickened and hyperechoic, steatitis vs peritonitis vs diffuse neoplasia.



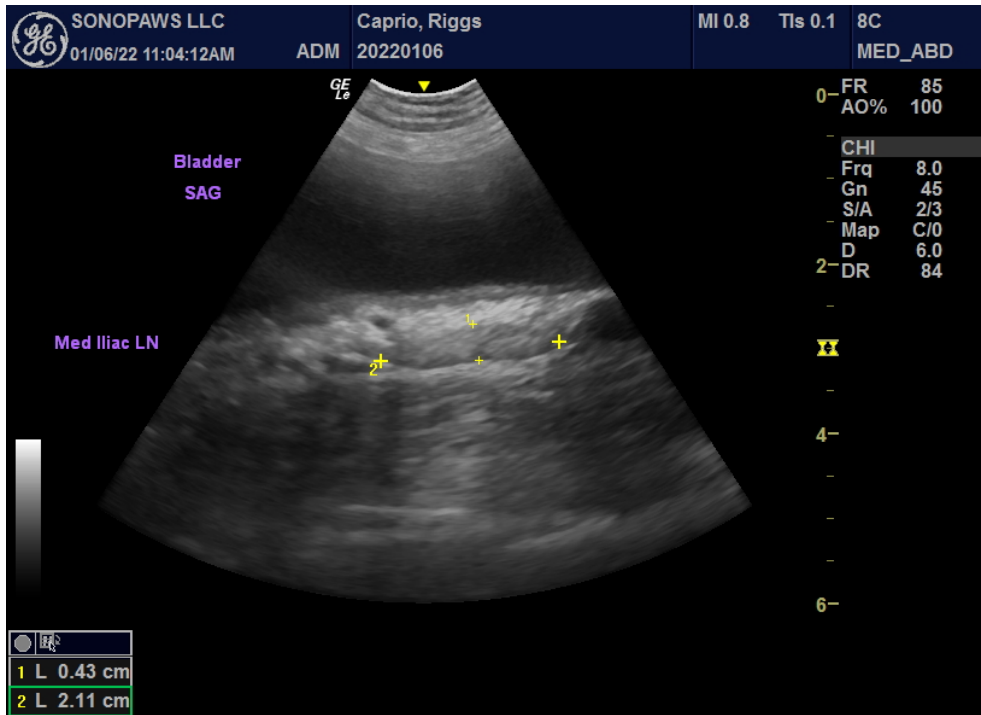
Small amount of anechoic fluid around the jejunum on the left side of the abdomen. Ascites due to liver disease vs systemic fungal disease vs peritonitis vs diffuse neoplasia. Abdominocentesis: 3cc of sero-purulent brown liquid was collected from the lower left quadrant.



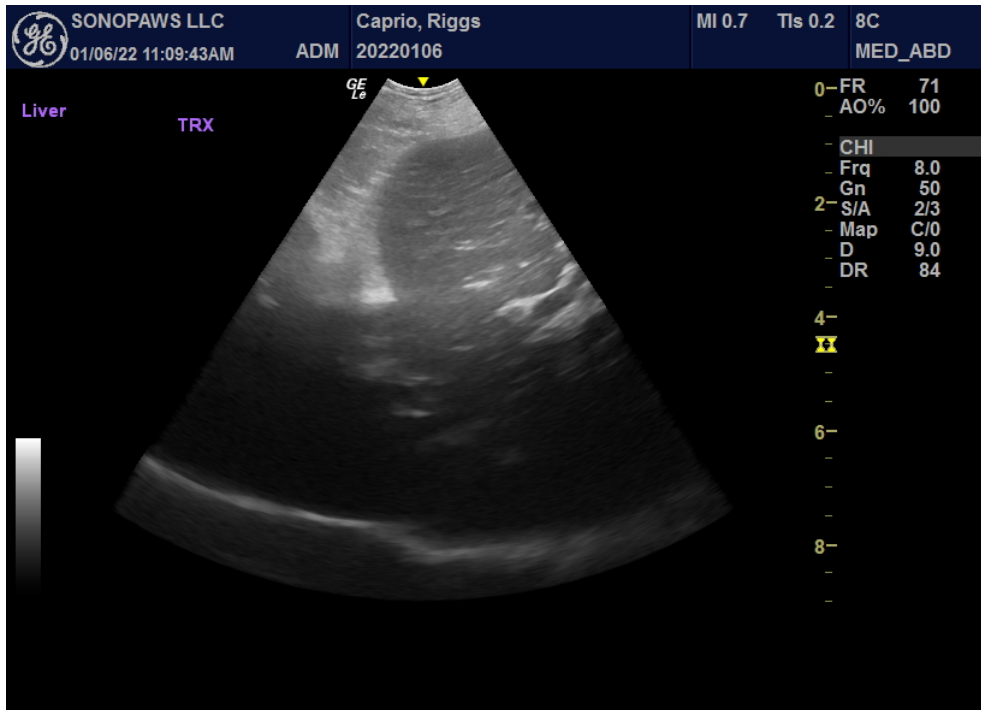
Prominent rounded jejunal lymph node measuring 7.0mm wide (> 5mm). Reactive lymph node (infectious, inflammatory) vs metastatic disease.



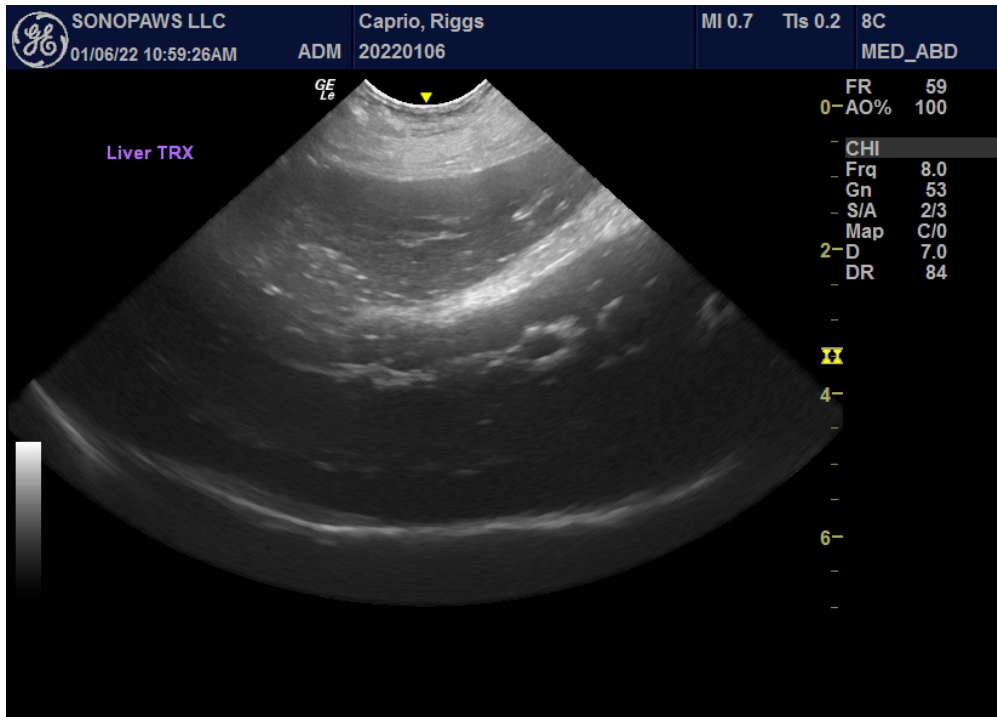
Rounded hypoechoic hepatic lymph node measuring 9.6mm wide (> 5mm). Reactive lymph node (infectious, inflammatory) vs metastatic disease.



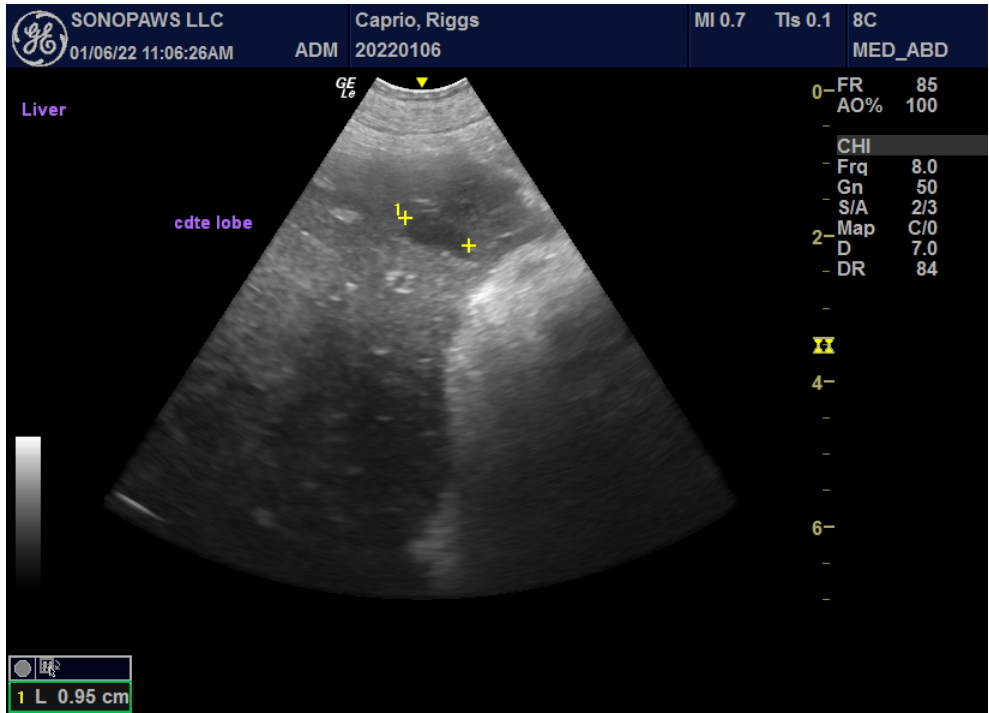
Normal fusiform medial iliac lymph node, measuring 4.3mm wide (< 5mm).



Transverse view of the mid liver. Diffusely hypoechoic liver, normal size. The differentials are passive congestion vs hepatitis (toxins, infectious (fungal, Lepto), inflammatory (Copper storage disease, chronic active hepatitis) vs diffuse neoplasia (lymphoma, mast cell tumor). Hyperechoic reactive fat around the liver.

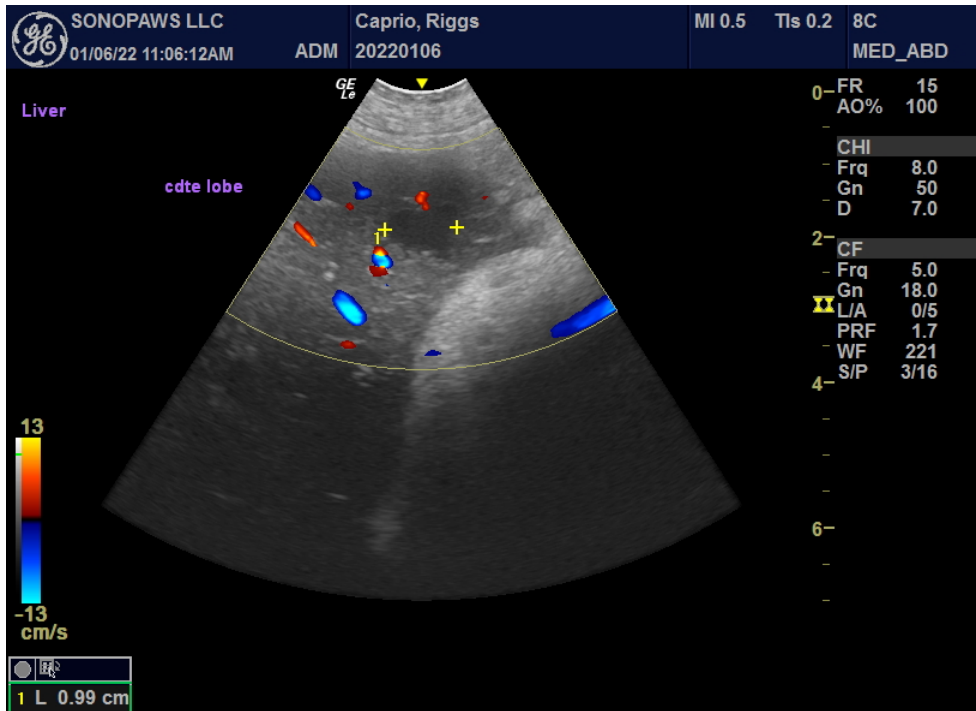


Transverse view of the mid/left liver. Diffusely hypoechoic liver with pronounced portal markings. The differentials are passive congestion vs hepatitis (toxins, infectious (fungal, Lepto), inflammatory (Copper storage disease, chronic active hepatitis) vs diffuse neoplasia (lymphoma, mast cell tumor). Hyperechoic reactive fat around the liver.

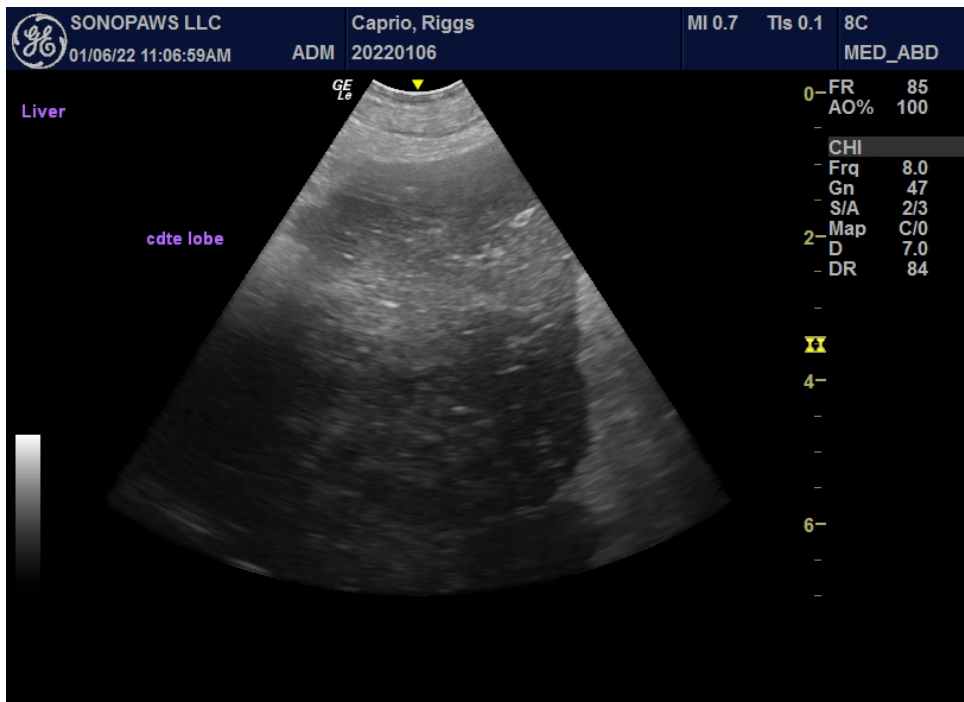


Ill-defined hypoechoic nodule (9.5mm) in the caudate lobe of the liver, not distorting the capsule. The differentials are benign nodular hyperplasia vs hematoma vs abscess vs fungal granuloma vs emerging neoplasia.

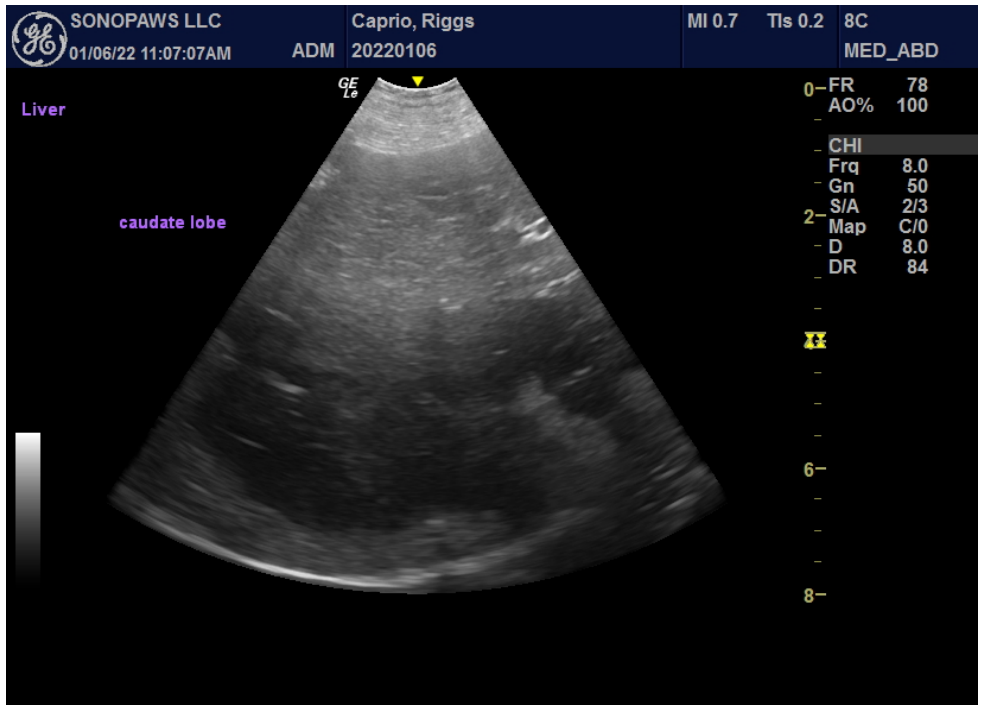




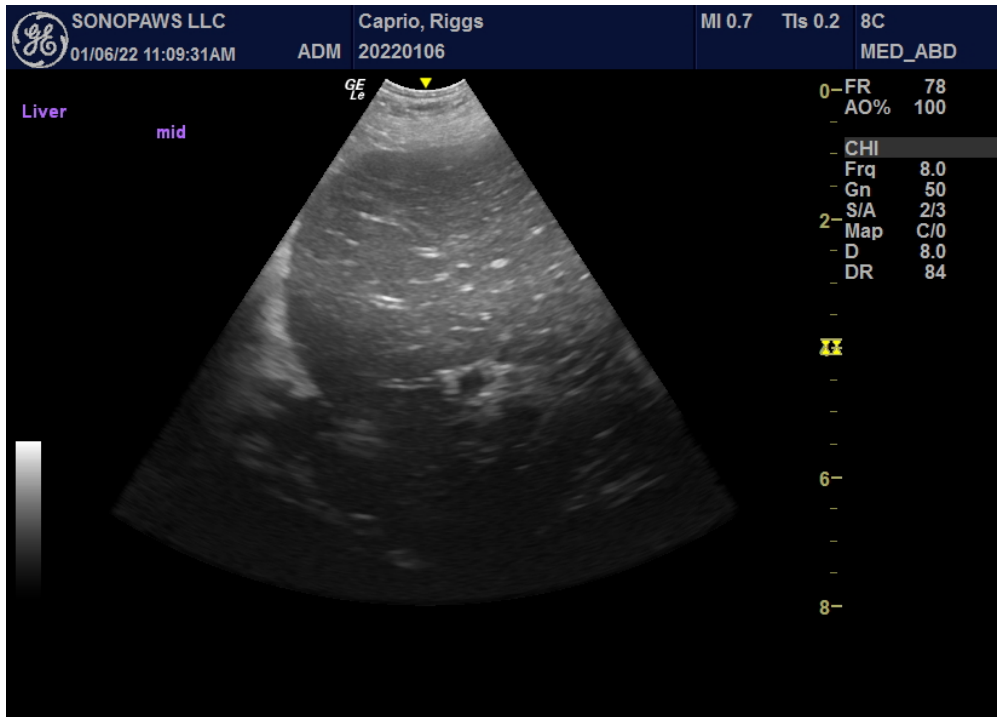
Color doppler on the same liver nodule, no obvious blood flow. The differentials are benign nodular hyperplasia vs hematoma vs abscess vs fungal granuloma vs emerging neoplasia.



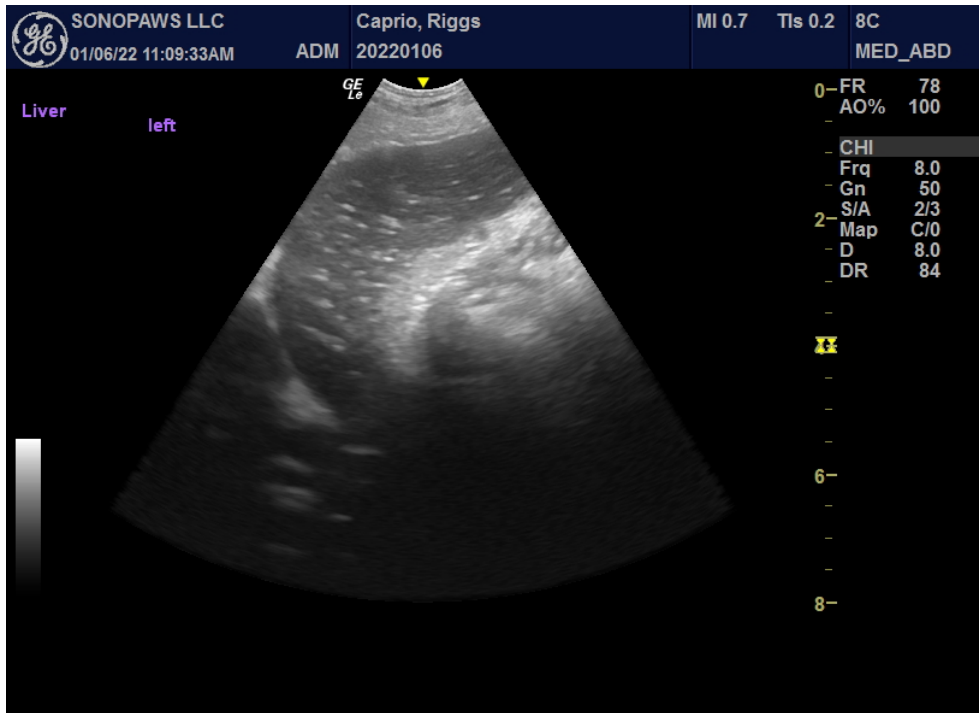
Heterogeneous caudate lobe of the liver, surrounded by reactive hyperechoic fat.



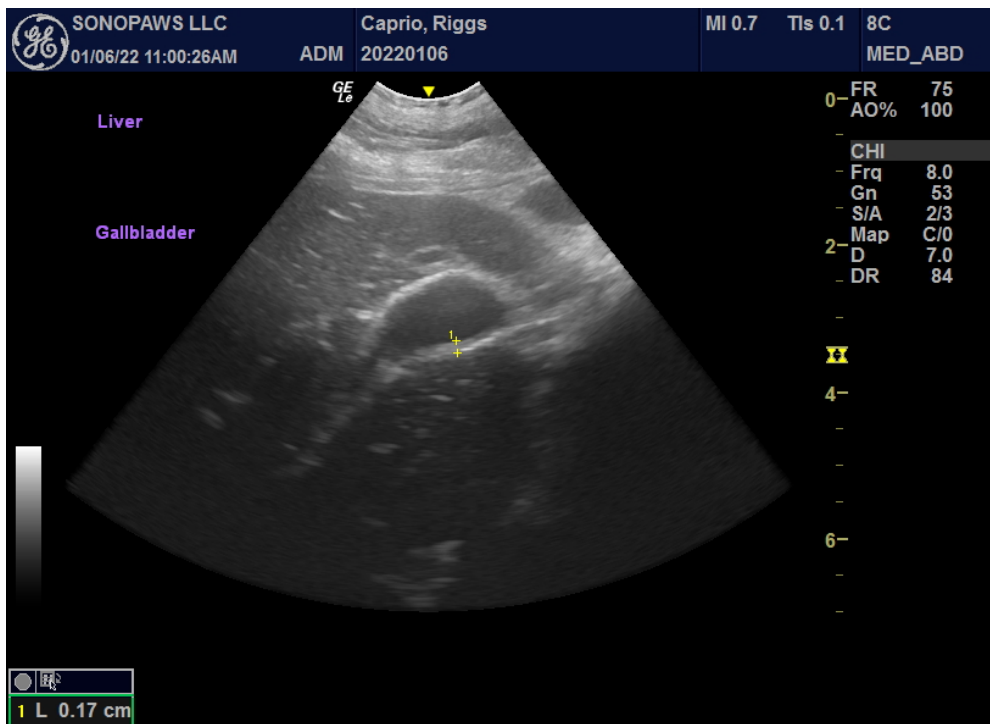
Heterogeneous caudate lobe of the liver, surrounded by reactive hyperechoic fat.



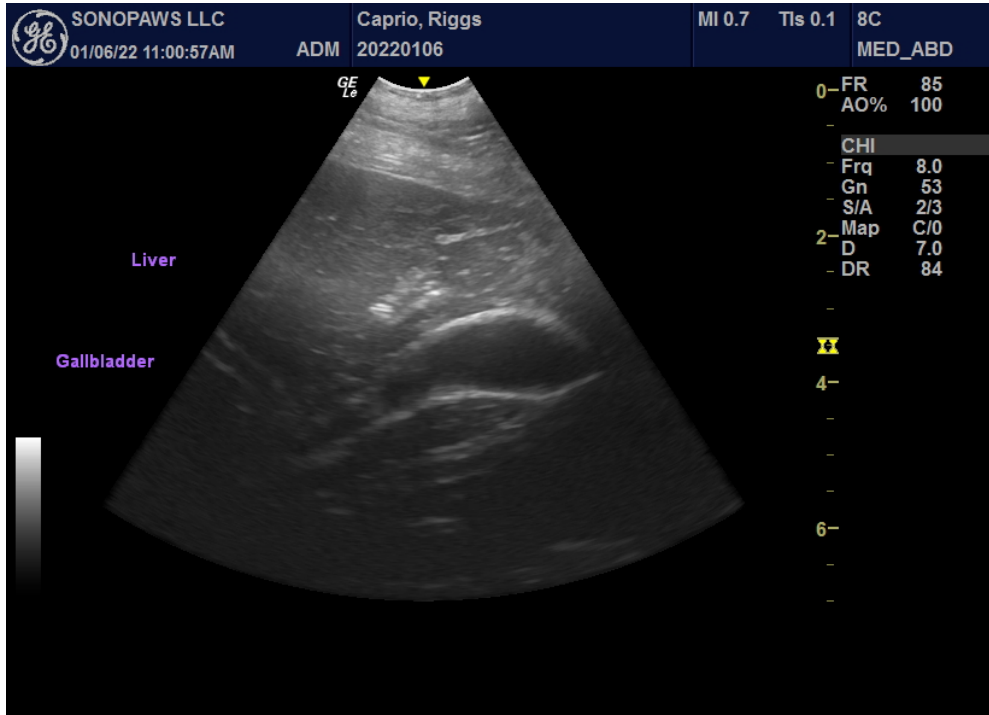
Mid liver, prominent portal markings.



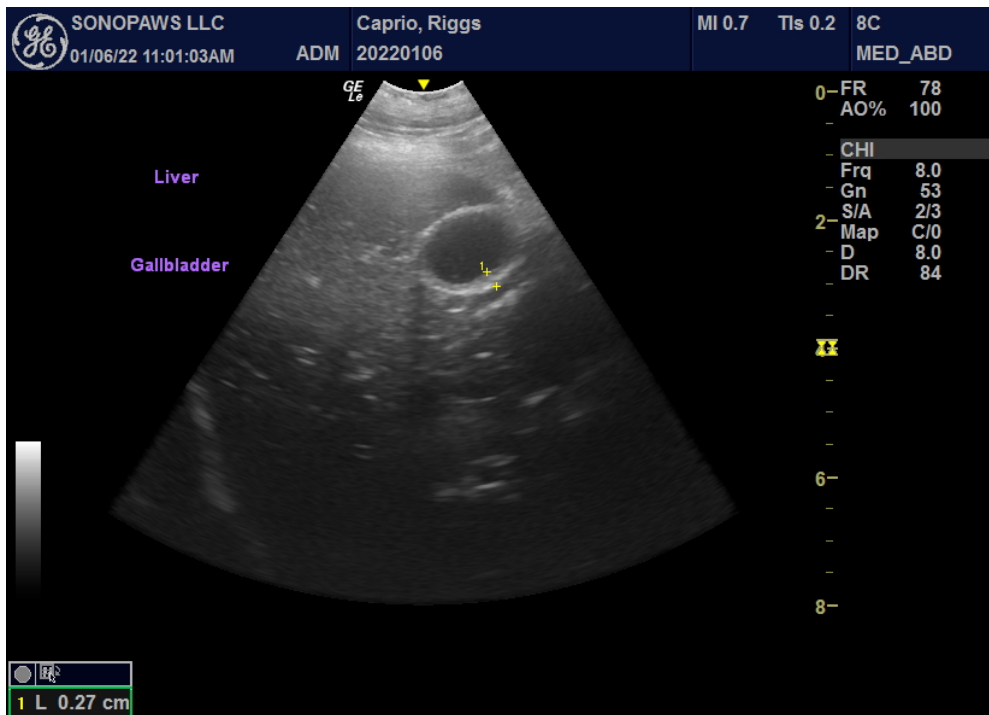
Left liver, hypoechoic with marked portal vessels.



Right intercostal view of the right liver and gallbladder. Small gallbladder with anechoic bile. Hyperechoic and thickened gallbladder wall (1.7 > 1mm), due to cholecystitis vs cholangitis/hepatitis vs wall edema due to biliary obstruction (none seen) vs mucosal gland hyperplasia.



Right intercostal view of the right liver and gallbladder.



Sagittal view of the right liver and gallbladder. Small gallbladder with anechoic bile. Hyperechoic and thickened gallbladder wall (2.7mm > 1mm), due to cholecystitis vs cholangitis/hepatitis vs wall edema due to biliary obstruction (none seen) vs mucosal gland hyperplasia.

**Treatment:**

Rigs was started on Metronidazole, Amoxicillin, Enrofloxacin, Ursodiol, Denamarin, B12 and Cerenia for suspected suppurative hepatitis. A fungal panel and Leptospirosis panel were sent to Idexx. The abdominal fluid was sent for cytology. A liver biopsy was recommended. Chest radiographs were obtained.

**3 view chest radiographs (radiologist review):**

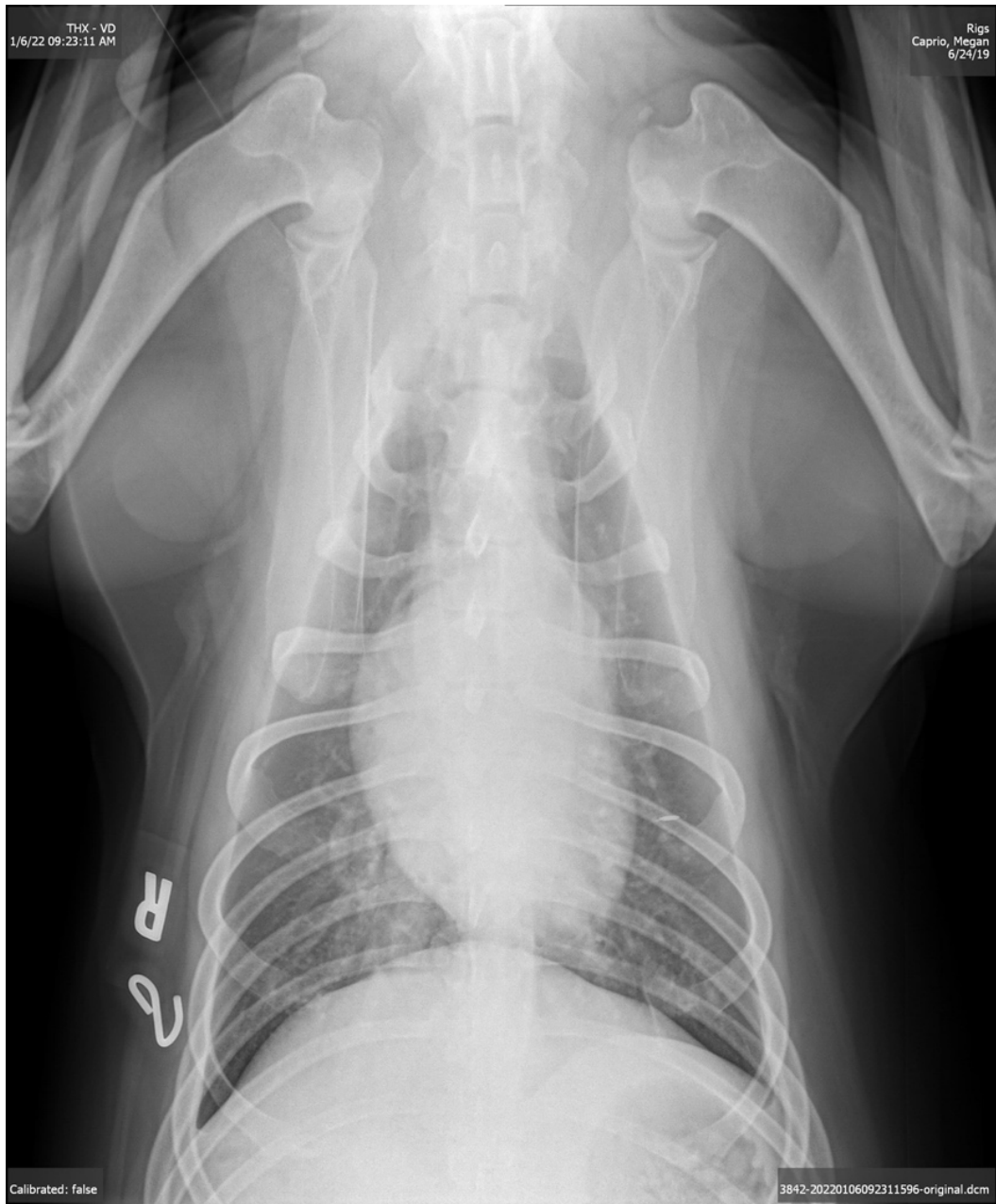
Throughout the pulmonary parenchyma are multiple variably sized round, soft tissue opacity nodules. This is confirmation from that seen in the abdominal study. In the region of the sternal lymph node there is a convex, soft tissue opacity structure. The cardiac silhouette and pulmonary vasculature are normal, as are the musculoskeletal structures. In the cranial abdomen, similar to previous, the peritoneal serosal detail is moderately decreased. No other abnormalities are noted.

Conclusions:

1. Multifocal soft tissue pulmonary nodules. This could indicate metastatic neoplasia from an unknown process, possibly from a neoplastic process in the abdomen. Alternatively, given the young age of the patient, infection such as blastomycosis or other fungal infection should be considered.
2. Moderate sternal lymphadenopathy. This could indicate reactive lymphadenitis or neoplastic infiltration.
3. Similar moderately decreased peritoneal serosal detail.

Further investigation of the abdomen (CT versus ultrasound) would be useful in this patient to identify either a primary neoplasm or further sites of infection. This would also facilitate sampling of any abdominal pathology and/or the sternal lymph nodes, however the pulmonary nodules are considered to be too central in the lungs to sample with ultrasound guidance.





**Cytology results of the peritoneal effusion, EasternVetPath:**

TP 4.8 g/dL TNCC 92,8000 cells/ $\mu$ L (red, opaque).

Marked neutrophilic inflammation. The cytologic findings are consistent with a severe acute inflammatory infiltrate, a fairly nonspecific finding with no etiology apparent. While no microorganisms were found, a septic process cannot be ruled out and should be suspected based on the marked cellularity of this fluid. Bacterial culture/sensitivity is recommended.

Rigs was transferred to a referral center for an abdominal exploratory for a suspected septic abdomen.

**Exploratory surgery on January 7:**

Moderate amount of mucopurulent discharge present in the abdomen, sample sent for culture. Resection of the abscessed right medial liver lobe, papillary and caudate process of the caudate lobe, along with omental adhesions. The abdomen was lavaged and a drain was placed. Rigs recovered well and was discharged on January 10.

**Culture and histopathology results:**

Liver: high grade malignant neoplasm, suspect hepatoblastoma, with abscessation, omental extension, marked proliferative serositis, chronic hepatitis, probable copper deposition, multifocal moderate to marked subcapsular lobular atrophy, zone 3 lipogranulomas and zone 3 bile canalicular plugs; copper stain pending. The mitotic count is >100 per 10 high power fields (10 high power fields = 2.37 mm<sup>2</sup>). The extent of excision of the neoplasm is difficult to judge due to the multiple portions submitted but the one defined margin is free of neoplastic cells by 2.2 mm. The extent of excision of the omental extension cannot be accurately assessed.

Addendum: Copper staining reveals moderate copper deposition in zone 3 hepatocytes. On a scale of 0-5+, this dog would be classified as 3+.

Culture of peritoneal effusion: Clostridium.

**Follow-up:**

Rigs is doing well at home. He had his first Carboplatin injection on 01.24.22. His second dose will be in 3 weeks, followed by repeat imaging to monitor the lung lesions and abdominal lymph nodes.

**Conclusion:**

Neoplasia was not highly suspected at first, due to the patient's young age and ultrasound findings more suggestive of an infectious process (fungal or bacterial). This shows the potential limitations of an ultrasound exam without additional diagnostics (cytology, culture and biopsy).

A hepatoblastoma is a rare aggressive neoplasm in dogs. Only one case has been described in the literature in 1997 in a 13-year-old Maltese dog<sup>1</sup>. It is also seen in humans, affecting patients in early childhood (under 5 years of age). In children, it is often found in the right liver lobe and metastasizes to the lungs<sup>2</sup>. The prognosis for Rigs is guarded, since he has lung metastases and a high mitotic index.

Thank you to Drs. Vanderson, Bowles and Hart, primary veterinarians at Burke Forest Veterinary Clinic.

<sup>1</sup> SHIGA A, SHIROTA K, et al., Hepatoblastoma in a dog, J Vet Med Sci, Dec 1997;59(12):1167-70.

<sup>2</sup> *Hepatoblastoma*, Children's Hospital of Philadelphia, [www.chop.edu](http://www.chop.edu).