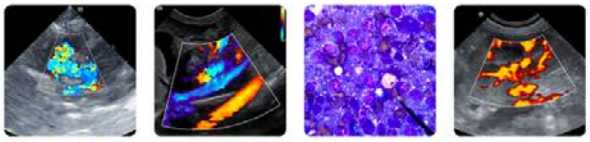

PATIENT

Bruce Lektsog

SPECIES

Canine

BREED

Pomeranian

SEX

Neutered Male

AGE

10 Years

WEIGHT

7.2 kg

INTERPRETED BY

Brad Harris, DVM, DACVECC, Residency trained in cardiology

IMAGING PERFORMED BY

Mariusz Chmielinski, DVM

HOSPITAL NAME

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PRESENTING CLINICAL SIGNS

Bruce presented for two collapse episodes over the past week, along with a worsening chronic cough, decreased appetite, and increased lethargy. Collapse events involved sudden stiffness, wobbling, drooling, upward eye deviation, and brief unresponsiveness, followed by fatigue. No vomiting, normal urination, daily soft stools. He is blind from prior SARDS.

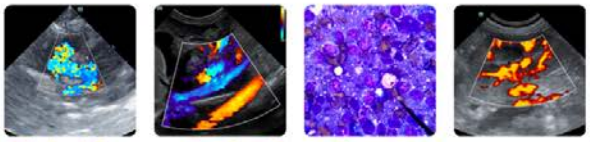
Abnormal PE/Chem/CBC/UA Results: Vitals stable. Vitals T: 38.5 P: 104 R: panting MM: pink CRT: <2secs Grade 3–4/6 left-sided heart murmur (most significant finding). Hematology: Moderate–severe non-regenerative anemia: RBC 2.96, HCT 0.203, Hgb 68; low reticulocytes. Platelets severely low: 62 $\times 10^9$/L. WBC normal with mild monocytosis; toxic/immature neutrophils suspected → possible inflammation. MPV high (18.6). Chemistry: Azotemia: Creatinine 255 (↑), BUN 13.4 (↑). Marked liver enzyme elevations: ALT 248 (↑), ALP >2000 (↑↑). Mild ↑ bilirubin. Globulins high (44) with low-normal albumin → A:G ratio 0.7. Electrolytes largely normal. Amylase/lipase within reference. Urinalysis: Concentrated urine (USG 1.038). Mild proteinuria (30 mg/dL). No glucosuria, ketones, bilirubin, or blood. No bacteria; sediment essentially inactive.

ULTRASONOGRAPHIC EXAMINATION OF THE HEART & ABDOMEN

CANINE CARDIAC PARAMETERS	BW	HR BPM	LAD 4 ch Long	RAD 4 ch Long	La/Ao Heart Base	LVIDd	LVIDs
NORMAL PARAMETER		50-100			<1.6		
PATIENT	7.2	NM	3.2	1.9	1.61	2.71	1.67
CANINE CARDIAC PARAMETERS	**FS**	**EPSS**	**PV V MAX (m/s)**	**AV V Max (m/sec)**	**MR Vmax**	**TR Vmax**	**RPA distensibility (normal >30%)**
NORMAL PARAMETER	28-40	<0.6	0.7-1.6	0.7-1.7	4.5-5.5	< 2.7	
PATIENT	38	0.2	1.1	1.6	NM	NM	36

Cardiac Presentation

The left atrium is upper limits of normal to mildly enlarged. The left ventricle is normal in dimension, with normal systolic function. The right atrium and ventricle are subjectively normal in dimension and systolic function. The mitral valve is thickened and redundant consistent with myxomatous changes, and there is no significant prolapse. There is evidence of mild mitral regurgitation. The tricuspid valve leaflets are minimally thickened with mild tricuspid regurgitation and no evidence of pulmonary hypertension. The left ventricular outflow tract demonstrated normal laminar flow and the visible aorta is unremarkable. The right ventricular outflow tract assessment revealed normal laminar flow, and appropriate diameter and distensibility. There is no evidence of semilunar valve insufficiency. There is no visible pericardial, pleural, or free peritoneal fluid noted. The cardiac chambers, pericardial and visible extra-cardiac regions were free of masses, spontaneous echo contrast, or thrombi.



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Urinary System

The urinary bladder, trigone, and pelvic urethra are unremarkable with normal wall thicknesses and normal tone. The ureters were not visualized, which is a normal finding. There are no uroliths or sediment noted, and anechoic urine is present. The ureteral papillae appear normal. There is no evidence of inflammatory, infiltrative, or neoplastic disease.

The kidneys are normal in size. The cortices are hyperechoic with a decrease in corticomedullary definition. The cortex to medulla ratio is appropriate with no significant pyelectasis or pelvic dilation. There are multifocal renal cortical cystic changes with mildly irregular capsular contours bilaterally. Left kidney measures 4.63 cm. Right kidney measures 5.18 cm.

Adrenal Glands

Both adrenal glands are visualized and have normal shape, size, position and echogenicity for this breed. The phrenic vasculature, glandular echogenicity and detail were unremarkable. Capsule, cortex, and medullary definition were normal for this age patient. Left measures 0.64 cm at the caudal pole. Right measures 0.65 cm at the caudal pole.

Spleen

The spleen measures 1.27 cm at the hilus. It is slightly prominent with a diffusely mottled or heterogeneous parenchymal pattern and subtle hypoechoic nodular changes throughout the parenchyma that do not distort the splenic capsule. The capsule is smooth without significant irregularity, and the vasculature is normal with no evidence of congestion, spontaneous echo contrast, or thrombosis.

Liver

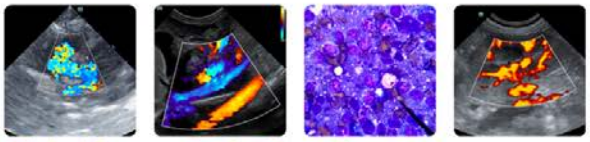
The liver is subjectively enlarged with slightly rounded margins. The parenchyma is diffusely mottled with ill-defined hyperechoic nodular changes throughout. The gallbladder is appropriately thin walled and contained anechoic bile with a moderate amount of suspended echogenic debris and dependent sediment. The cystic and common bile ducts were normal. No intra- or extrahepatic biliary dilation noted.

Gastrointestinal

The stomach and intestines are free of stasis and peristaltic activity, with no significant dilation noted. There is normal wall thickness and acceptable curvilinear mural detail. The pyloric-duodenal junction and ileocecocolic junction are patent, and the colon contains normal shadowing feces. There is no evidence of shadowing obstructive material or overt infiltrative disease noted. No associated abnormal lymphatic activity is documented.

Pancreas

The pancreas is prominent and hyperechoic with irregular contour and subtle nodular changes throughout. The regional mesentery and omental fat are normal with no evidence of significant peritonitis. There are mildly prominent mesenteric and jejunal lymph nodes with normal length to width ratios and isoechoic parenchyma. There is no significant free fluid noted.



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ULTRASONOGRAPHIC FINDINGS

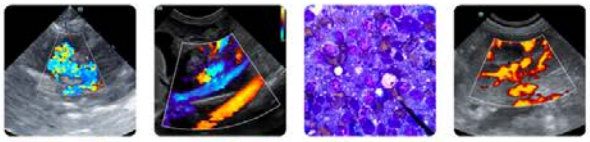
- There is increased renal cortical echogenicity and thickening with a mildly irregular capsular contour. Multifocal cystic cortical changes are noted. This is secondary cystic formation consistent with chronic age related degeneration and remodeling. There is no evidence of abscessation or suspicion of neoplasia.
- The changes to the spleen may represent benign changes such as lymphoid hyperplasia or extramedullary hematopoiesis. However, infiltrative disease such as round cell neoplasia can't be definitively excluded.
- The diffuse hepatic changes are non-specific and could be consistent with vacuolar hepatopathy, nodular hyperplasia, inflammatory, immune-mediated, metabolic, or endocrine disease. Infiltrative neoplasia or acute hepatitis cannot be ruled out.
- The gallbladder contains echogenic, suspended and dependent unorganized debris. This is not yet to the level of an organized mucocele, however early/developing mucocele cannot be ruled out. This dependent sediment is often an incidental finding or may be associated with concurrent endocrine disease such as hyperadrenocorticism or diabetes mellitus.
- The prominent, hyperechoic pancreas is suggestive of chronic pancreatic remodeling. This may be secondary to chronic pancreatitis. However, there is no active evidence of inflammation at this time. Additionally, infiltrative neoplastic disease can't be definitively excluded but is not highly suspected based on this appearance.
- The slightly prominent mesenteric and jejunal lymph nodes display no loss of parenchymal detail or change in echogenicity. This is most consistent with reactive lymphadenitis or lymphatic hyperplasia.

INTERPRETATION OF THE FINDINGS & FURTHER RECOMMENDATIONS

A urinalysis and urine culture via cystocentesis are recommended to evaluate the urinary tract changes for potential urinary tract infection.

Given the lack of significant evidence for active urinary sediment, a urine protein to creatinine ratio is also indicated. Ideally, fine needle aspirates and sampling of the liver and spleen would be performed. However, given the anemia and moderate thrombocytopenia, this is not recommended at this time. Infectious disease testing should be considered, given the elevations in liver enzymes and azotemia, especially for Leptospirosis. Consider a CBC with pathology review to evaluate for potential changes that may be consistent with a secondary autoimmune process such as immune mediated hemolytic anemia or Evan's syndrome. Pending additional diagnostic tests, supportive care and empiric antibiotic therapy, as clinically indicated, is recommended.

The cardiac findings are consistent with degenerative/myxomatous mitral valve disease with moderate hemodynamic effects consistent with at least ACVIM Stage B1 and possibly early stage B2. Stage B2 criteria for heart enlargement that are used to identify dogs that may benefit substantially from treatment before the onset of clinical signs of heart failure include hear murmur intensity ≥3/6, echocardiographic LA/Ao in the right-sided short axis view in early diastole ≥1.6, left ventricular internal diameter in diastole, normalized for body weight (LVIDDN) ≥1.7, VLAS > 3, and breed-adjusted radiographic vertebral heart score (VHS) >10.5.



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Cardiac recommendations/Treatment:
Given the degree of chamber dilation, an aggressive treatment approach would be to start cardiac therapy. Therapy would include Enalapril or benazepril (0.5 mg/kg BID assuming normotension and lack of renal insult), Vetmedin (0.25-0.35 mg/kg BID), with a cough suppressant (e.g. Hydrocodone 0.25-0.35 mg/kg BID to q6 hours PRN) as necessary based on the severity of the cough. While there is an increased risk of IV fluids, corticosteroids, or anesthesia, there is no overt objection, as the need likely outweighs the risks. If not already performed, baseline thoracic radiographs and blood pressure are recommended. A repeat chest X-rays, BP, and chemistry should be performed again in 1-2 weeks. A repeat echo, blood pressure, chemistry panel and thoracic radiographs are indicated in 6 months.

As the results are on the border between stages B1 and B2 (B2 is where therapy is typically recommended), a conservative approach is to hold off on therapy and just follow the 6 month recheck plan. Either option is acceptable and should be discussed with the owner. Regardless of approach, owners should begin monitoring the resting respiratory rate. If a progressive increase in respiratory rate is seen, then evaluation by a veterinarian is necessary.

Anesthesia considerations:
If anesthesia is necessary, then alpha-2 agonists, ketamine, high dose acepromazine, and Telazol should be avoided. Skip any ACE-inhibitor (if receiving) on morning of anesthesia. Fluid therapy during anesthesia should be considered at a reduced rate (e.g., 5 ml/kg/hour) if possible. A shorter anesthetic duration will reduce the risk of complications. Pre-oxygenation is advised. Pre-medication with an opioid (i.e., butorphanol, hydromorphone, oxymorphone) with or without a benzodiazepine is generally the safest protocol. An induction agent such as Propofol, alfaxalone, or diazepam/etomidate can be used to effect. Maintenance of anesthesia with isoflurane or sevoflurane is reasonable.

Diet:
Ensure feeding a grain-inclusive diet if possible. A high-quality food from Hills, Royal Canin, Science Diet, Eukanuba, Iams, or Purina that is highly palatable with adequate protein and calories for maintaining optimal body condition with mild dietary sodium restriction (<100 mg/100 kcal) is recommended. Consider omega-3 fatty acid supplementation.

Activity:
Moderate physical activity (meandering walks, exploring the backyard, playing with toys inside, getting excited when family gets home, etc.) is encouraged, but periods of strenuous aerobic activity (jogging, strenuous outdoor ball play, prolonged play at the dog park, etc.) should be avoided, especially during periods of high heat (> 80 F) and humidity. Dogs with heart disease tend to tolerate cool and cold temperatures much better than high temperatures. Avoid sudden increases in activity (e.g. 2 block walks during the week but 2 mile walks followed by 30 minutes at the dog park on the weekends) as this may be difficult for the cardiovascular system to deal with.

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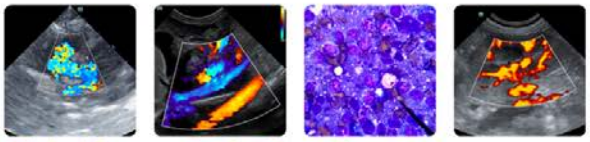

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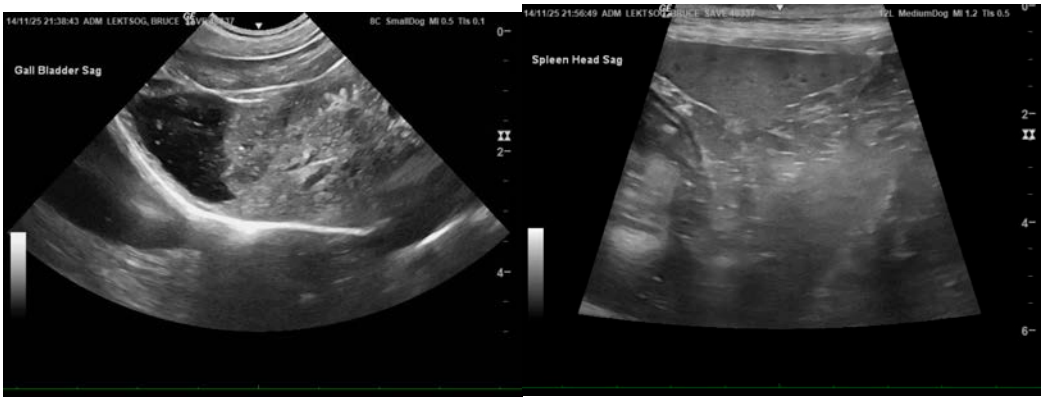

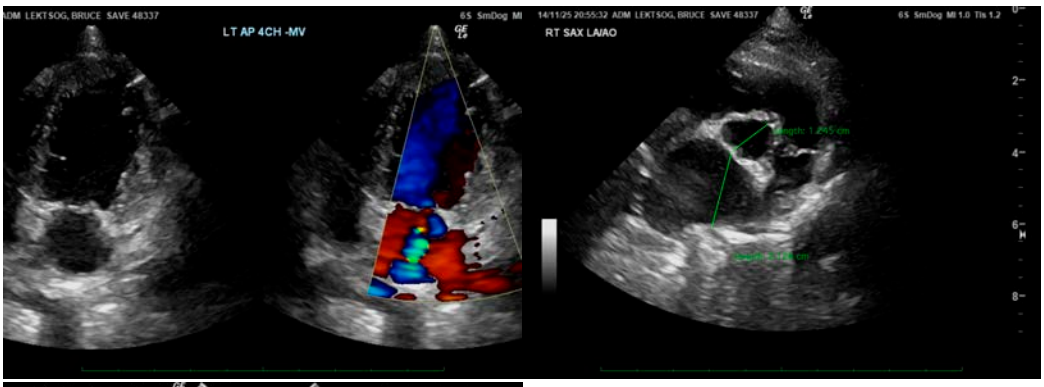

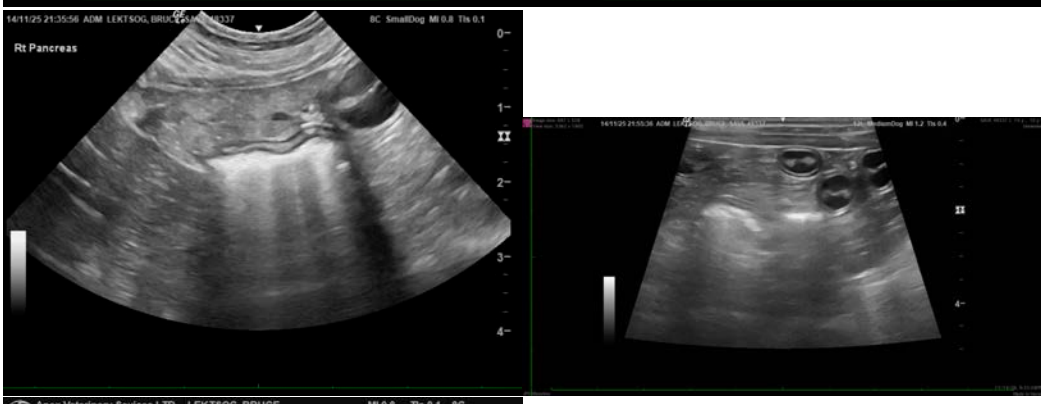

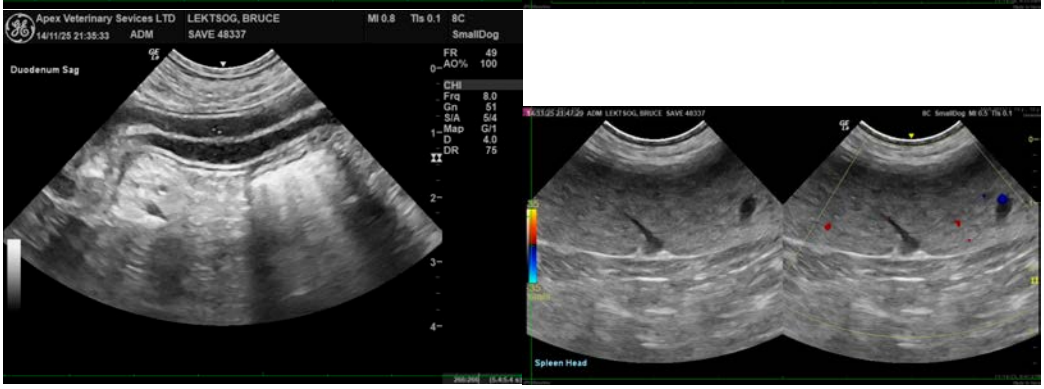

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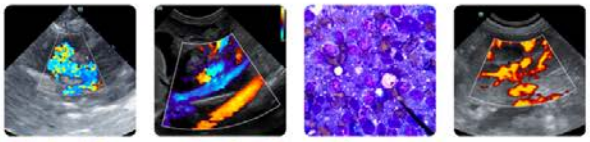

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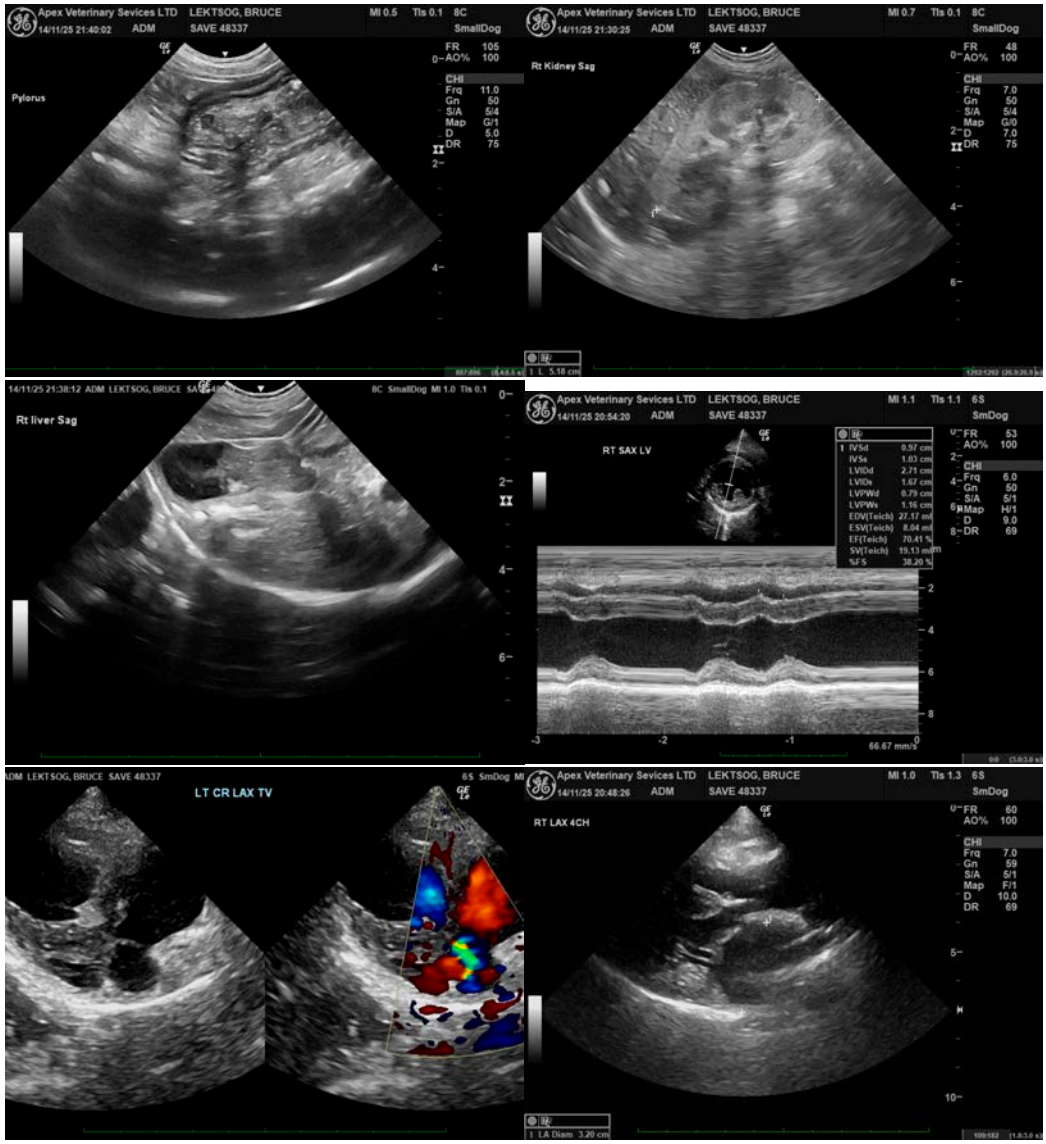

The information and recommendations provided are based on the images presented by the referring veterinarian/sonographer. No evaluation can be communicated regarding pathology that was not visible in the image/video clips provided.

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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