



**PATIENT**

Sookie Johnson

**PRESENTING CLINICAL SIGNS**

Severe elevation of ALPK as well as positive LDDST. Attending concerned about possible adrenal tumor. Severe elevation ALPK and positive LDDST

**SPECIES**

Canine

**ULTRASONOGRAPHIC EXAMINATION OF THE ABDOMEN**

**Urinary System**

**BREED**

Pomeranian

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 was noted. Ureteral papillae were normal.

**SEX**

Neutered male

**AGE**

11 years

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 this age patient. Medullary structure differed distinctly from that of the cortex and no evidence of pelvic dilation was present. Both kidneys measured 4.0 cm.

**WEIGHT**

6 kg

**Adrenal Glands**

The left **adrenal gland** was slightly enlarged at the caudal pole measuring 1.01 cm and the cranial pole measured 0.6 cm. The left adrenal gland was irregularly swollen. The right adrenal gland was slightly swollen and measured 0.57 cm at the cranial pole and 0.59 cm at the caudal pole.

**INTERPRETED BY**

Eric Lindquist, DMV  
DABVP, Cert. IVUSS

**Spleen**

**IMAGING PERFORMED BY**

Dr. Belan

The **spleen** was largely smooth with subtle heterogeneous parenchymal changes while maintaining normal echogenic relationship to the liver and kidney. These changes are consistent with normal age-related alteration. Hyperechoic lipogranulomatous change was noted and measured 0.74 cm. The capsule was 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. No evidence of active acute or chronic inflammatory, neoplastic, or infarctual changes was noted.

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Dr. Lebouldus

**Liver**

The **liver** revealed patchy, mixed, hypoechoic parenchymal changes with ill-defined margins. Vascular and biliary tracts were of normal volume with no evidence of congestion. The portal vein to vena cava ratio was 1:1. The gallbladder wall was slightly polypoid and mildly thickened.

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**Gastrointestinal**

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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



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demonstrated normal luminal chyme and stool consistency respectively. No obstructive or overt infiltrative disease was noted. No associated abnormal lymphatic activity was noted.

Sookie Johnson

**SPECIES**

**Pancreas**

Canine

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.

**BREED**

Pomeranian

**ULTRASONOGRAPHIC FINDINGS**

**SEX**

Patchy, undefined hepatic changes.

Neutered male

Slightly enlarged and swollen adrenal glands.

**AGE**

**INTERPRETATION OF THE FINDINGS & FURTHER RECOMMENDATIONS**

11 years

FNA of the liver, cytology and culture is warranted to rule out suppurative hepatitis versus nodular hyperplasia. There is a minor potential for neoplasia. The left adrenal gland should be monitored to ensure that it is not a unilateral tumor; however, hyperplasia owing to PDH makes the most sense in this patient. I recommend ensuring that the urine specific gravity is less than 1.020 and if so the following algorithm would be ideal to ensure that this is not a false positive LDDST as adrenal glands can be swollen and slightly irregular for non-functional reasons.

**WEIGHT**

6 kg

**INTERPRETED BY**

**Efficient & Accurate Cushing's Work up-Lindquist**

Eric Lindquist, DMV  
DABVP, Cert. IVUSS

**Notes regarding Cushing's Clinical Presentations:**

**IMAGING PERFORMED BY**

*Nearly all Cushing's dogs have SAP elevations and true PU/PD (USG < 1.025) and most are polyphagic. Cushing's dogs are > 6 years and usually > 9 years old, usually have poor skin coats, body scores > 3/5, and are usually sedentary animals.*

Dr. Belan

*Its important to remember that Cushing's dogs usually look and play the part and other diseases cause false + stress related cortisol spikes. On rare occasion a Cushing's dog will not follow the rules but this is truly an exception.*

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*Potential Cushing's patient workups can be costly and frustrating if not definitive and, in my experience, the non-definitive patient usually has something else going on that may be contributing to some of the clinical signs a Cushing's dog will have, especially SAP elevations or PU/PD. Based on this prelude of information I came up with the following algorithm in the spirit of diagnostic efficiency.*

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Dr. Lebouldus

*The following suggested protocol is based on current available literature on Cushing's disease and extensive clinical-sonographic experience evaluation + Cushing's and False + LDDST & ACTH stim. cases in order to maximize the efficiency of a Cushing's workup in practice.*

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**Screen first, workup second**

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1) **UA:** Repeatable (2-3 urine samples) Urine specific gravity & urine cortisol/creatinine ratio (UCCR): If **repeatable USG< 10.20 and + UCCR** move to next step 2.

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Note: UA is inexpensive and easy to obtain and if UA criteria is not met for Cushing's then resources can be spent into other more pertinent diagnostics or left on hold until the UA criteria is met in emerging Cushing's cases.

**SPECIES**

Canine

2) **Sonogram:** Does the patient have concurrent disease clinically or sonographically as non-Cushing's illness will influence the potential false + LDDST or even ACTH stim. The sonogram gives a global perspective of the internal health of the patient to be considered in the Cushing's workup as an assessment of concurrent disease. Is there a concurrent neoplastic process, UTI pancreatitis, mucocele....? Are the adrenals enlarged (Cushing's-PDH, stress, age related or breed variant), or atrophied (iatrogenic Cushing's or adrenal burnout), have asymmetric enlargement (Adrenal tumor, hyperplasia, adenoma, age related variant), or is there vascular invasion (Invasive pheo with false + UA criteria or adenocarcinoma or phrenic thrombosis)? The sonogram answers these questions proactively.

**BREED**

Pomeranian

**SEX**

Neutered male

3) **LDDST** (0.01 D-Sodium phosphate mg/kg IV) (Better screening test but plagued with false +) Use if there is potential early Cushing's or if adrenal asymmetry present on sonogram suspecting tumor. Use LDDST in cats at a higher dose (0.1 mg/kg IV).

**OR**

**AGE**

11 years

4) **ACTH stim.** (Better confirming test but can have false +) Use if the patient "looks" Cushingoid or if bilateral adrenal enlargement is present, or high normal width on sonogram, or if iatrogenic Cushing's suspected (Cortisone Tx in past).

**WEIGHT**

6 kg

5) If **diabetic** then run both LDDST & ACTH stim.

5) Run a **serial blood pressure** in a BP friendly non "white coat effect" atmosphere. Run at least 3 at different times over a few hours or when eating as the patient tends to be calm when eating or give Torbutrol when entering the facility.

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DABVP, Cert. IVUSS

6) **Perform CT** of the pituitary to identify macro adenoma expansion if any lethargy or dullness or other central clinical CNS signs are minimally present.

Suggested reading:

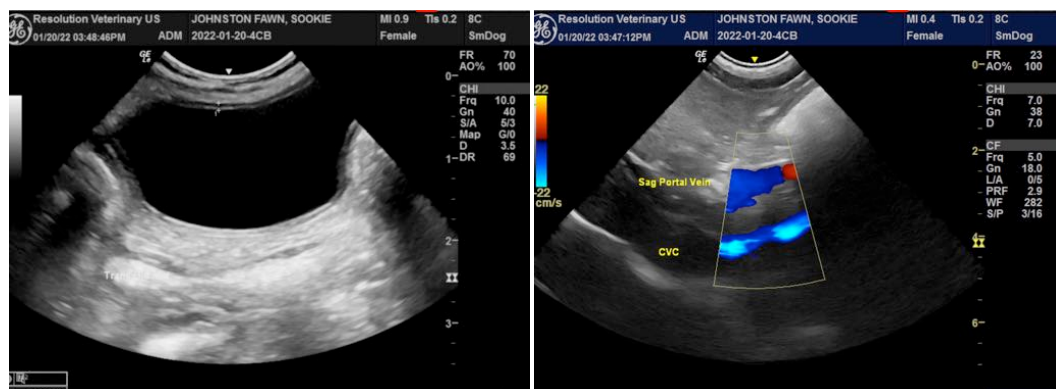
**IMAGING PERFORMED BY**

Dr. Belan

Behrend EN, Kooistra HS, Nelson R, et al. Diagnosis of Spontaneous Canine Hyperadrenocorticism: 2012 ACVIM Consensus Statement (Small Animal). J Vet Intern Med 2013;27:1292-1304.

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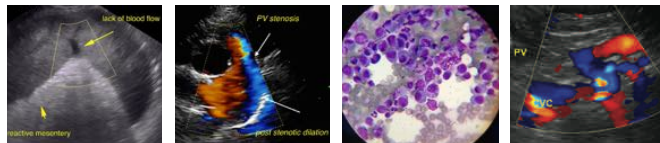
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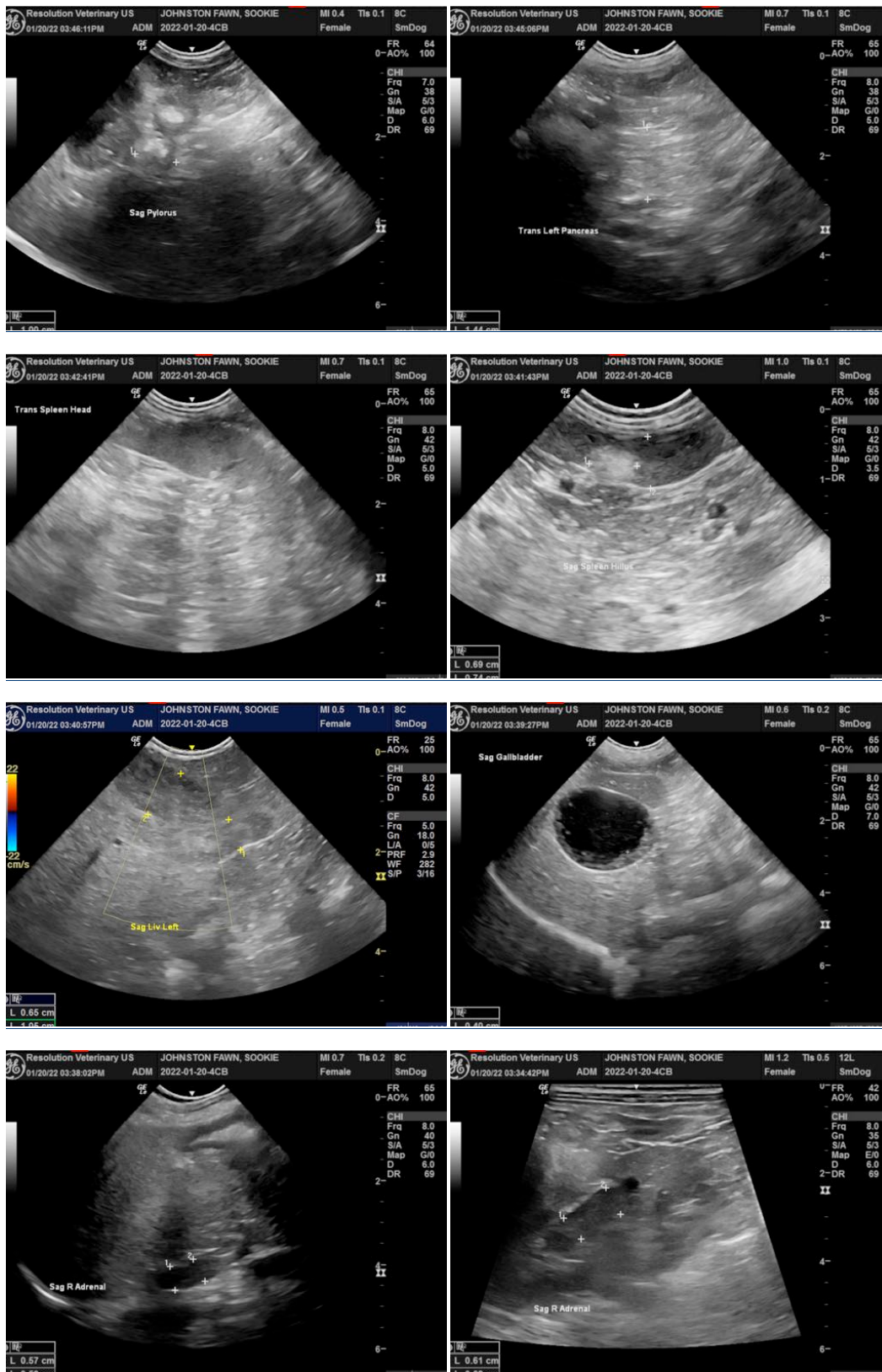
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The information and recommendations provided are based on the images presented by the referring veterinarian/sonographer. No evaluation can be communicated regarding pathology that was not visible in the image/video clips provided.

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.

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