



**PATIENT**

Watson Gordon

**SPECIES**

Canine

**BREED**

Hound Mix

**SEX**

Neutered male

**AGE**

9.5 years

**WEIGHT**

59.8 lbs

**PRESENTING CLINICAL SIGNS**

History: P resented for annual exam a few months ago and o mentioned p experiencing polyphagia. No PU/PD, energy normal, no v/d/c/s. Routine bw done and revealed elevated liver enzymes. UA done afterwards - low concentration and UPC 1.2. Recheck bw/ua/upc pending (samples collected today)  
Abnormal PE/Chem/CBC/UA Results: PE - mod periodontal disease, no other abnormalities, TPR wnl  
CBC - HCT 58% (H), HBG 20.8 (H), mild reticulocytosis. Rouleaux present - saline agglutination negative  
Chem - ALT 129 U/L, ALP 849 U/L 4dx - neg x 4 UA - USG 1.023, protein 3+, pH 5.5 UPC - 1.2

**ULTRASONOGRAPHIC EXAMINATION OF THE ABDOMEN**

**Urinary System**

The **urinary bladder** and visible pelvic urethra were unremarkable for the level of repletion presented. The urine, however, did present some mildly echogenic debris consistent with mucous, exfoliated cells from renal or bladder origin, and/or blood clots as these echogenic changes can all present similarly. Minor apical polypoid changes were noted. This is often related to urinary tract infection but may represent simple evidence of exfoliated debris or sterile inflammation. Cystocentesis, urinalysis, +/- culture would be recommended to rule out and define any UTI.

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. The right kidney measured 7.66 cm. The left kidney measured 6.9 cm.

**INTERPRETED BY**

Eric Lindquist, DMV  
DABVP, Cert. IVUSS

**IMAGING PERFORMED BY**

Dr. Fritz

**HOSPITAL NAME**

Waterbury VH

**REFERRING VET**

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**Adrenal Glands**

Both **adrenal glands** revealed slight, heterogenous parenchymal changes; however, this may be normal. The left adrenal gland measured 2.45 x 0.59 cm. The right adrenal gland measured 2.69 x 0.7 cm at the caudal pole and 1.3 cm at the cranial pole.

**Spleen**

The **spleen** in this patient was mildly enlarged with uniform parenchyma and was folded upon itself cranially. This is a positional variant and is not pathological. There was no evidence of significant disease.

**Liver**

The **liver** was uniformly swollen with minor, excessive gallbladder debris and over distension with dependent and suspended bile without evidence of overt mucocele formation. However, excessive sludge was present. Minor gallbladder polyps were noted. The liver presented coarse architecture with mildly increased portal markings and subtle, mixed echogenic changes. This is consistent with vacuolar hepatopathy and some level of remodeling and history of inflammatory component. There was no overt suspicion of neoplasia.



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

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**Pancreas**

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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.

**SEX**

Neutered male

**ULTRASONOGRAPHIC FINDINGS**

**AGE**

9.5 years

Unremarkable abdomen.

Bladder debris and polypoid changes.

Benign hepatopathy.

**WEIGHT**

59.8 lbs

Non-specific renal changes.

**INTERPRETATION OF THE FINDINGS & FURTHER RECOMMENDATIONS**

**INTERPRETED BY**

Eric Lindquist, DMV  
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FNA can be considered for further definition. Structurally normal adrenal glands. However, an emerging PDH cannot be completely ruled out. There was no evidence of significant disease. I cannot rule out occult infection/UTI with wash out effect. If the urine specific gravity continues to drop under 1.020 and the patient appears Cushingoid then work-up for pituitary dependent Cushing's is warranted even though the adrenal glands measure normal. A smaller percentage of PDH patient's can have normal adrenal glands. This may be an emerging Cushing's patient.

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

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

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*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.*

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*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. 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.

*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.*

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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.

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**Address & treat concurrent disease first before performing Cushing's testing or testing will be artificially altered increasing false negatives and positives.**

**AGE**

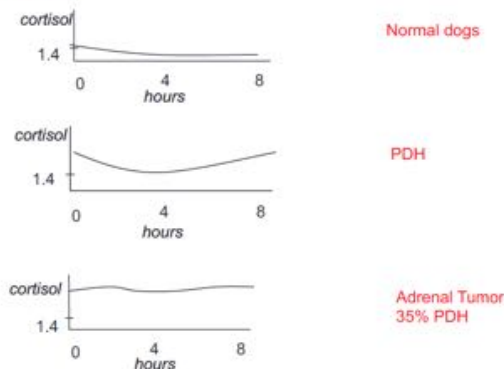
9.5 years

3) **LDDST** (0.01 D-Sodium phosphate mg/kg IV **with precise dosing\*\*\*\***) (Better screening test but plagued with false + but considered more specific than ACTH stim) 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). **Interpretation LDDST:** Look at 8-hour post first: If > 1.4 = Cushing's. Then look at 4-hour: if > 1.4 or > 50% baseline = Cushing's. 4-hour do then 8-hour spike most consistent with PDH. Flat line high constant curve without dip more consistent with tumor but can be PDH. See attached graph.

**WEIGHT**

59.8 lbs

**LDDS**



Courtesy: Rebecca Berg DACVIM, DECVM

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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). ACTH stim is better for diagnosis of Addisons, Iatrogenic Cushing's, and Cushing's therapy monitoring but problematic with initial Cushing's diagnosis. First dx LDDST is suggested.

5) If **diabetic** then run both LDDST & ACTH stim but stabilize as much as possible first.



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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. Cushing’s hypertension is usually 150-180 systolic range while pheochromocytoma range is more often > 180 systolic.

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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. CT for adrenal may be more thorough for adrenalectomy surgical planning if ultrasound views of the CVC were problematic.

**BREED**

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7) **Adrenectomy** for adrenal mass is prescribed then it is essential to stabilize the patient first regarding secondary disease such as organ dysfunction, hypertension, diabetes mellitus, hypernatremia, thromboembolic risk urinary and other infection in order to minimize potential for operative and postoperative complications as they are common in adrenalectomy. Trilostane stabilization therapy for Cushing’s would be the first approach then address surgery and hypertension should be managed ideally < 160 systolic with ace inhibitors, phenoxybenzamine, or amlodipine.

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Suggested reading:

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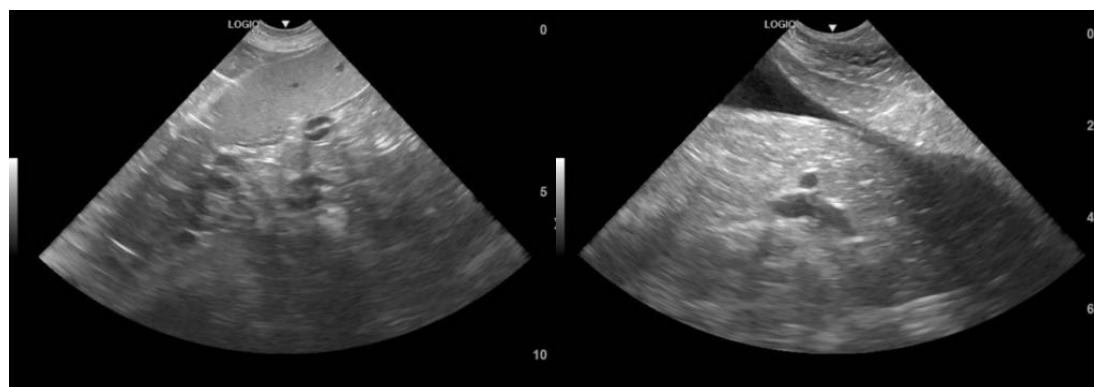
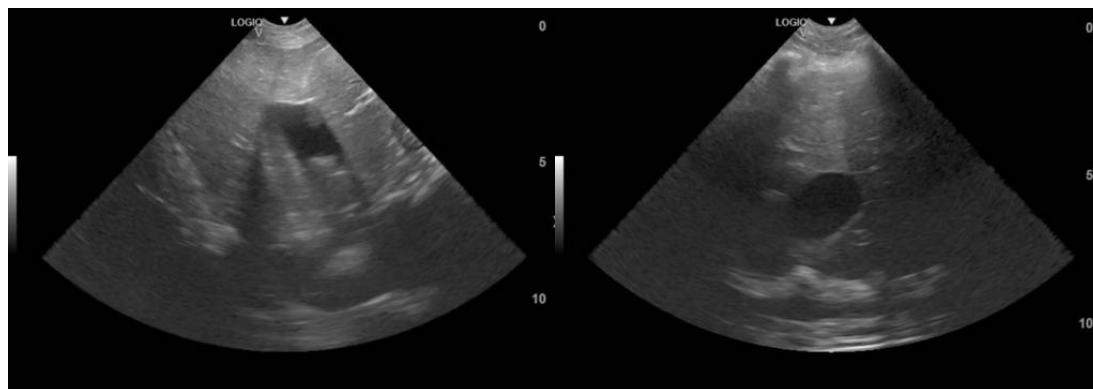
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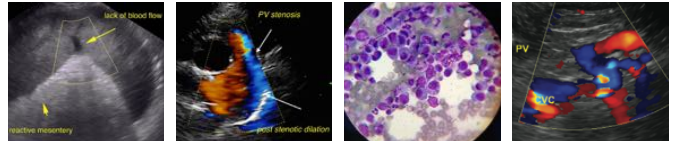
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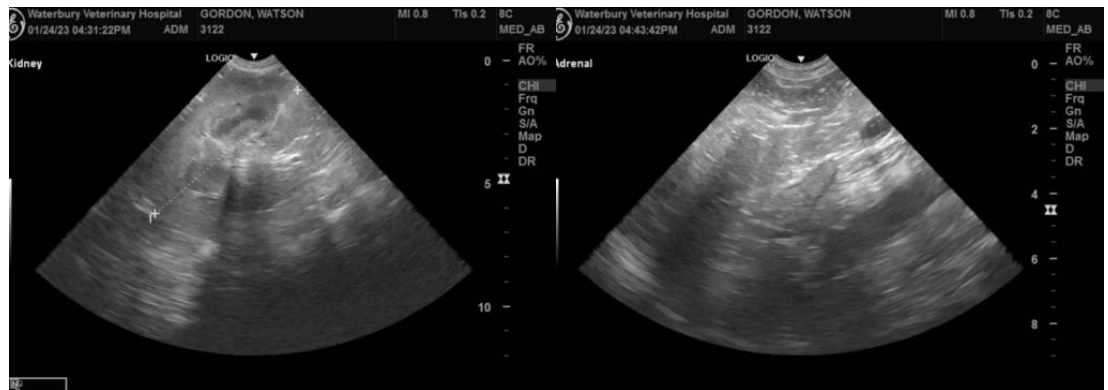
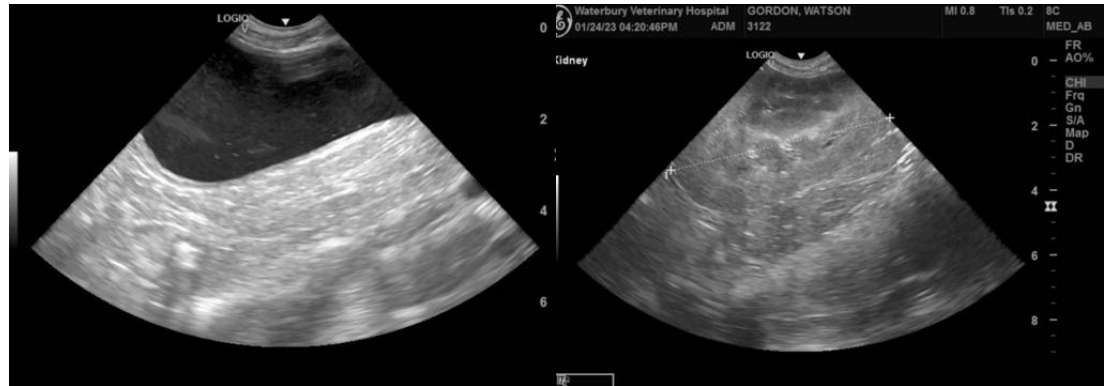
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The information and recommendations provided are based on the images presented by the referring veterinarian/sonographer. No evaluation can be communicated regarding pathology that was not visible in the image/video clips provided.

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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