



**PATIENT PRESENTING CLINICAL SIGNS**

Tiki Diaz History: Abdominal distension  
Medication: Panacur

**SPECIES**

Canine Labs: Hematocrit 35, platelet 1112, T4 0.7, ALT 331, ALP 6266, GGT 111, Cholesterol 44, Precision PSL 3370

**BREED**

Chihuahua

**SEX**

Female

**AGE**

5 years

**WEIGHT**

10Pounds

**ULTRASONOGRAPHIC EXAMINATION OF THE ABDOMEN**

**Urinary System**

The urinary bladder, trigone, cystourethral junction, and visible pelvic urethra exhibited normal thickness and tone. Anechoic urine was present in the lumen with no uroliths or sediment. The ureteral papillae were normal. The ureters were not visible which is normal. No evidence of inflammatory or neoplastic changes were noted.

No overt evidence of pathology associated with the uterus or bilateral ovaries, if clinically indicated.

Aortic trifurcation was normal.

Normal size and margination were present in the kidneys. A normal 1:3 cortex / medulla ratio and normal corticomedullary definition were maintained. The echogenicity of the cortex was similar to or slightly less than normal liver parenchyma while the medulla echogenicity was hypoechoic to the cortex with no evidence of pelvic dilation. The left kidney measured 4.2 cm in length. The right kidney measured 4.6 cm in length.

**Adrenal Glands**

Bilateral symmetrical adrenal gland enlargement with uniformly hypoechoic parenchyma was present. The left adrenal gland measured 1.26 cm width at the caudal pole and 0.82 cm width at the cranial pole. The right adrenal gland measured 0.96 cm width at the caudal pole and 0.73 cm width at the cranial pole.

**Spleen**

The spleen exhibited a finely textured and homogenous parenchyma which was hyperechoic to the liver and renal cortical parenchyma. The capsule was smooth and regular without apparent expansion. The splenic vasculature at the hilus was normal in volume with no evidence of congestion or thrombosis. Acute to chronic inflammatory, neoplastic, or benign parenchyma changes were not noted.

**Liver**

The liver presented enlarged in size. The parenchyma of the liver was subjectively normal in echogenicity compared to the spleen and renal cortices. The liver parenchyma was uniform with a mildly coarse echotexture. The capsule of the liver was symmetrically rounded to mildly swollen in margination. The hepatic and portal vasculature were normal in appearance without signs of congestion. Multiple focal areas of nonobstructive biliary tree mineralization were present.

The gallbladder exhibited moderate distention. The gallbladder lumen contained generalized mixed echogenic to mineralized organized debris, occupying the entirety of the gallbladder lumen. Hypoechoic areas noted between the luminal debris and interluminal walls, suggestive of mucus was

**INTERPRETED BY**

R. McKenzie Daniel,  
DVM, DABVP  
(Canine and Feline)

**IMAGING PERFORMED BY**

Rebekah Jakum, CVT  
ARDMS/RVT

**HOSPITAL NAME**

VCA Northside AH

**REFERRING VET**

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**PATIENT** present. No overt evidence of perigallbladder inflammation or effusion noted. The cystic and common bile ducts were normal.

Tiki Diaz

***Gastrointestinal***

**SPECIES** The stomach presented intact wall layering with a normal wall layer ratio. Minor retained non-shadowing ingesta/chyme present in the antrum/pylorus.

Canine

The small intestine presented intact wall layering with 1:3 muscularis/mucosa ratio. The lumen of the small intestine was empty with no signs of ileus, obstruction or foreign material.

**BREED**

Chihuahua

Normal visible colon wall layers were present with apparent formed feces in lumen.

***Pancreas***

**SEX**

The pancreas was normal in size and contour with isoechoic to heterogeneous parenchyma compared to adjacent omentum. No signs of active inflammation or neoplasia.

Female

***Free Abdomen***

**AGE**

No overt lymphadenopathy or peritoneal effusion was present.

5 years

**ULTRASONOGRAPHIC FINDINGS**

**WEIGHT**

- Hepatomegaly exhibiting multiple areas of focal non-obstructive biliary tree mineralization- subjectively benign
- Gallbladder mucocele exhibiting focally mineralized organized luminal debris and suspect mucosal hyperplasia
- Heterogeneous pancreas- patient variant, remodeling owing to previous inflammatory episode or low grade to chronic pancreatitis possible
- Bilateral adrenomegaly- suggestive of PDH

10Pounds

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**INTERPRETATION OF THE FINDINGS & FURTHER RECOMMENDATIONS**

Full adrenal work up, including LDDST, recommended. The bilateral adrenomegaly suggests PDH, however, is not specific given the lack of reported clinical signs consistent with PDH.

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Hepatosupportive medications recommended, although potential for eventual or prophylactic cholecystectomy likely indicated in this patient.

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Cushing Work UP

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

Dr. Strickler

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

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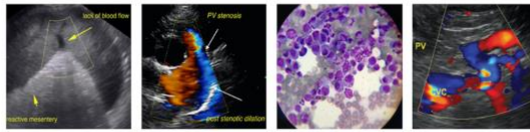
*Nearly all Cushing's dogs have SAP elevations and true PU/PD (USG < 1.025) and most are polyphagic. Cushing's dogs are > 6 years and usually > 9 years old, usually have poor skin coats, body scores > 3/5, and are usually sedentary animals.*

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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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**PATIENT** *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.*

Tiki Diaz

**SPECIES** *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.*

Canine

**BREED** **Screen first, workup second**

Chihuahua 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.

**SEX** *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.*

Female

**AGE** 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.

5 years

**WEIGHT** 10Pounds

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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.**

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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.

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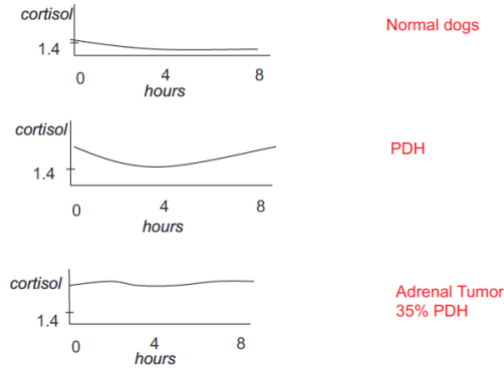
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**LDDS**



Courtesy: Rebecca Berg DACVIM, DECVIM

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.

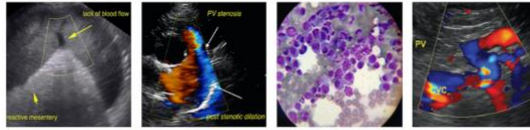
5) Run a **serial blood pressure** in a BP friendly non “white coat effect” atmosphere. Run at least 3 at different times over a few hours or when eating as the patient tends to be calm when eating or give Torbutrol when entering the facility. Cushing’s hypertension is usually 150-180 systolic range while pheochromocytoma range is more often > 180 systolic.

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.

7) **Adrenalectomy** 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.

Suggested reading:

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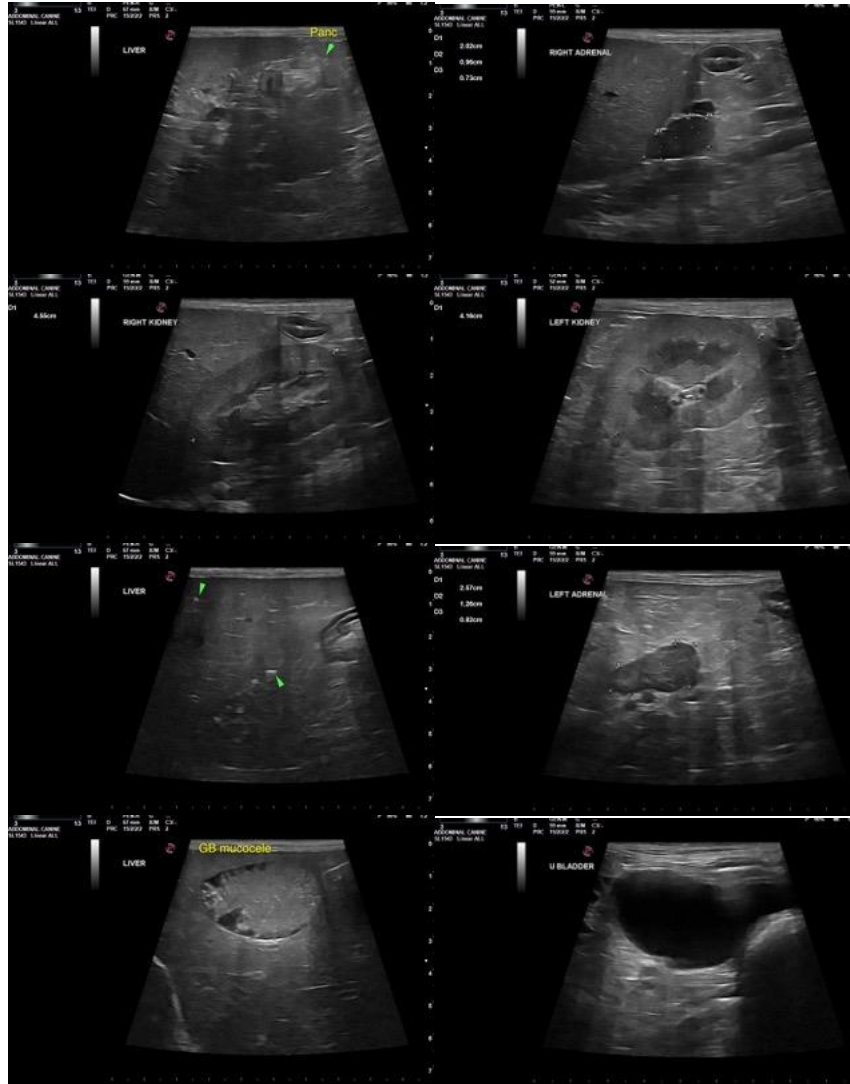
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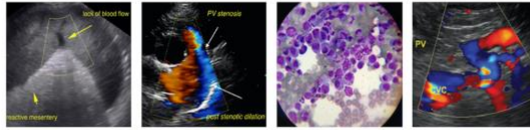
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The information and recommendations provided are based on the images presented by the referring veterinarian. No evaluation can be communicated regarding pathology that was not visible in the image/video clips provided.

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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