**DATE**

2/3/22

PRESENTING CLINICAL SIGNS

History: History of PU/PD, pot belly, persistent proteinuria (recently worsening) and liver value elevations. Previous ultrasound showed vacuolar hepatopathy.

PATIENT

Mac Maisel

Current Medications: Enalapril 5mg BID, Provable Chews SID, Welactin 1 capsule SID, Purina ProPlan HA, all over 1 year.

Lab Results: Attached separately.

1/27/22: UPC 2.1

SPECIES

Canine

11/16/21: coccidia, hookworm and eimeria +

11/9/21: ALKP 452, UPC 2.1, culture negative

6/18/21: enterobacter and Ecoli UTI

6/4/21: UPC 0.9, ALKP 259, alb 4.7

3/17/21: UPC 1.6

BREED

Poodle Mix

2/12/21: ALKP 383UPC 1.9

2/6/21: bile acids negative

1/27/21: tick panel negative, lepto PCR negative

1/23/21: cortisol pre 1.5, post <0.2, post <0.2

SEX

Neutered male

Date of Previous IntraPet Ultrasound: 1-7-2021.

Sedation: Not required to complete full diagnostic ultrasound.

Stat Report: Not requested.

Imaging Performed By: Stephanie Pearce RDCS, RVT.

AGE

5/18/12

ULTRASONOGRAPHIC EXAMINATION OF THE ABDOMEN**WEIGHT**

26.9 lbs

Urinary System

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.

INTERPRETED BY

Eric Lindquist, DMV
DABVP, Cert. IVUSS

The prostate was uniform and measured 1.15 cm.

The right **kidney** measured 6.15 cm with mildly increased cortical echogenicity. The right kidney was normal in size and contour. The left kidney was normal in size and contour measuring 5.24 cm with mildly increased echogenicity.

HOSPITAL NAME

Everhart VC

Adrenal Glands

Both **adrenal glands** were at the upper limits of normal. The right adrenal gland measured 2.27 x 0.68 cm at the caudal pole and 0.54 cm at the cranial pole. The left adrenal gland measured 1.81 x 0.64 cm at the caudal pole and 0.61 cm at the cranial pole.

REFERRING VET

Dr. Notarangelo

Spleen

The **spleen** presented a smooth homogeneous parenchyma hyperechoic to liver and renal cortical parenchyma. The capsule was smooth without noticeable expansion or deviation from within the spleen or adjacent pathology. The splenic vasculature demonstrated normal volume without signs of congestion or thrombosis. No sonographic evidence of acute or chronic inflammatory, neoplastic, or infarctual changes was noted.

INVOICE

95795

Liver

Exam of the cranial abdomen demonstrated excessive **liver** size and swollen contour. Mild, coarse architecture was noted with increased portal markings and minor parenchymal remodeling is suggestive of an inflammatory component. The gallbladder and common bile duct were unremarkable.

Gastrointestinal

Examination of the **gastrointestinal tract** revealed a stomach and intestine free of stasis, of normal wall thickness, acceptable curvilinear mural detail, and peristaltic activity. The stomach revealed a minor amount of residual chyme and fluid. Small and large intestine demonstrated normal luminal chyme and stool consistency respectively. Intestinal wall thickness measured 0.3 cm. No obstructive or overt infiltrative disease was noted. No associated abnormal lymphatic activity was noted.

Pancreas

The **pancreas** was prominent, hypoechoic and mildly irregular measuring 1.25 cm. This was largely similar to the prior sonogram possibly more hypoechoic.

ULTRASONOGRAPHIC FINDINGS

Subjectively benign abdomen.

Prominent pancreas.

Mildly increased hypoechoic echogenicity.

INTERPRETATION OF THE FINDINGS & FURTHER RECOMMENDATIONS

Subxiphoid palpation is recommended to assess for pain-solicited response. If pain is noted low grade pancreatitis is suspected. Given that the adrenal glands are technically normal size there is a potential for emerging PDH. If the urine specific gravity is persistently less than 1.020 then work-up for PDH is indicated. A small percentage of PDH patients can have measurably normal adrenal glands and Cushing's will drive proteinuria as well. Doxycycline treatment is warranted to empirically treat for infectious agents that can cause proteinuria as well. Reduction of systemic antigenicity through the diet and other causes can be considered in case low-grade immune mediated issues are playing a role. FNA of the liver can be considered for further definition, but subjectively appears benign. Vacuolar hepatopathy is a normal finding, yet may be an underlying endocrine source.

Efficient & Accurate Cushing's Work up-Lindquist

Notes regarding Cushing's Clinical Presentations:

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.

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.

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.

Screen first, workup second

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.

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.

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

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).

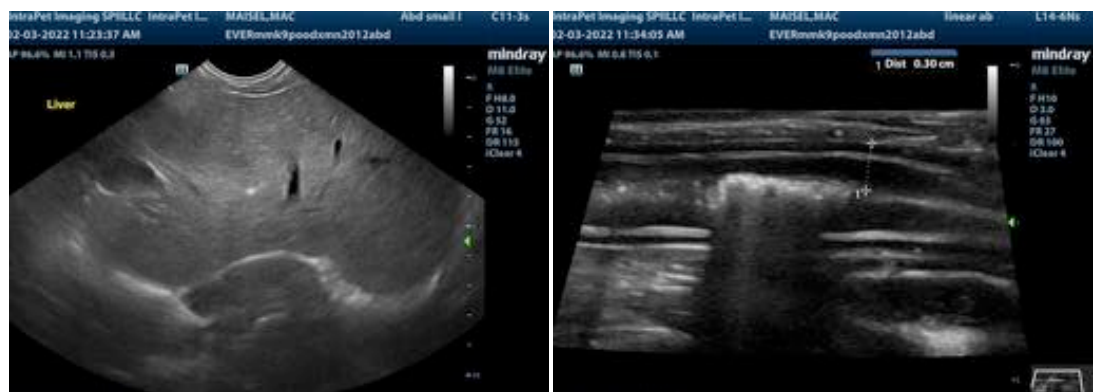
5) If **diabetic** then run both LDDST & ACTH stim.

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.

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:

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 .







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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