



PATIENT	PRESENTING CLINICAL SIGNS
Dunkin Chamberlain	No reported clinical signs of Liver or Cushing's disease. LE increasing. Previous AUS report attached.
SPECIES	Abnormal PE/Chem/CBC/UA Results: February 2022: Elevated ALKP, all other liver values WNL. AUS in 3/2022 (report attached) ALP has been stable q 6 months until this month. March 2023: ALKP > 2000, ALT 369, GGT 22.
Canine	
BREED	ULTRASONOGRAPHIC EXAMINATION OF THE ABDOMEN
Terrier X	Urinary System
SEX	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 were noted. Ureteral papillae were normal. The pelvic urethra was imaged 3.0 cm beyond the cystourethral junction.
Neutered Male	
AGE	The prostate measured 1.17 cm.
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 his age patient. Medullary structure differed distinctly from that of the cortex and no evidence of pelvic dilation was present. The right kidney measures 5.75 cm.
WEIGHT	
19 Pounds	
INTERPRETED BY	Adrenal Glands
Eric Lindquist, DMV	The adrenal glands appeared mildly enlarged and swollen. No evidence of focal capsular expansion or invasion into the phrenic veins were noted. No overt suspicion of neoplasia was noted. This is considered likely a hyperplastic change associated with stress or adrenal endocrinopathy (PDH). If isosthenuria is persistently present and the patient morphologically suggests Cushing's disease, then ACTH testing would be indicated. The right adrenal gland measured 2.03 cm in length x 0.77 cm at the caudal pole. The left adrenal gland measured 0.61 cm at the caudal pole and 0.68 cm at the cranial pole.
DABVP, Cert. IVUSS	
IMAGING PERFORMED BY	Spleen
Karen Ebersole, DVM, DABVP (Canine/Feline)	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 were noted.
HOSPITAL NAME	Liver
Scanvet	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. 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.
REFERRING VET	Gastrointestinal
Dr. Lane	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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3/16/23	



PATIENT

Pancreas

Dunkin Chamberlain

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.

SPECIES

Canine

ULTRASONOGRAPHIC FINDINGS

BREED

- Mild bilateral adrenal hypertrophy and benign vacuolar hepatopathy liver pattern
- Otherwise benign abdomen with age related renal changes

Terrier X

INTERPRETATION OF THE FINDINGS & FURTHER RECOMMENDATIONS

SEX

If USG is < 1.020, and the patient appears cushingoid, workup for Cushing's/PDH indicated.

Neutered Male

Efficient & Accurate Cushing's Work up-Lindquist

AGE

Notes regarding Cushing's Clinical Presentations:

11 Years

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.

WEIGHT

19 Pounds

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.

INTERPRETED BY

Eric Lindquist, DMV

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.

DABVP, Cert. IVUSS

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.

IMAGING PERFORMED BY

Karen Ebersole, DVM,
DABVP (Canine/Feline)

Screen first, workup second

HOSPITAL NAME

Scanvet

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.

REFERRING VET

Dr. Lane

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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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).



PATIENT

OR

Dunkin Chamberlain

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).

SPECIES

Canine

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

BREED

Terrier X

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.

SEX

Neutered Male

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:

AGE

11 Years

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.

WEIGHT

19 Pounds

INTERPRETED BY

Eric Lindquist, DMV
DABVP, Cert. IVUSS

IMAGING PERFORMED BY

Karen Ebersole, DVM,
DABVP (Canine/Feline)

HOSPITAL NAME

Scanvet

REFERRING VET

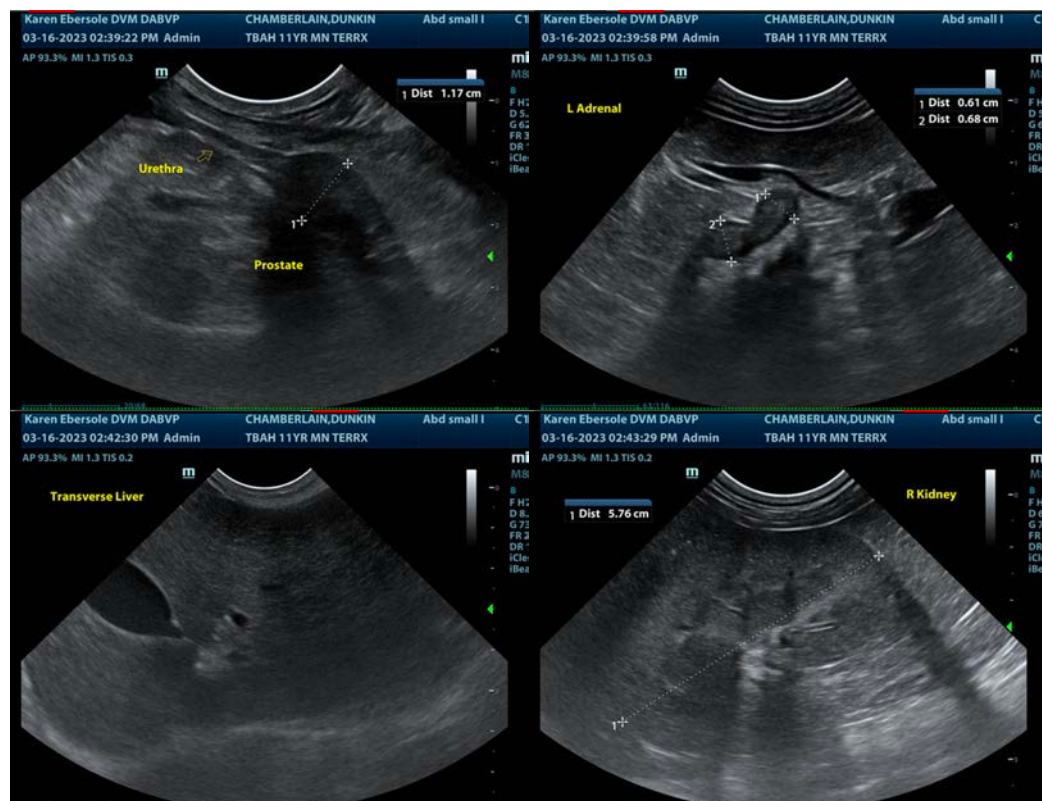
Dr. Lane

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Terrier X

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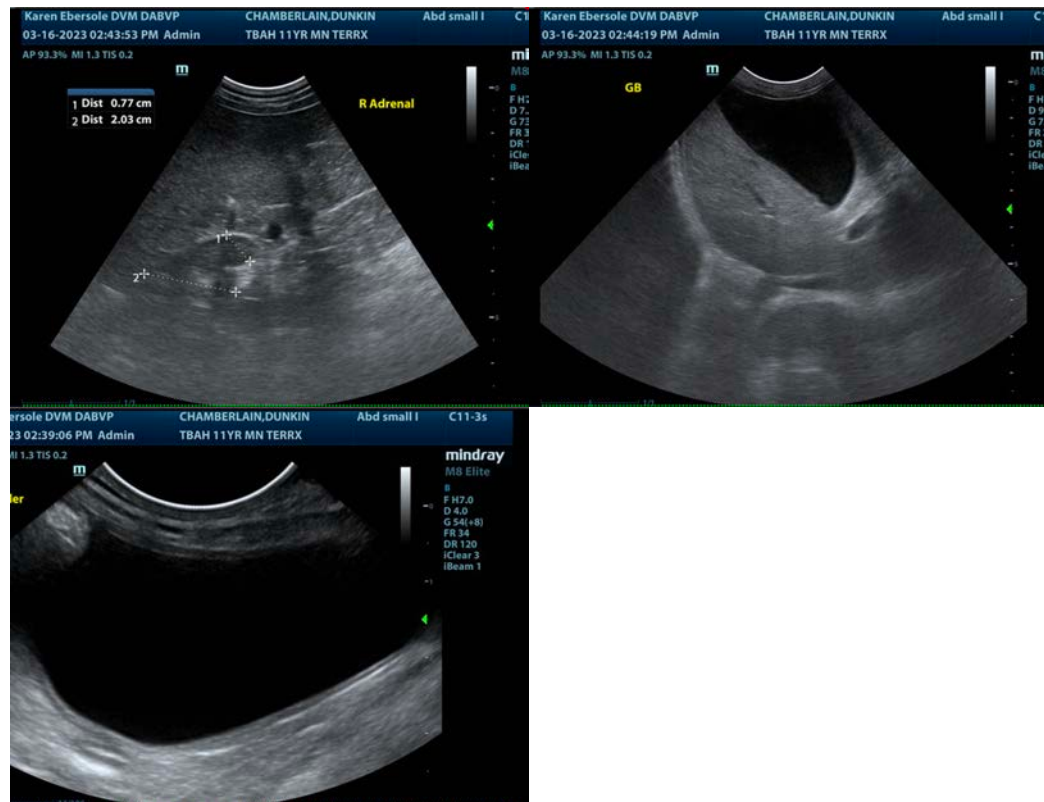
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The information and recommendations provided are based on the images presented by the referring veterinarian/sonographer. No evaluation can be communicated regarding pathology that was not visible in the image/video clips provided.

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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