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"Trixie" Kittleson  
Case #3 Basic Abdomen  
12-30-19

Trixie is a 13 year-old female spayed Dachshund that presented to the emergency service for a two-day history of hyporexia, vomiting, diarrhea and involuntary shaking. Pertinent history is that she was diagnosed with Stage II chronic kidney disease (CKD) 6 months previous based on the IRIS staging of CKD (modified in 2019) with a creatinine of 2.5 and an SDMA of 35. She was receiving no specific therapy for the CKD.

Physical examination findings include a weight of 4.6 kg, Body condition score (BCS) – 3/9, Muscle condition score (MCS)- 2/3, rectal temperature-100.5 F, oral- mm's pink, dry with an estimated dehydration of 7-10%, CRT-2seconds, heart rate- 100 bpm, respiratory rate-24 abdominal palpation- kidneys subjectively smaller than normal and non-painful. Integument, eyes, ears, musculoskeletal- no significant findings.

**Lab work:**

<b>CBC</b>	<b>Result</b>	<b>Reference Range</b>	<b>Units</b>
<b>RBC</b>	<b>4.90</b>	<b>5.80-11.0</b>	<b>M/uL</b>
<b>HCT</b>	<b>26.2%</b>	<b>28.0-47.0</b>	<b>%</b>
<b>HGB</b>	<b>7.9</b>	<b>8.6-16.0</b>	<b>ug/dL</b>
MCV	46.5	37.7-50.0	fL
MCH	17.1	12.3-17.2	pg
MCHC	36.8	28.9-42.2	g/dL
RDW	16.8%	17.2-31.3	%
Platelet	351	160-660	K/uL
<b>WBC</b>	<b>32.2</b>	<b>3.7-20.5</b>	<b>K/uL</b>
<b>Seg neut</b>	<b>31.1</b>	<b>1.30-15.70</b>	<b>K/uL</b>
Band neut	0.50	0.00-0.50	K/uL
Lymph	0.40	1.00-7.90	K/uL
Mono	0.16	0.00-1.00	K/uL
Eos	0.00	0.10-2.00	K/uL
Baso	0.00	0.00-0.10	K/uL

**Chemistry Profile:**

	<b>Result</b>	<b>Reference Range</b>	<b>Units</b>
Glucose	154	65-155	g/dL
ALT	118	23-145	U/L
ALKP	21	8-115	U/L

TBili	0.2	0.2-0.4	mg/dL
GGT	2	0-2	U/L
Chol	193	81-275	mg/dL
<b>BUN</b>	<b>140</b>	<b>13-36</b>	<b>mg/dL</b>
<b>Creat</b>	<b>6.9</b>	<b>0.6-2.1</b>	<b>mg/dL</b>
<b>Phos</b>	<b>15.0</b>	<b>2.7-7.3</b>	<b>mg/dL</b>
<b>Calcium</b>	<b>6.5</b>	<b>8.1-11.8</b>	<b>mg/dL</b>
<b>Ionized Ca</b>	<b>0.79</b>	<b>1.1-1.4</b>	<b>mmol/L</b>
Total prot	7.8	5.7-8.6	g/dL
Alb	3.4	2.3-3.9	g/dL
Glob	4.4	2.8-5.4	g/dL
Na	149	144-171	mmol/L
K	4.8	3.4-5.4	mmol/L
Cl	106	107-124	mmol/L

### Urinalysis (Cytocentesis)

	<b>Result</b>	<b>Reference range (where applicable)</b>
Color	Yellow	N/A
Clarity	Clear	N/A
<b>SG</b>	<b>1.010</b>	<b>1.020-1.060</b>
Glucose	Neg	Negative
Bilirubin	Neg	Negative
Ketone	Neg	Negative
Blood	<b>4+</b>	<b>Negative</b>
pH	5.5	
Protein	Neg	Negative-trace
<b>WBC</b>	<b>&gt;20 HPF</b>	<b>0-5 HPF</b>
<b>RBC</b>	<b>&gt;20 HPF</b>	<b>0-5 HPF</b>
<b>Bacteria</b>	<b>Rods observed</b>	<b>Negative</b>
Epi cell	None observed	
Casts	None observed	
Crystals	None observed	

### Lab work Interpretation:

There are two primary changes in the CBC. The first is normocytic, normochromic anemia. Causes of anemia are either regenerative (hemolysis, blood loss) resulting in a macrocytic, hypochromic anemia or non-regenerative (many causes including decreased erythropoietin and anemia of any chronic disease) resulting in a normocytic, normochromic anemia. The second is a leukocytosis with a mature neutrophilia. Causes of a mature neutrophilia include infection and inflammation.

There are several changes in the chemistry. There is azotemia, hyperphosphatemia, and hypocalcemia (both ionized and total). Differentials for azotemia include pre-renal (dehydration), renal (acute and chronic kidney disease) and post-renal (ureteral or urethral obstruction). Hyperphosphatemia can be

associated with the azotemia. Hypocalcemia can be secondary to azotemia or be related to primary hypoparathyroidism.

The urinalysis reveals isosthenuria, hematuria, bacteriuria, and pyuria. A urine culture was submitted. The urine culture returned 5 days later with growth of >10,000 CFU *E. Coli* susceptible to all antibiotics tested.

An abdominal ultrasound was performed. A complete set of 43 images and discussion commence on the following page.



Image 1- Sagittal view of the left liver lobe



Image 2- Transverse view of the left liver lobe





Image 3- Sagittal view of the mid-liver



Image 4- Transverse view of the left liver



Image 5- Sagittal view of the gall bladder. The gall bladder wall is of normal thickness (1.15 mm). There is anechoic bile and some echogenic material within the gall bladder.



Image 6- Sagittal views comparing the spleen and the left lateral liver lobe showing normal echogenicity of each organ with the spleen more hyperechoic than the liver.

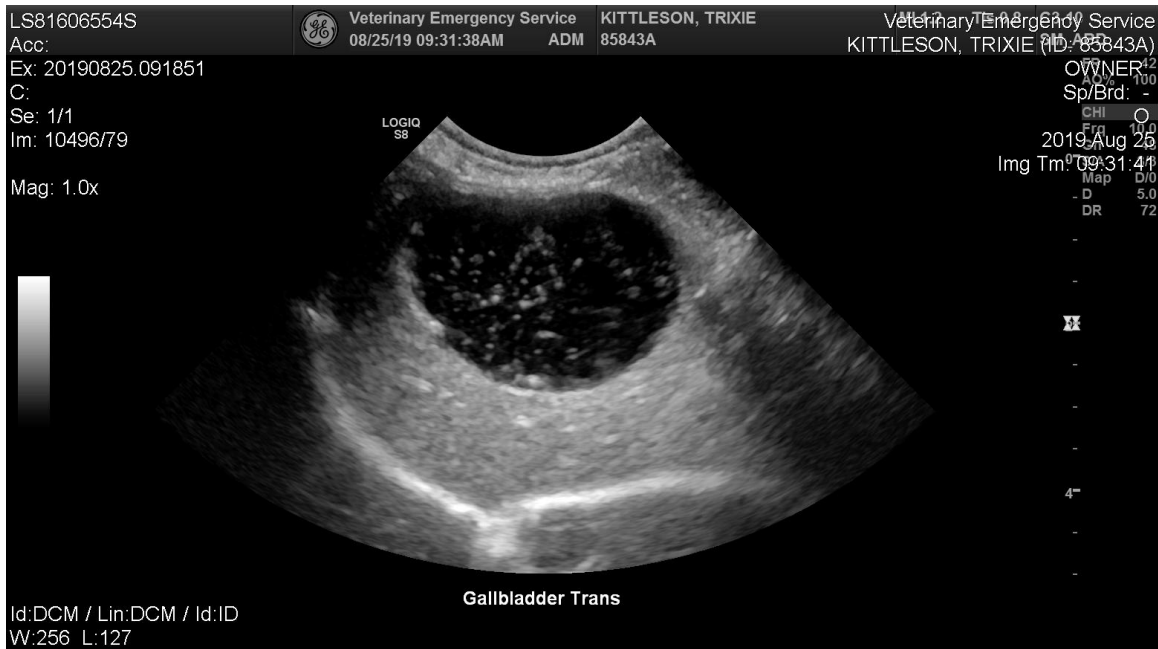


Image 7- Transverse view of the gall bladder. There is anechoic bile and some echogenic material within the gall bladder.



Image 8- Sagittal view of the caudal aspect of the gall bladder and the cystic duct. There is anechoic bile and some echogenic material within the gall bladder.



Image 9- Sagittal view of the right lateral liver lobe and the right kidney. The right renal cortex is hyperechoic when compared to the liver.

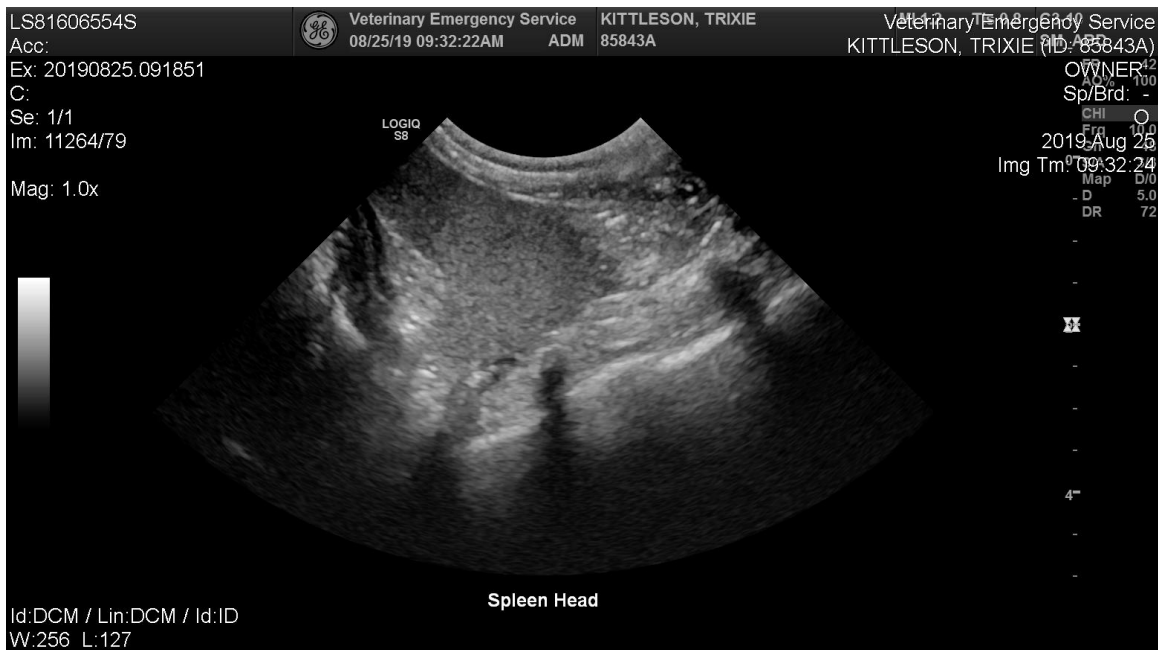


Image 10- Transverse view of the head of the spleen

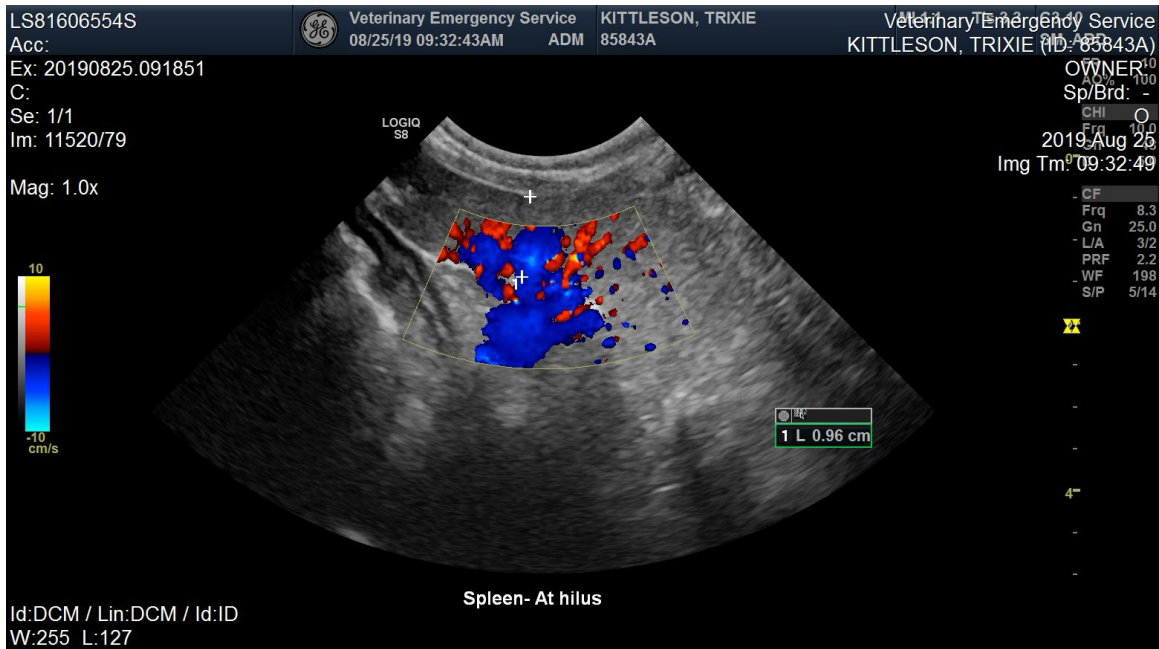


Image 11- Sagittal view of the spleen at the hilus. Doppler color flow of the hilus does not reveal evidence of a thrombus.



Image 12- Sagittal view of the tail of the spleen



Image 13- Transverse view of the spleen



Image 14- Sagittal view of the left kidney. The cortex is hyperchoic, there is loss of corticomedullary definition and the contour is irregular.



Image 15- Sagittal view of the left kidney. The cortex is hyperchoic, there is loss of corticomedullary definition, the contour is irregular, and the length is normal (4.07 cm).

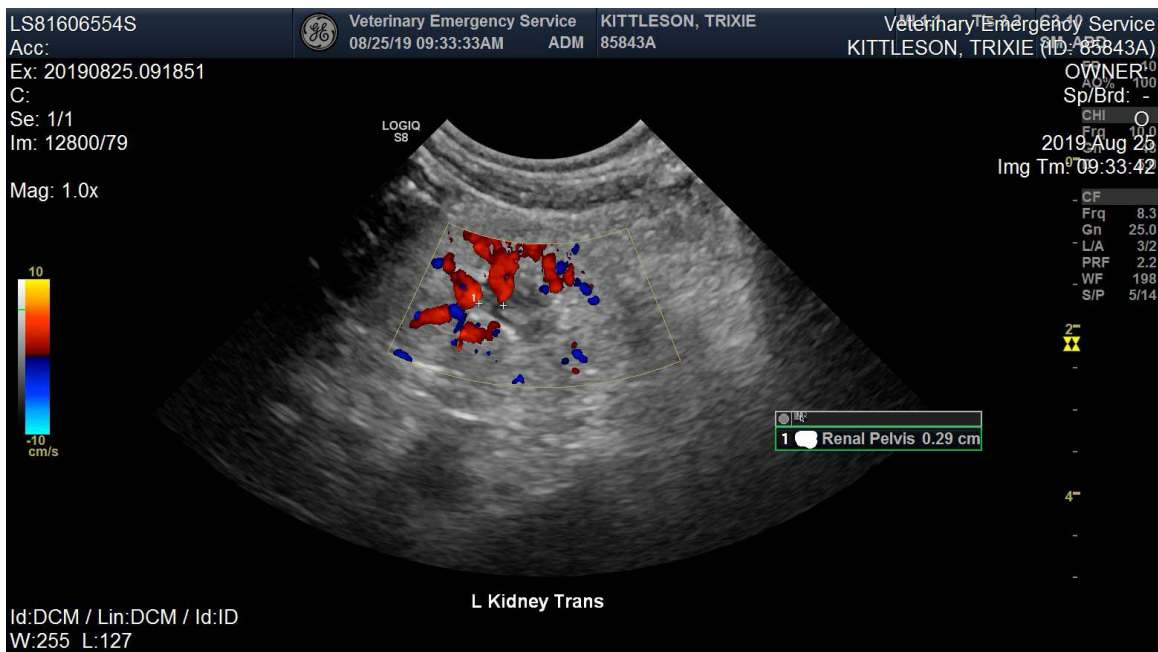


Image 16- Transverse view of the left kidney. Color Doppler was used to differentiate the vasculature while identifying a dilated and hyperechoic renal pelvis (2.9 mm).



Image 17- Sagittal views of the left kidney and the spleen. The renal cortex is hyperechoic when compared to the spleen.

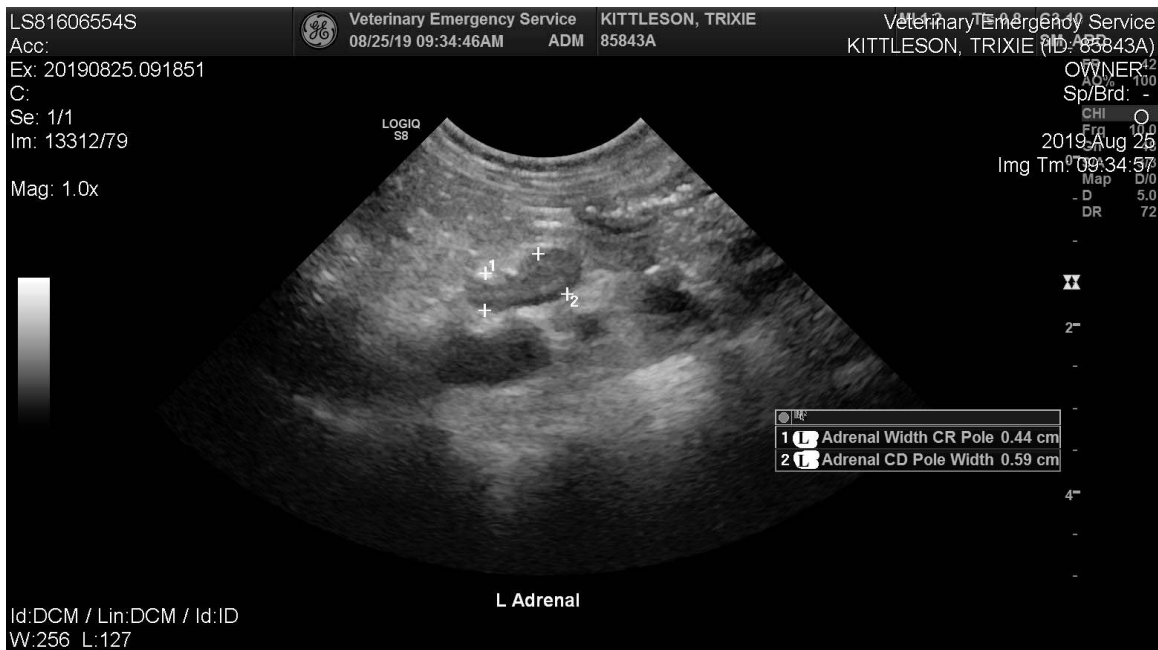


Image 18- Sagittal view the enlarged left adrenal gland with the caudal pole measuring 0.59 cm (normal for dogs <10 kg is <0.54 cm)





Image 19- Sagittal view of the right kidney. The cortex is hyperchoic, there is loss of corticomedullary definition and the contour is irregular.

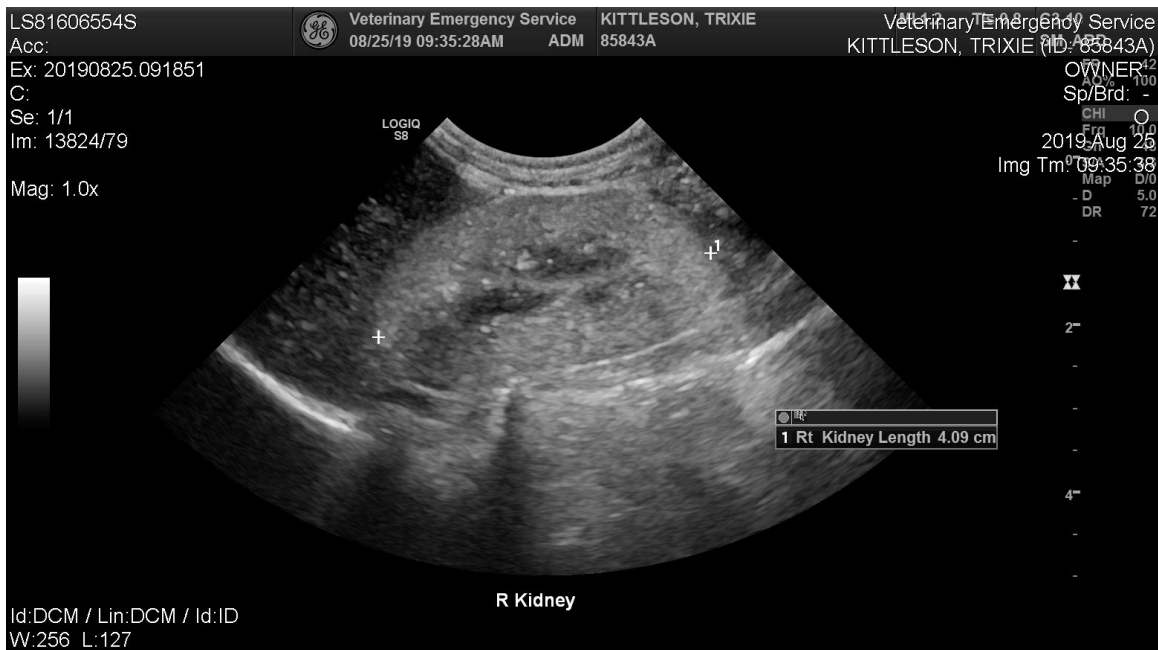


Image 20- Sagittal view of the right kidney. The cortex is hyperchoic, there is loss of corticomedullary definition, the contour is irregular and the length is normal (4.09 cm).

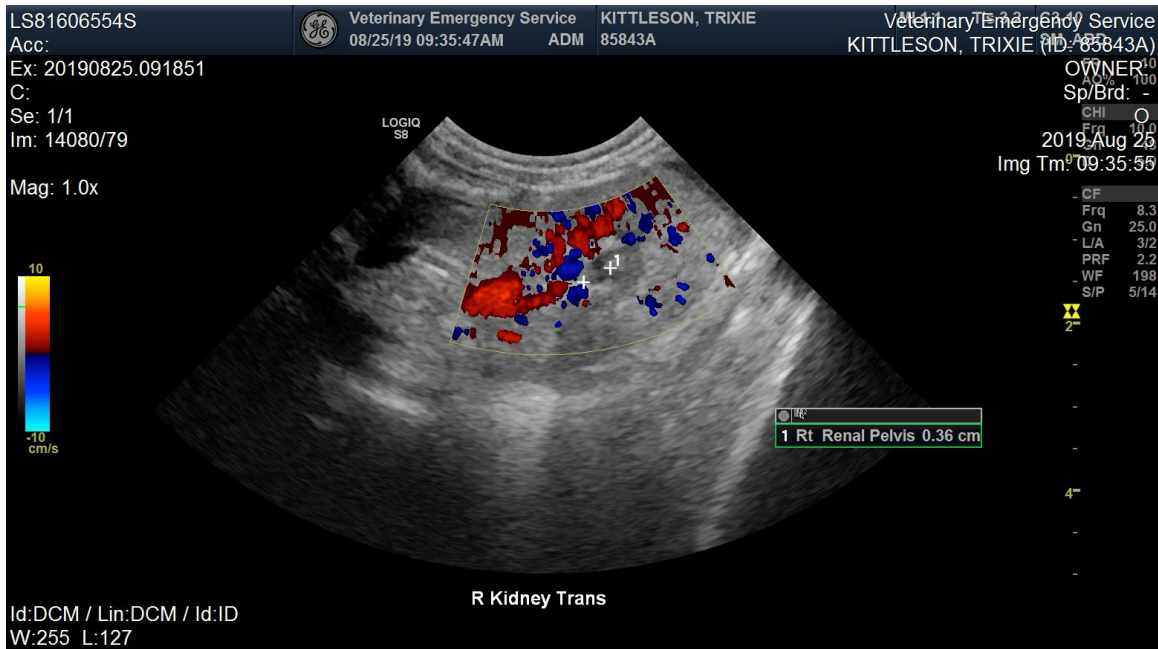


Image 21- Transverse view of the right kidney. Color Doppler was used to differentiate the vasculature while identifying a dilated and hyperechoic renal pelvis (3.6 mm)

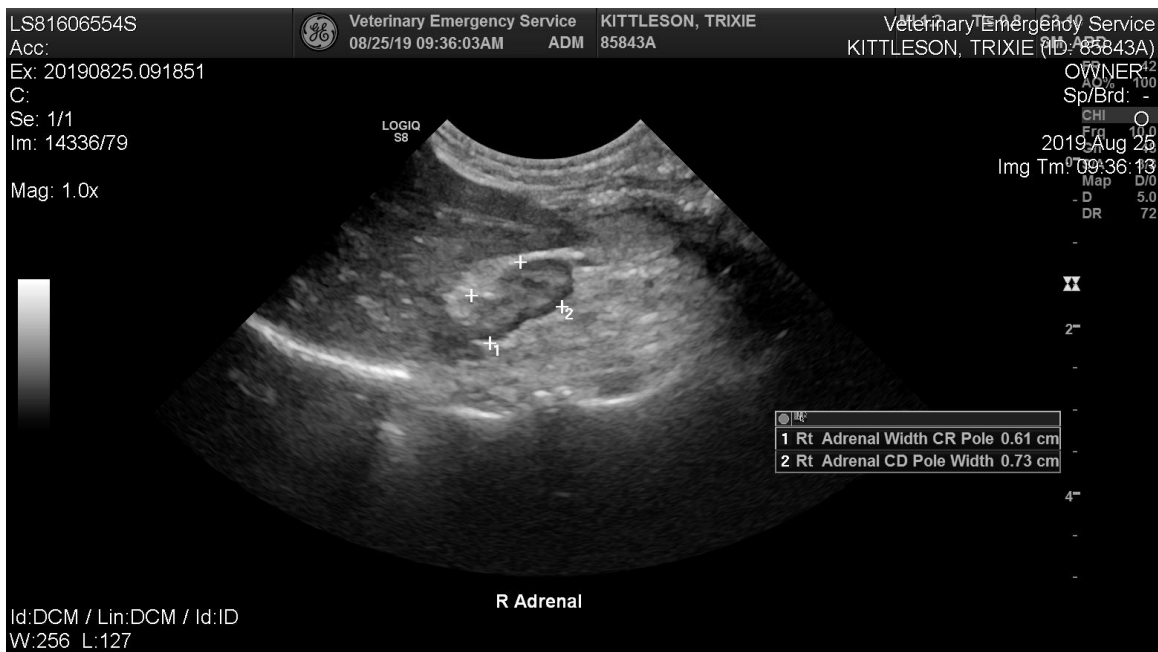


Image 22- Sagittal view of the enlarged right adrenal gland with the caudal pole measuring 0.73 cm (normal for dogs <10 kg is <0.54 cm)



Image 23- Sagittal view of the urinary bladder with normal wall thickness (0.31 cm)



Image 24- Sagittal view of the trigone area of the urinary bladder



Image 25- Transverse view of the urinary bladder



Image 26- Sagittal view of the urinary bladder; the proximal urethra could not be imaged due to the pelvis



Image 27- Sagittal view of the normal left medial iliac lymph node (1.21 cm). Medial iliac LN in the dog can be up to 4 cm long and 2 cm wide.



Image 28- Sagittal view of the normal right medial iliac lymph node (1.04 cm). Medial iliac LN in the dog can be up to 4 cm long and 2 cm wide.



Image 29- Sagittal view of the stomach with minimal luminal gas interference and normal stomach wall thickness and normal wall layering. (0.33 cm)



Image 30- Sagittal view of the stomach with minimal gas interference and normal stomach wall thickness and normal wall layering (0.40 cm)



Image 31- Sagittal view of the stomach with minimal gas interference and normal stomach wall thickness (0.33 cm)



Image 32- Sagittal view of the pyloroduodenal junction.

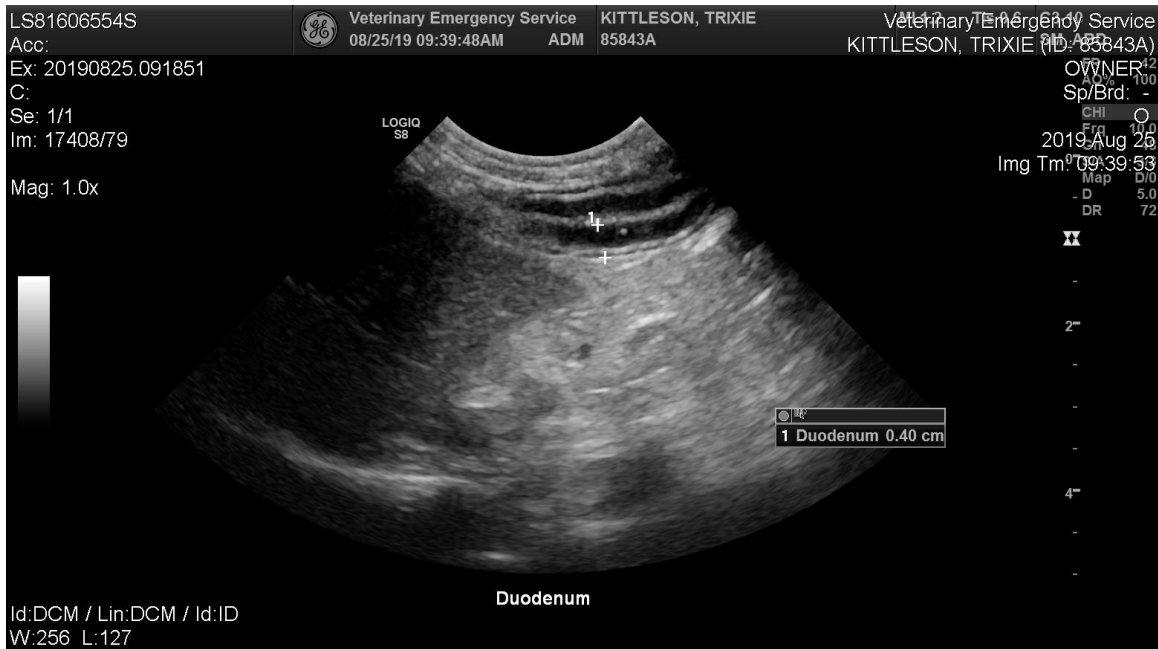


Image 33- Sagittal view of the duodenum that measured within normal limits (0.29 cm) and had normal layering.



Image 34- Sagittal view of the right limb of the pancreas. The right limb of the pancreas is hyperechoic.





Image 35- Sagittal view of the left limb of the pancreas



Image 36- Sagittal view of the jejunum. There is normal layering and thickness (0.26 cm)



Image 37- Transverse view of the jejunum. There is normal layering and thickness (0.33 cm)



Image 38- Transverse view of the jejunum. There is normal layering and thickness (0.34 cm)

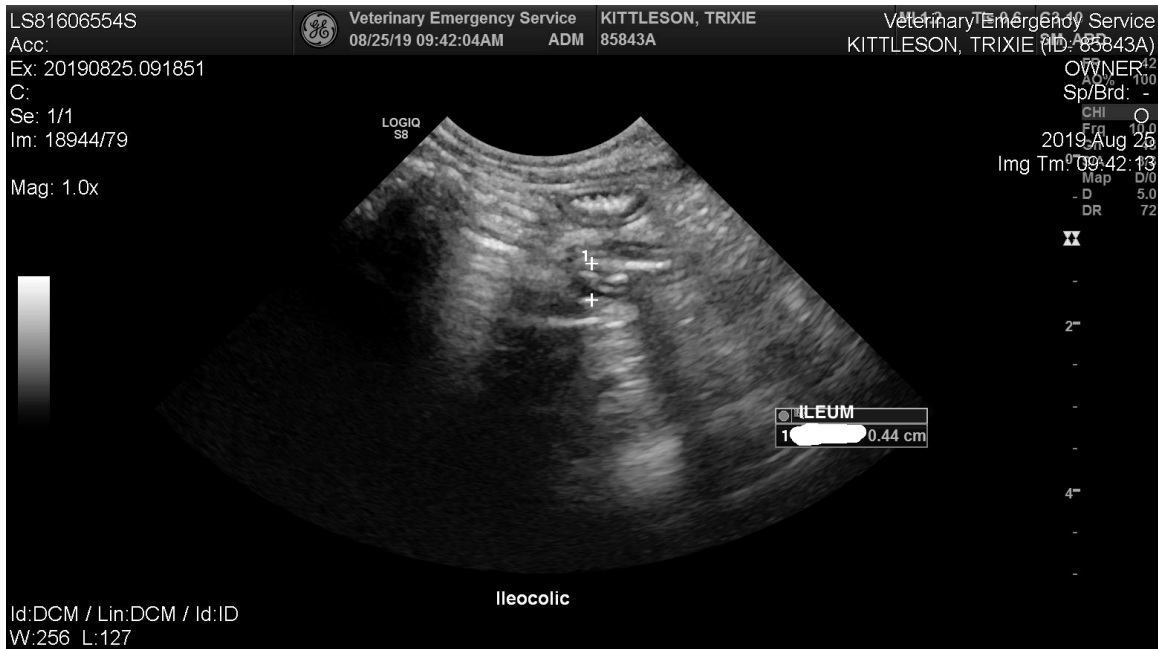


Image 39- Longitudinal view of the ileocolic junction with normal measurement of the ileum (0.44 cm).



Image 40- Longitudinal view of the distal colon. The colon is of normal thickness (0.30 cm)



Image 41- Sagittal view of the transverse colon



Image 42- Sagittal view of the mesenteric root

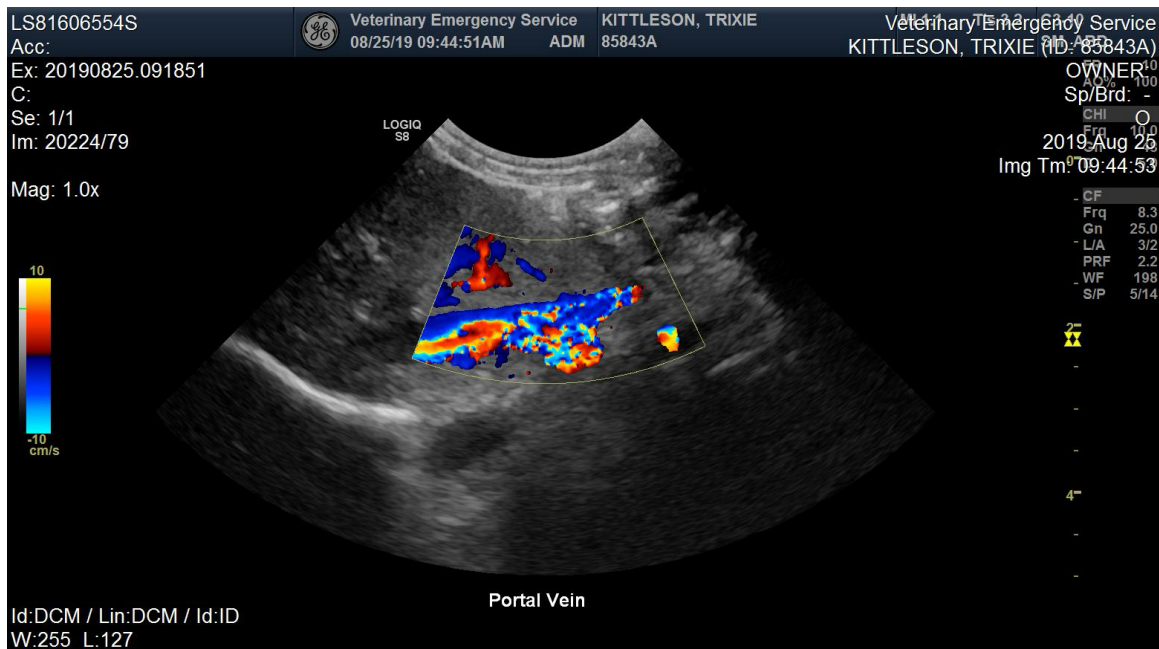


Image 43- Sagittal view of the portal vein.

### Interpretation summary:

There are four primary findings from the abdominal ultrasound. First, there are hyperechoic kidneys with irregular contour and loss of corticomedullary definition. Differentials for hyperechoic kidneys include degenerative kidney disease (CKD), pyelonephritis, toxins (NSAID, ethylene glycol, grape/raisins) and infectious disease (leptospirosis, Lyme nephritis).

Second, the renal pelvis is hyperechoic and dilated. A hyperechoic pelvis is most compatible with pyelonephritis. The pelvis can be dilated due to pyelonephritis or diuresis. Diuresis can occur with IV fluid therapy or the polyuric phase of acute kidney injury. Obstruction or partial obstruction of the ureter can also cause renal pelvis dilation.

Third, the adrenal glands are enlarged. Differentials for bilateral adrenal gland enlargement include pituitary dependent hyperadrenocorticism, benign nodules and neoplasia.

Fourth, the right limb of the pancreas is hyperechoic, which could indicate chronic pancreatitis or fibrosis from previous episodes of pancreatitis.