
PATIENT PRESENTING CLINICAL SIGNS

Woody Vreeburg

SPECIES

Canine

BREED

Terrier Mix

SEX

Neutered Male

AGE

11 years

History: History: New patient to our clinic. Current medications: Pimobendan 1.25mg/ml PO BID prev echo by Dr. Mackie (cardiologist) Theophylline 60mg/ml PO BID Prednisone 1mg PO SID Flovent HFA 110mcg inhaler BID Hydrocodone 5mg/ml 1.5ml PO PRN q 8-12 hrs Pt has a history of tracheal collapse, stent was placed but pt was also found to have bronchiolitis and has been on flovent inhaler, prednisolone, hydrocodone, and theophylline to control symptoms. Pt has a grade IV/VI holosystolic murmur. Echo by Dr. Mackie (cardiologist) in the past recommended vetmedin- past echo report not in previous records. Hx pancreatitis and hypercalcemia on blood panel Cough worsening, sounds different per owner. Soft stool- improving per o since o has switched pt to stella and chewys diet. Radiographs performed at prev clinic in March 2022: Images of the thorax reveal mild cardiac enlargement identified. A tracheal stent is present which appears to be intact and within normal limits. Pulmonary infiltrates are not present. Mineralization is identified involving both kidneys which is punctate. There multiple calculi within the urinary bladder. Serosal detail is normal Conclusion The tracheal stent is within normal limits without evidence of tracheal collapse. Pneumonia is not noted. Evidence of renal and cystic calculi. Mild cardiac enlargement without decompensation is present Eric Herrgesell, DVM, DACVR On exam pt has thin skin and haircoat, dental disease, grade 4/6 systolic murmur, abdominal distension, coughs with tracheal palpation, sebaceous adenoma like masses over body. Pt has the appearance of a dog with cushings Ultrasound of bladder revealed thickening/polyp/possible mass at cranial end of bladder, multiple bladder stones. K9 wellness panel- TP 7.5, ALP 360, BUN/Creat 28, TG 554, Neut 11868, T4 WNL 1.7, UA 1.029, pH 6.0, pro 1+, no crystals or neoplastic cells noted. Urine culture neg, ionized ca WNL

WEIGHT

11.8 Pounds

ULTRASONOGRAPHIC EXAMINATION OF THE HEART
INTERPRETED BY

 Lisa Carioto, DVM,
 DVSc, Diplomate
 ACVIM

IMAGING PERFORMED BY

 Loetitia Saint-Jacques,
 DVM

HOSPITAL NAME

Brighton Greens VH

REFERRING VET

Dr. Janeway

CANINE	MR	TR	LA/AO	LA/AO	FS	EF	EPSS
CARDIAC	VMAX	VMAX	(Boon method)	(Heart Base; Swedish)	(%)	(%)	(cm)
PARAMETERS	(m/s)	(m/s)					
NORMAL PARAMETER	4.5-5.5	<2.7	1.3	<1.6	28-40	40-100	<0.6
PATIENT	5.72	3.40	NM	Approx. 2.25	41	NM	NM
CANINE	HR	AV	PV	BODY WEIGHT	LA	LVIDd	LVIDs
CARDIAC	(BPM)	VMAX	MAX	kg	2D long axis Base view	Avg; 2D and m-mode short axis	Avg; 2D and m-mode short axis
PARAMETERS		(m/s)	(m/s)				
NORMAL PARAMETER	50-100	0.7-1.7	0.7-1.6				
PATIENT		1.8	0.54	5.36	3.08	2.38	1.40

 Adapted from June Boon, Veterinary Echocardiography, 1998
 Sisson D et al. JVIM 1991; 5: 232, and Jacobs et al. Am J Vet Res 1985; 46:1705

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DATE

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PATIENT	Echocardiographic findings
Woody Vreeburg	<i>Mitral valve</i> <ul style="list-style-type: none"> • Moderate to severe thickening and irregularity of both leaflets, consistent with myxomatous degeneration. The septal leaflet is more severely affected compared to the posterior leaflet.
SPECIES	
Canine	<ul style="list-style-type: none"> • Moderate prolapse of both leaflets.
BREED	
Terrier Mix	<ul style="list-style-type: none"> • Marked mitral regurgitation, entering pulmonary veins • Severe left atrial enlargement
SEX	
Neutered Male	<ul style="list-style-type: none"> • Mild to moderate left auricular enlargement. • Rounding of the interventricular septum, i.e. suggestive of left ventricular enlargement
AGE	
11 years	<ul style="list-style-type: none"> • Moderate to marked increase of LA: Ao ratio • LA normalized for BW (LAN = 1.74); marked left atrial enlargement • LVIDd normalized for BW (LVIDND = 1.45); within normal limits (WNL)
WEIGHT	
11.8 Pounds	<ul style="list-style-type: none"> • LVIDs normalized for BW (LVIDNs = 0.82); WNL
INTERPRETED BY	<i>Aortic valve</i> <ul style="list-style-type: none"> • No abnormalities • No aortic insufficiency
Lisa Carioto, DVM, DVSc, Diplomate ACVIM	<i>Tricuspid valve</i> <ul style="list-style-type: none"> • Moderate to severe thickening and irregularity of both leaflets, consistent with myxomatous degeneration
IMAGING PERFORMED BY	
Loetitia Saint-Jacques, D.V.T	<ul style="list-style-type: none"> • Moderate prolapse of posterior leaflet • Moderate to severe (left parasternal, 4 chamber apical view) tricuspid regurgitation with two divergent jets • Pulmonary hypertension present (3.40 m/s) • Moderate atrial enlargement (2.06 cm); Cor pulmonale • Subjectively, the right ventricle appears mildly enlarged (eccentric hypertrophy) in right parasternal, long axis, 4 chamber view, and left parasternal, 4 chamber apical view. However, there is no evidence in the 2D, right parasternal, short axis ("mushroom") view, i.e., no flattening of the interventricular septum.
HOSPITAL NAME	
Brighton Greens VH	
REFERRING VET	
Dr. Janeway	
INVOICE	<i>Pulmonic valve</i> <ul style="list-style-type: none"> • Mild thickening and irregularity of the tips of the leaflets
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PATIENT

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**IMAGING
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- Trivial pulmonary insufficiency.
- Main pulmonary artery within normal limits.
- Pulmonary artery - bifurcation, no abnormalities.
- Pulmonary artery: aortic ratio within normal limits.

Other

- No signs of pericardial or pleural effusion
- Pulmonary veins, subjectively, they appear mildly dilated.
- No evidence of pulmonary edema.
- No obvious signs of a mass.

The papillary muscles and endocardium are mildly hyperechoic.

ULTRASONOGRAPHIC EXAMINATION OF THE ABDOMEN

Urinary System

The urinary bladder is not fully distended. No abnormalities are present with the trigone or proximal urethra. However, a 1.6 mm mineralization or cystolith (a subtle “dirty” shadow is produced) is present within the prostatic urethra. A very small amount of free floating sediment, a small of which scintillates or “twinkles” is present. Multiple cystoliths of variable size are present along the ventral wall. The largest measures approximately 6 mm in length.

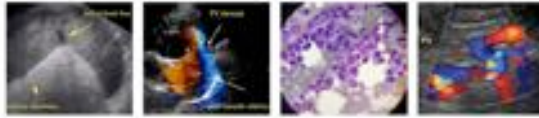
The mucosa is thickened and irregular, and echogenic “mass-like” structures are observed along the dorsal wall and apex, including the junction of the two regions. Some appear as soft tissue, frond-like projections. Examples of measurements include: dorsal wall 2.8 mm, ventral wall 0.41 mm. The lesions at the apex vary, one measures approximately 8.1 mm, while another one, at the junction of the apex and dorsal wall measures approximately 15 mm. The latter arises from the mucosa and is a frond-like projection. None of the lesions is not vascularized when evaluated with colour Doppler. The sonographic appearance of the mucosa and the echogenic “mass-like” structures are most compatible with polyploid cystitis. Neoplasia, such as a transitional cell carcinoma, is considered much less likely, but cannot be excluded. There is no evidence of an obstruction.

Prostate

The prostate is primarily homogenous with occasional hyperechoic foci, suggestive of age-related nodular hyperplasia, mineralization and/or fibrosis. It measures 0.81 cm, which is within normal limits for a neutered male. A 1.6 mm mineralization or cystolith (a subtle “dirty” shadow is produced) is present within the prostatic urethra. There is no evidence of an obstruction

Os penis and penis: No calculi

Kidneys



PATIENT

Woody Vreeburg

The **left** kidney measures 4.12 cm. The capsule is smooth. The cortex is mildly hyperechoic and thicker than usual, as well as a mild to moderate loss of the normal definition of the cortico-medullary junction. Mineralizations and nephroliths of the arcuate arteries, diverticulae and pelvis are present, without evidence of pyelectasia. The surrounding mesentery is not hyperechoic.

SPECIES

Canine

The **right** kidney measures 4.29 cm. The capsule is smooth. The cortex is mildly hyperechoic. It is within normal limits in thickness. The normal definition of the cortico-medullary junction is well preserved. Mineralizations and nephroliths of the arcuate arteries, diverticulae and pelvis are present, without evidence of pyelectasia. A small, round, anechoic structure (0.19 cm), with a smooth, thin wall is visualized within the cortex. It is most consistent with a benign cyst. The surrounding mesentery is not hyperechoic.

BREED

Terrier Mix

SEX

Neutered Male

Aortic bifurcation/trifurcation

No abnormalities observed.

AGE

11 years

Adrenal Glands

The **left** adrenal gland measures 0.36 cm at the cranial pole, 0.33 cm at the caudal pole. No abnormalities are noted with the gland's overall architecture, echogenicity or echotexture. The phrenico-abdominal vein and surrounding vasculature and mesentery are unremarkable.

WEIGHT

11.8 Pounds

The **right** adrenal gland measures 0.39 cm at the cranial pole, 0.41 cm at the caudal pole. No abnormalities are noted with the gland's overall architecture, echogenicity or echotexture. The phrenico-abdominal vein and surrounding vasculature and mesentery are unremarkable.

INTERPRETED BY

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Spleen

The spleen is within normal limits in size, architecture, echotexture, and echogenicity. The capsule is smooth. A mixed anechoic to hypoechoic nodule measuring 0.40 cm in diameter x 0.38 cm in length mid-body. A second, mixed anechoic to hypoechoic nodule (0.32 cm in diameter x 0.38 cm in length) is observed toward the head. Perivascular cuffing is observed, consistent with myelolipomas which are considered clinically insignificant. No abnormalities are observed with its vasculature, i.e. congestion and thrombi are not identified.

IMAGING PERFORMED BY

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Liver

Mild hepatomegaly is suspected, however, this is better characterized at the time of the ultrasound or with radiographs. The liver's borders are smooth, but mildly rounded. It is diffusely hyperechoic, but is homogeneous in echotexture. An anechoic to hypoechoic nodule measuring 0.32 cm in diameter is observed. No abnormalities are observed with the hepatic vessels visualized.

REFERRING VET

Dr. Janeway

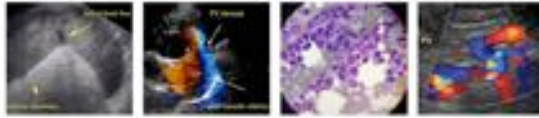
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The **gallbladder** (GB) is mildly distended with a moderate to large amount of free floating, gravity-dependent and inspissated echogenic material (sludge). Some of the sludge is more echogenic (very hyperechoic, without shadowing), and is also adhered to the intramural wall. The GB wall is within normal limits in thickness and echogenicity. The portions of the cystic and/or common bile ducts observed are not dilated or tortuous. The walls of the cystic duct and a few of the intrahepatic bile ducts

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PATIENT

Woody Vreeburg

are markedly hyperechoic, which are suggestive of mineralization. Mineralizations, and choleliths (4 mm) are also observed within intrahepatic bile ducts. There are no obvious signs of an obstruction.

SPECIES

Canine

Gastrointestinal

The gastric wall is within normal limits in thickness and the wall layers are well defined. No obvious abnormalities are observed with its peristalsis.

BREED

Terrier Mix

The small intestinal wall thickness, including the duodenum, is within normal limits and the definition of the wall layers is preserved. Abnormally dilated loops of bowel are not observed.

SEX

Neutered Male

Jejunum: A few loops of jejunum show increased prominence of the mucosa and muscularis, however, this is subtle and also subjective. The clinical significance is unknown.

The colonic wall is not thickened and mural detail is considered normal.

AGE

11 years

There are no obvious signs of a mass, foreign body, infiltrative disease or an obstruction in the gastrointestinal tract.

WEIGHT

11.8 Pounds

Pancreas

The pancreas has a mildly coarse echotexture, and is diffusely hyperechoic. The coarse echotexture is considered secondary to age related changes. The coarse echotexture in conjunction with the hyperechogenicity are suggestive of previous episodes of pancreatitis, i.e., fibrosis. There are no signs of active pancreatitis or neoplasia.

INTERPRETED BY

Lisa Carioto, DVM,
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Other

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Loetitia Saint-Jacques,
D.V.T

Lymph nodes

No abnormalities are observed

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Abdominal effusion is not visualized.

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Dr. Janeway

ULTRASONOGRAPHIC FINDINGS

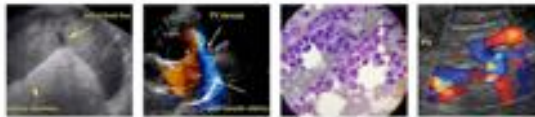
- Moderate to severe myxomatous degeneration of the mitral and tricuspid valves, ACVIM stage B2, with bilateral atrial enlargement. Right atrial enlargement is consistent with Cor pulmonale. Subjectively, the right ventricle also appears mildly enlarged.
- Pulmonary hypertension is present, which may be causing the increased frequency and severity of Woody's cough that sounds differently. Sildenafil may be required if there is no improvement in Woody's cough after having adjusted his medications.

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IMAGING PERFORMED BY

Loetitia Saint-Jacques,
DVT

HOSPITAL NAME

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REFERRING VET

Dr. Janeway

- Adjustments to Woody's medications are recommended, however, please discuss with Dr. Mackie to ensure he is in agreement.
- **Urinary bladder:** Cystolithiasis, with high index of suspicion of a polyploid cystitis. Neoplasia, such as a transitional cell carcinoma (TCC), is considered much less likely, but cannot be excluded.
- **Prostate and prostatic urethra:** Age-related changes, as well as presence of a cystolith within the prostatic urethra. The latter is not causing obstructive disease at this time.
- **Kidneys:** Renal architecture is well preserved for a dog of Woody's age. Bilateral mineralizations and nephrolithiasis without signs of obstructive disease. Reasons for their development are often multifactorial (age, genetic and/or diet related, +/- hypercalcemia). They may be acting as a chronic nidus for bacterial infections. A benign cyst is noted in the right kidney. The hyperechoic cortices may be age-related, however, glomerulonephritis (GN) and pyelonephritis cannot be excluded.
- **Adrenal glands:** Although not excessively thin and flattened, they are quite small and consistent with iatrogenic hyperadrenocorticism given the physical exam findings described in the history.
- **Liver:** A vacuolar hepatopathy is suspected which is attributed to the administration of steroids. Cholestasis cannot be excluded. Hepatitis, cholangitis/cholangiohepatitis are considered much less likely. Nodular hyperplasia or regeneration is the likely cause of the single nodule observed. It does not have signs of a "target lesion", i.e. there are no signs suggestive of neoplasia.
- **Gallbladder (GB):** The appearance of Woody's gall bladder is not consistent with a "classical" mucocoele. He also has mineralizations and multiple choledocholiths, as well as hyperechogenicity of walls of multiple bile ducts. There is no evidence of obstructive disease. Although the presence of gall bladder sludge, choleliths and choledocholiths are not necessarily clinically significant, some dogs may show clinical signs of gastroesophageal reflux disease (GERD) as a result, therefore, obtaining a history regarding signs of GERD from the client is suggested.
- **Pancreas:** Age-related changes and signs possibly due to previous episodes of pancreatitis. There are no signs of active pancreatitis or neoplasia.
- **Gastrointestinal:** The finding of mildly prominent mucosa and muscularis layers of a few loops of jejunum is subjective and may be clinically insignificant. Further investigation is not considered necessary unless there is a chronic history of vomiting and diarrhea.

INTERPRETATION OF THE FINDINGS & FURTHER RECOMMENDATIONS

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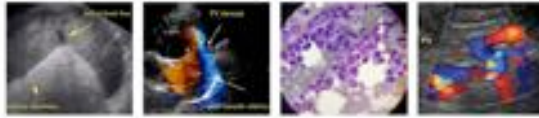
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Other suggestions/recommendations include:

- Evaluation of blood pressure



PATIENT

Woody Vreeburg

- pimobendan (Vetmedin); avoid compounded products if possible. Continue at 1.25 mg PO q12h. Sometimes trying one month of the Vetmedin to compare general status to the compounded product, or ensure the compounded product is less than one month old and has not been left out in the heat or sun.

SPECIES

Canine

- theophylline 60 mg/ml PO BID. No change. If possible, have client monitor heart rate at home to ensure not tachycardic. (Palm of hands placed over thorax or inexpensive stethoscope).

BREED

Terrier Mix

- prednisone 1 mg PO SID. If possible, decrease dose by 25% every 2 weeks to the minimum dose that is effective in controlling Woody's clinical signs. Prednisolone is available as a liquid for humans (PediaPred), therefore easier to wean. If still showing signs of iatrogenic hyperadrenocorticism, *budesonide* may be considered.

SEX

Neutered Male

- Flovent HFA 110mcg inhaler BID. Change in concentration to 250 ug/actuation, or continue 110 ug/actuation three times a day for 2 weeks and then decrease dose to twice a day.
- hydrocodone 5 mg/ml 1.5 ml PO. Administer two to three times a day for 2 weeks to "break the cycle" of inflammation at level of trachea and then decrease to as needed.

AGE

11 years

- If no improvement, secondary bacterial infection with *Mycoplasma* highly likely (steroids), altered microenvironment (stent and steroids), consider azithromycin or doxycycline, depending on GI sensitivity.

WEIGHT

11.8 Pounds

- If still no improvement, a low dose of sildenafil (0.5 – 0.8 mg/kg every 8 hours) should be started and gradually uptitrated every few days over a few weeks to decrease risk of hypotension.

INTERPRETED BY

Lisa Carioto, DVM,
DVSc, Diplomate
ACVIM

- If general anesthesia is required to assess the stent, the internist may want to (very carefully) perform a bronchoalveolar lavage and culture. A blind trans endotracheal tube wash is not recommended due to the fragility of the stent. Note, if possible, the most recent thoracic radiographs may be sent to the original individual who performed the interventional procedure to compare radiographs to ensure the stent has not migrated.

New medication suggested

IMAGING PERFORMED BY

Loetitia Saint-Jacques,
D.V.T

- spironolactone (0.5-1 mg/kg) has anti-fibrotic effects and is may help slow the progression of Woody's cardiac disease.

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- furosemide – Suggestion to have a few days' worth of medication at home, in case of emergency. No obvious signs of decompensation, however, Woody has multiple co-morbidities and it may be prudent to be (overly) prepared.

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Dr. Janeway

- Monitoring of the resting (sleeping) respiratory rate (RRR) is highly recommended once a day. The RRR should NOT EXCEED 30 breaths per minute (bpm). If the respiratory rate is greater than 30 bpm, or if there is a gradual increase (over a day or two) toward 30 bpm, the patient should be evaluated immediately for congestive heart failure and the appropriate treatment initiated.

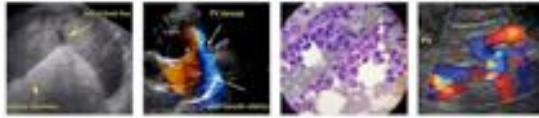
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- Other clinical signs clients should monitor for include coughing (particularly at night), fatigue, lethargy, decreased exercise tolerance (i.e., not being able to walk for as long before becoming tired, or "running out of breath" while playing, or going up and down stairs, as well as syncope

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PATIENT

Woody Vreeburg

(collapsing or fainting spells). Restlessness, or agitation during the night, or being unable to find a comfortable position to sleep are also very common clinical signs.

SPECIES

Canine

- Moderate salt restriction is suggested (between 0.4-0.5 grams/1000 kcal of food). Monitor salt content in treats.

BREED

Terrier Mix

- Blood work PCV/TS, renal profile, SDMA and arterial blood pressure, are recommended 10-14 days after initiation of spironolactone.

SEX

Neutered Male

- Blood work, CBC, serum biochemical profile, including a SDMA, and arterial blood pressure, are recommended at least twice a year to monitor renal parameters. If cost prohibitive, a PCV/TS may be performed instead of a full CBC.

- Re-evaluation of an echocardiogram is suggested in 6 months, or sooner depending on clinical signs.

AGE

11 years

The following is suggested regarding the abdominal findings:

Evaluation of diet, amount of sodium (see echo report) and calcium

Many of the Stella and Chewy diets are grain free; not ideal

WEIGHT

11.8 Pounds

Additional source of soluble fibre, psyllium, may help soft stools.

Evaluation of ionized calcium (well within normal limits? Phosphorus? +/- PTH suggested, +/- vitamin D). Further testing unnecessary if iCa and phosphorus well WNL.

INTERPRETED BY

Lisa Carioto, DVM,
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ACVIM

Exclude possible pyelonephritis, particularly due to chronic administration of steroids:

Urine culture and sensitivity may be a false negative, a sterile polypliod cystitis may be present, vs. a poorly vascularized TCC (still considered less likely).

- Traumatic catheterization and cytology (FNA not recommended due to potential risk of seeding abdomen if neoplastic).
- +/- BRAF test (false negatives possible)

IMAGING PERFORMED BY

Loetitia Saint-Jacques,
D.V.T

Urine protein: creatinine ratio will likely be falsely elevated due to systemic inflammation, but best to have baseline, if severely elevated, most likely true GN or amyloidosis.

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Tests to rule out GN

- Arterial blood pressure
- SNAP 4Dx (or equivalent test)
- *Leptospira* PCR (urine and serum, if no beta lactam or penicillin antibiotics in the last 2 months, or serology)
- +/- testing for *Bartonella* spp
- +/- PCR tests for other vector borne diseases depending on risk of exposure

REFERRING VET

Dr. Janeway

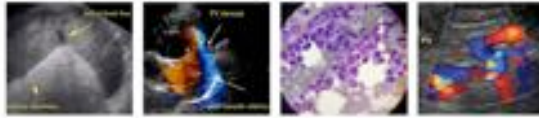
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Woody is not the ideal candidate for general anesthesia at the moment for a cystotomy or a PCCL (which tends to take longer than a cystotomy). The risk of obstruction appears to be low given the size of the stones within the bladder, however, there is a potential risk due to the prostatic

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PATIENT

Woody Vreeburg

stone/mineralization. Client education regarding signs of urinary obstruction should be discussed, as well as risks of general anesthesia for procedure to remove cystoliths.

See echo report regarding adjustment of medications.

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Neutered Male

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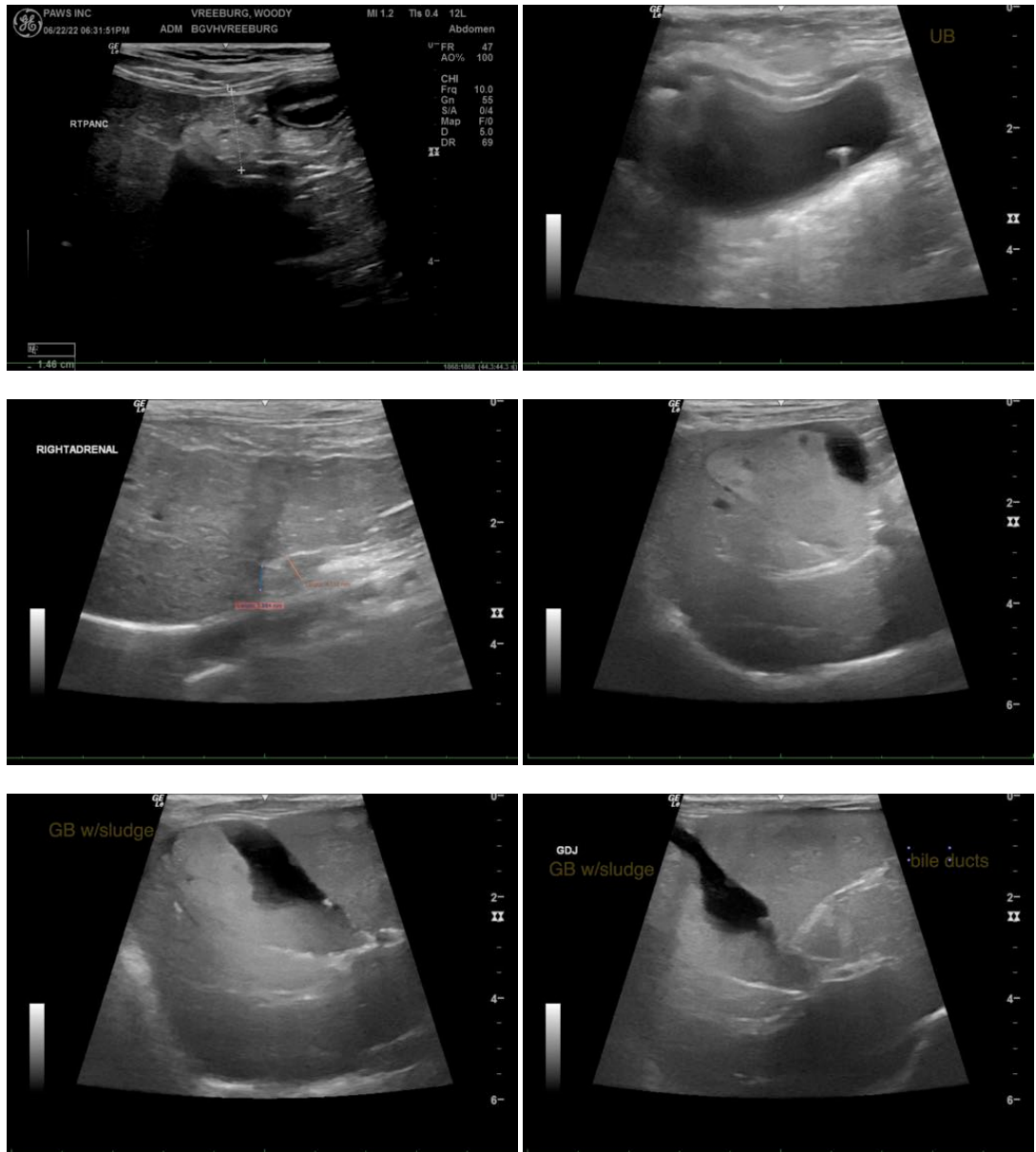
Dr. Janeway

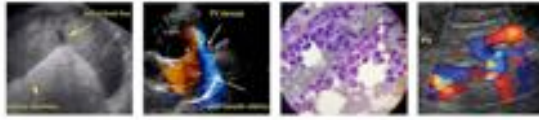
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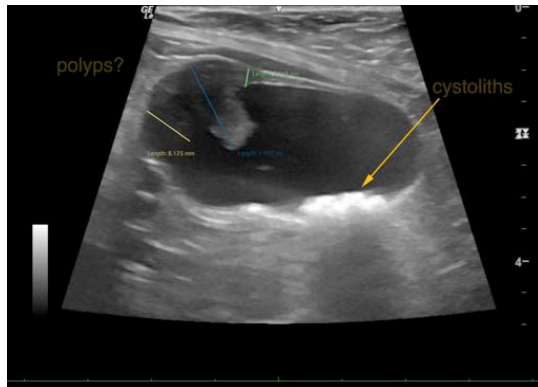
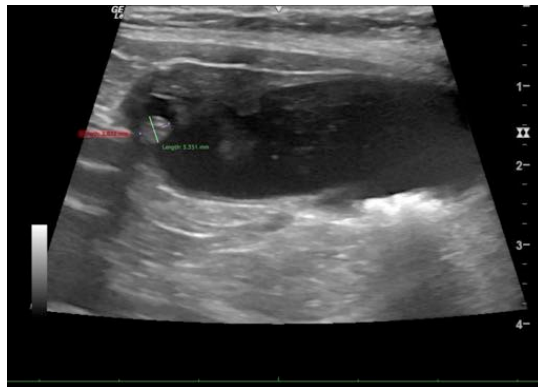
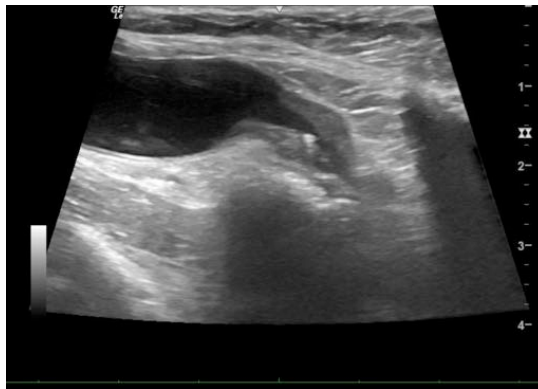
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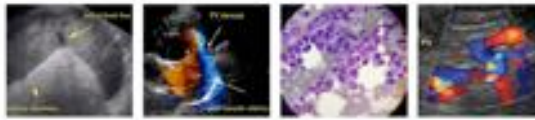
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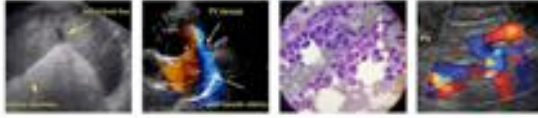


The information and recommendations provided are based on the images presented by the referring veterinarian/sonographer. No evaluation can be communicated regarding pathology that was not visible in the image/video clips provided.

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.

Lisa Carioto, DVM, DVSc, Diplomate ACVIM

Lisa.Carioto@sonopath.com



PATIENT

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SPECIES

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**IMAGING
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