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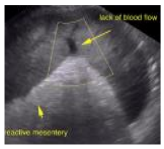
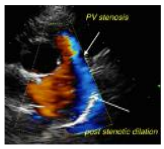
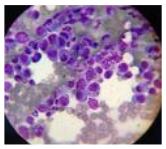
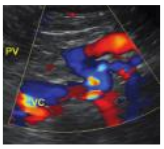

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1-800-838-4268 info@sonopath.com

**PATIENT**

Mitch Getz

**SPECIES**

Canine

**BREED**

Maltese

**SEX**

Neutered Male

**AGE**

13 Years 4 Months

**WEIGHT**

11.2 Pounds

**INTERPRETED BY**

Eric Lindquist, DMV DABVP, Cert. IVUSS

**IMAGING PERFORMED BY**

Dr. Jessie Evoniuk

**HOSPITAL NAME**

State Avenue VC

**REFERRING VET**

Dr. Jessie Evoniuk

**INVOICE**

21598

**DATE**

3/13/23

## PRESENTING CLINICAL SIGNS

History: a little bit better Meds: 2 furosemide, crushes pill and it goes better, PUPD - double dose seems better, was coughing Fri AM: 26 RR, PM:76 RR at home, was labored breathing Fri pm Not eating well, puréed food and syringe fed, got about 12 mls total last night, this am had about 7ml No vomiting, hasn't coughed since Sat night 1/29/23 visit assessment: DDX: Kennel cough due to recent grooming, Tracheitis 3/12/23 visit assessment: Left sided CHF, abdomen: ddx-small intestinal dysbiosis/pancreitis due to excessive treats. Elevated ALP- Vaculor hepatopathy, cushings- Open

## ULTRASONOGRAPHIC EXAMINATION OF THE HEART & ABDOMEN

| **CANINE CARDIAC PARAMETERS** | **MR VMAX** (m/s) | **TR VMAX** (m/s) | **LA/AO** (Boon method) | **LA/AO** (Heart Base; Swe) | **FS** (%) | **EF** (%) | **EPSS** (cm) |
|---|---|---|---|---|---|---|---|
| **NORMAL PARAMETER** | 4.5-5.5 | <2.7 | 1.3 | <1.3 | 28-40 | 40-100 | <0.6 |
| **PATIENT** | | | 0.8 | 1.3 | 40 | | 0.1 |
| **CANINE CARDIAC PARAMETERS** | **HR** (BPM) | **AV VMAX** (m/s) | **PV MAX** (m/s) | **BODY WEIGHT** (kg) | **LA** 2D short axis Base view (cm) | **LVIDd** Avg; 2D and m-mode short axis (cm) | **LVIDs** Avg; 2D and m-mode short axis (cm) |
| **NORMAL PARAMETER** | 50-100 | 0.7-1.7 | 0.7-1.6 | | | | |
| **PATIENT** | | | | -- | | 1.3 | |

### *Cardiac Presentation*

The cardiac presentation in this patient presented severe tricuspid insufficiency and right atrial enlargement. The left heart was volume contracted. Right atrial enlargement in 4 chamber long axis measured 3.5 cm. The right atrium and right ventricle were dilated in this patient with dystrophic/dysplastic tricuspid valve and tricuspid insufficiency. Tricuspid insufficiencies were not available. The pulmonary artery was uniformly dilated as well.

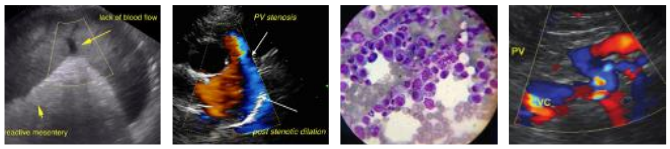
### *Urinary System*

The **urinary bladder** presented minor concretions yet no obstructive disease. The pelvic urethra was imaged 2.0 cm beyond the cystourethral junction. Th residual prostate measured 7.0 mm.

The **kidneys** revealed normal size and structure, corticomedullary definition and ratio for this age. The cortices presented largely uniform texture with normal echogenic relationship to liver and spleen. Medullary structure differed distinctly from the cortex and no evidence of pelvic dilation was present. The capsules were acceptably uniform without significant irregularities. The kidneys measured 4.0 cm each.

### *Adrenal Glands*

The **left adrenal gland** was mildly enlarged, measuring 0.9 cm in width.

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The **right adrenal gland** was enlarged and irregular, measuring 1.8 cm x 1.7 cm. Pheochromocytoma vs adenocarcinoma and adenoma are all possible.

### *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 were noted.

### *Liver*

The **liver** was mildly enlarged (uniform). Passive congestion pattern was noted. Dilated hepatic veins and vena cava were noted. The liver parenchyma was unremarkable. A benign anechoic cyst was noted, measuring 3.0 cm in the left liver. The gallbladder and common bile duct were unremarkable. A comet tail/shower curtain lung pattern was noted, indicative of alveolar disease.

### *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. 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.

### *Pancreas*

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.

### *Free Abdomen*

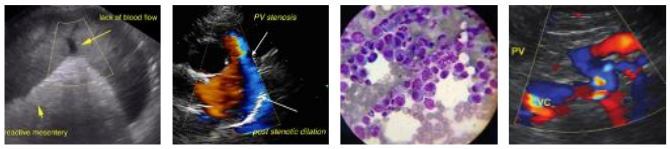
Slight amounts of **ascites** were noted.

### ULTRASONOGRAPHIC FINDINGS

- Severe tricuspid insufficiency and right atrial enlargement
- Passive congestion liver pattern with benign cyst and benign hepatopathy
- Comet tail/shower curtain lung pattern
- Ascites
- Enhanced mesentery
- Enlarged right adrenal gland- Pheochromocytoma vs adenocarcinoma and adenoma are all possible.
- Mildly enlarged left adrenal gland
- Minor bladder concretions
- Minor degenerative renal changes

### INTERPRETATION OF THE FINDINGS & FURTHER RECOMMENDATIONS

The cardiac presentation is most consistent with pulmonary hypertension and right sided heart failure given the hepatic vein dilation. Sildenafil is indicated 1 mg/kg BID, gradually moving to Spironolactone 1-2 mg/kg BID. Ace-Inhibitor therapy could be considered, however, primary causes,



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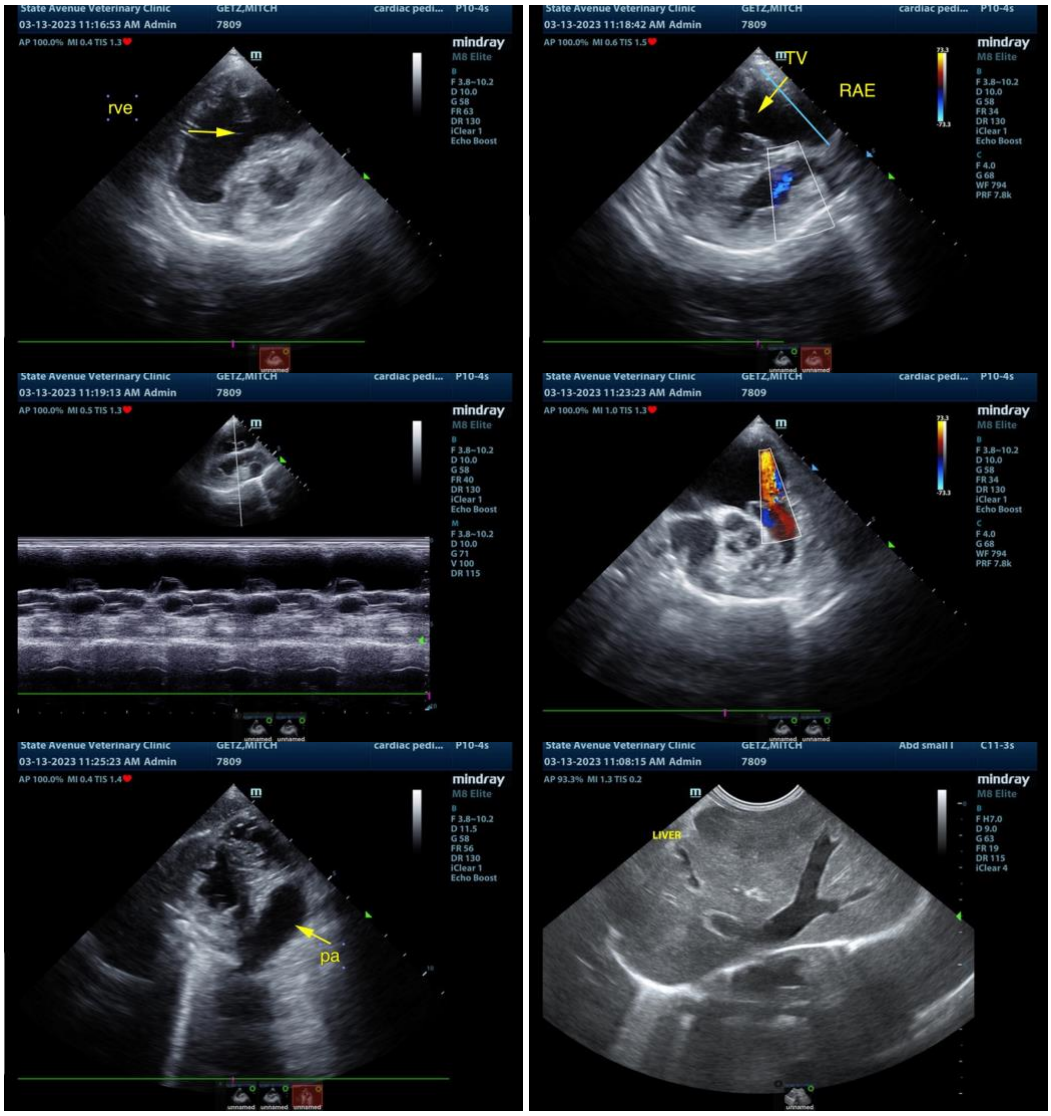
such as thromboembolic disease or acute respiratory distress syndrome/SARDS should be considered. The right adrenal pathology may be an underlying instigating cause. Prognosis is very guarded.

Come join us for the SonoPath Summit on Cardiology July 10-12, 2023
https://sonopath.com/sonopath-2023-summit/



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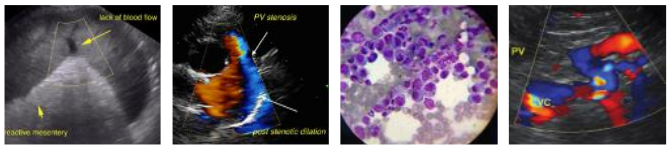

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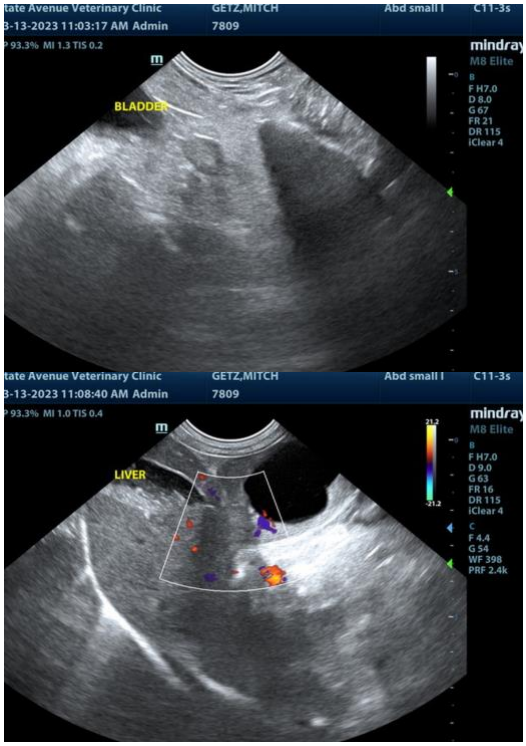


**The information and recommendations provided are based on the images presented by the referring veterinarian. No evaluation can be communicated regarding pathology that was not visible in the image/video clips provided.**

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.

**Eric Lindquist**, DMV, DABVP, Cert. IVUSS, CEO of SonoPath.com
info@SonoPath.com

## Right Heart Disease-General Considerations

*http://www.sonopath.com/RightHeartDisease*

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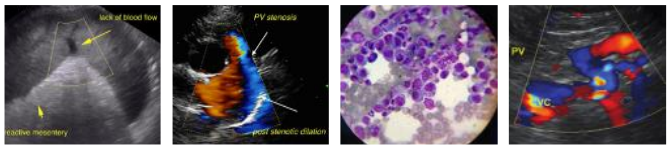


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**Description:** Right heart disease is often an incidental finding, which can be either cardiogenic or secondary to respiratory or systemic disease. The coughing patient with right heart disease may present with primary respiratory disease (i.e., bronchial collapse, collapsing trachea, pneumonitis) and suffer from secondary pulmonary hypertension (PHT). Concurrent mitral valve disease and chronic left-sided congestive heart failure (CHF) might also lead to PHT. The dyspeic patient with right heart enlargement might have pulmonary hypertension due to airway disease, chronic CHF, parenchymal lung disease (e.g. pulmonic fibrosis), or a cardiac shunt with secondary PHT and shunt reversal.

Primary cardiac causes of right heart enlargement include: tricuspid dysplasia/degeneration; pulmonic stenosis; pulmonic insufficiency; atrial or septal defects; patent ductus arteriosus; right auricular masses; and pericardial peritoneal diaphragmatic hernias. The second most common cause of right-sided enlargement is secondary PHT, which results in high-velocity tricuspid insufficiency (TR vel.>2.8 m/sec) and pulmonic insufficiency due to diseases that cause increased pulmonary vascular resistance or increased pulmonary wedge pressures. The most common cause of secondary PHT is left-sided heart failure (LHF), which presents radiographically as a more globoid-shaped heart with marked left atrial and ventricular enlargement. There are also signs of left-sided CHF as opposed to a simple prominent cranial waist or reverse D radiographic presentation.

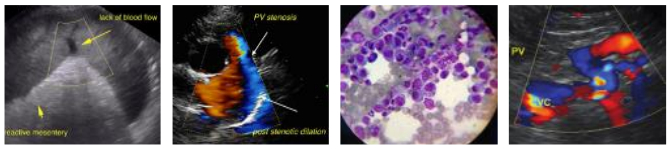
Secondary, non-cardiac causes of PHT include: acute or chronic respiratory disease; pulmonary thromboembolic disease; thoracic neoplasia; excessive thoracic fat deposition (e.g. Pickwickian syndrome, which leads to chronic hypoxia); brachycephalic syndrome; high altitude disease; heartworm disease; and primary vascular disease.

**Clinical Signs:** The most common presenting symptoms of right heart disease are collapse, syncope, intermittent or constant acute respiratory distress (e.g. thromboembolic disease), and exercise intolerance.

**Diagnostics:** Physical examination may reveal a right-sided apical heart murmur and/or a cranial left heart murmur, a split S2, jugular distension, ascites, and signs consistent with respiratory disease (i.e., cough, wheeze, tracheal collapse, tachypnea). Radiographic findings may reveal an enlarged right atrium, right ventricle, and/or primary/secondary branches of the pulmonary artery. In cases of PHT, an enlarged or engorged pulmonary artery is often present. Tortuous arteries or those that suddenly terminate can indicate the presence of thromboembolic disease or heartworms. An interstitial pattern might indicate the presence of pulmonary parasitism or primary interstitial lung disease. Pulmonic stenosis is suspected if the pulmonic segment is enlarged. ECG findings include tall P and S waves with a right axis shift.

**Treatment:** Please refer to the chapter “Pulmonary Hypertension” for therapeutic recommendations.

**References:**



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Oyama MA, Rush JE, Rozanski EA, et al. Assessment of serum N-terminal pro-B-type natriuretic peptide concentration for differentiation of congestive heart failure from primary respiratory tract disease as the cause of respiratory signs in dogs. *J Am Vet Med Assoc* 2009;235:1319-25.

Rozanski E. Interstitial lung disease in small animals. Proceedings from American College of Veterinary Internal Medicine Forum, Denver, CO, June 15-18, 2011.

Zoia A, Augusto M, Drigo M, Caldin M. Evaluation of hemostatic and fibrinolytic markers in dogs with ascites attributable to right-sided congestive heart failure. *J Am Vet Med Assoc* 2012;241:1336-43.