

**PATIENT PRESENTING CLINICAL SIGNS**

Rocky Whitney

Clinical exam findings: Progressive lethargy, weakness, and exercise intolerance since last night. Slightly labored breathing today. Not eating. No vomiting or diarrhea. Exam findings: Muffled heart sounds bilaterally, no murmur/arrhythmia ausculted, weak femoral pulses, mucous membranes pale and tacky, CRT 3-4 seconds, abdomen soft and non-painful, HR 160, RR 50, Temp 100.5.

**SPECIES**

Canine

**BREED**

Golden Retriever

Abnormal PE/Chem/CBC/UA Results: ABNORMAL Laboratory Findings Laboratory findings: BUN 46, CRE 3.9, GLU 155, Na+ 132, K+ 5.9, TP 4.7, Glob 1.7, WBC 22.27, NEU 19.55, PLT 83 (slightly clumped but appear decreased on blood smear). Blood pressure and urinalysis pending. Heart Rate and Respiratory Rates HR 160, RR 50 Blood Pressure Measurements pending Current Medications None Radiographic Findings Radiographic findings: Cardiomegaly (VHS 13). Pulmonary parenchyma WNL. Possible widening and increased opacity of the mediastinum.

**SEX**

MN

**ULTRASONOGRAPHIC EXAMINATION OF THE HEART**

**AGE**

8yr

**WEIGHT**

67.8lb

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			1.1	0.9			
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		Up to 1.1			4.04		

**INTERPRETED BY**

Eric Lindquist, DMV DABVP, Cert. IVUSS

**IMAGING PERFORMED BY**

Sara Hansen

**Cardiac Presentation**

**HOSPITAL NAME**

West Eugene AH

The cardiac presentation revealed severe cardiac tamponade. A collapsed right auricle was present. Myocardial remodeling was noted in the left ventricle which may be consistent with an infiltrative event within the myocardium. The left atrium/ventricle were volume contracted as were the right atrium/ventricle. An intramural mass was noted within the right auricle measuring ~ 3.0 cm.

**REFERRING VET**

Powers

The hepatic veins were dilated with secondary ascites present.

**INVOICE**

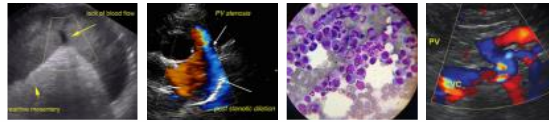
14288ag

**ULTRASONOGRAPHIC FINDINGS**

- Right auricular mass with pericardial effusion and tamponade.
- Potential myocardial infiltrative disease.
- Hepatic vein dilation with secondary ascites.

**DATE**

07/06/2023



**PATIENT**

Rocky Whitney

**SPECIES**

Canine

**BREED**

Golden Retriever

**SEX**

MN

**AGE**

8yr

**WEIGHT**

67.8lb

**INTERPRETED BY**

Eric Lindquist, DMV  
DABVP, Cert. IVUSS

**IMAGING PERFORMED BY**

Sara Hansen

**HOSPITAL NAME**

West Eugene AH

**REFERRING VET**

Powers

**INVOICE**

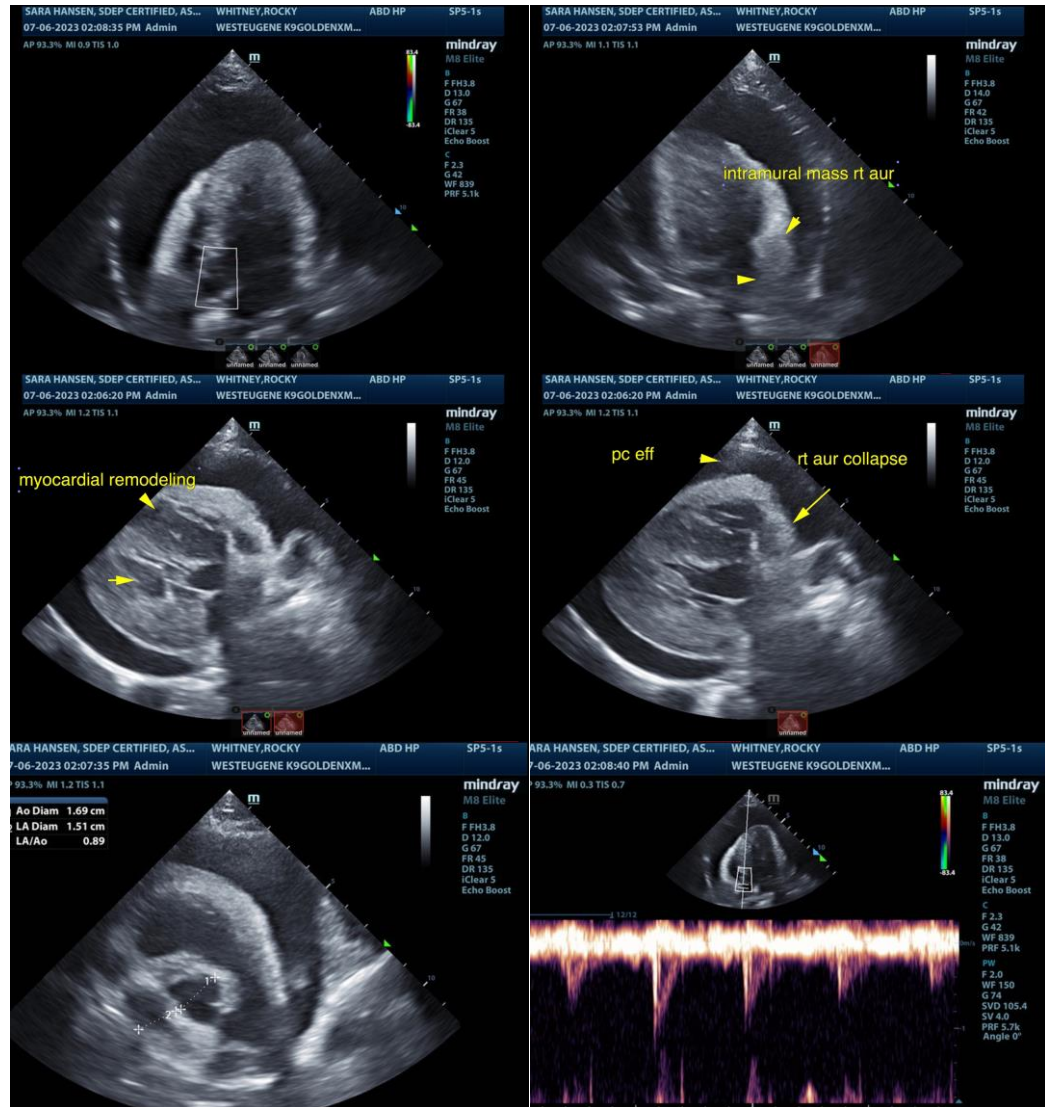
14288ag

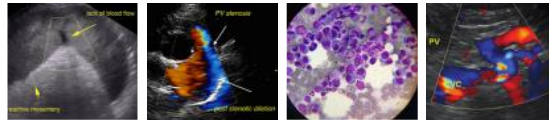
**DATE**

07/06/2023

**INTERPRETATION OF THE FINDINGS & FURTHER RECOMMENDATIONS**

Palliative pericardiocentesis recommended with oncology referral. Abdominal ultrasound is recommended.





## PATIENT

Rocky Whitney

## SPECIES

Canine

## BREED

Golden Retriever

## SEX

MN

## AGE

8yr

## WEIGHT

67.8lb

## INTERPRETED BY

Eric Lindquist, DMV  
DABVP, Cert. IVUSS

## IMAGING PERFORMED BY

Sara Hansen

## HOSPITAL NAME

West Eugene AH

## REFERRING VET

Powers

## INVOICE

14288ag

## DATE

07/06/2023



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.

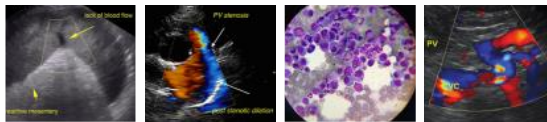
Eric Lindquist, DMV, DABVP, Cert. IVUSS, CEO of SonoPath.com  
Eric.Lindquist@SonoPath.com

## Pericardial Effusion and Cardiac Neoplasia

<http://www.sonopath.com/CardiacNeoplasiaEffusion>

**Description:** The pericardium is a fibrous sac that encloses the heart and the great vessels—aorta, pulmonary artery, proximal pulmonary veins, and vena cava—located at the heart's base. It is attached caudally to the diaphragm and under normal circumstances contains 1-15 mL of fluid. The latter is comprised of phospholipids that lubricate the heart and allow it to expand and contract without generating friction. The pericardium also fixes the heart, prevents excess motion, and links the diastolic distensibility of the ventricles, thus limiting the degree to which either the left or the right ventricle will distend during diastole. When there are acute changes in venous return (i.e., during exercise), the pericardium plays a critical role in limiting ventricular filling. In cases of chronic cardiac enlargement, the pericardium also becomes distended, and its ability to limit ventricular filling, especially when the heart is at rest, becomes compromised. Pericardial tamponade occurs when there is a rapid accumulation of fluid and the pressure inside the pericardium increases significantly. With tamponade, ventricular filling is restricted and cardiac output is decreased. The right atrium and ventricle are the most vulnerable to this condition as these compartments have thinner walls and a lower pressure.

**Etiology:** Causes of pericardial effusion include:



**PATIENT**

Rocky Whitney

**SPECIES**

Canine

**BREED**

Golden Retriever

**SEX**

MN

**AGE**

8yr

**WEIGHT**

67.8lb

**INTERPRETED BY**

Eric Lindquist, DMV  
DABVP, Cert. IVUSS

**IMAGING PERFORMED BY**

Sara Hansen

**HOSPITAL NAME**

West Eugene AH

**REFERRING VET**

Powers

**INVOICE**

14288ag

**DATE**

07/06/2023

- Neoplasia
  - Right atrial (RA) hemangiosarcoma
  - Heart base (aortic body) tumors
  - Mesothelioma
  - Rhabdomyosarcoma
  - Ectopic thyroid carcinoma
  - Metastatic neoplasia
- Idiopathic
- Congestive heart failure
- Peritoneal-pericardial diaphragmatic hernia
- Pericardial cyst
- Hypoalbuminemia
- Infectious pericarditis (bacterial, *Coccidioides immitus*)
- Feline infectious peritonitis
- Left atrial tear secondary to valvular disease

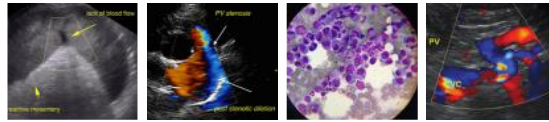
Coagulopathy

The majority of neoplastic masses consist of hemangiosarcoma and heart-based tumors (chemodectoma or ectopic thyroid adenocarcinoma). Idiopathic pericardial effusion is a diagnosis of exclusion; the effusion is typically hemorrhagic. Approximately 50% of dogs will be cured with a single pericardiocentesis, while some dogs will require multiple pericardiocentesis as well as surgery. A peritoneal-pericardial diaphragmatic hernia is a congenital hernia seen in dogs and cats in which the abdominal contents (i.e., liver, small intestine, spleen, stomach) herniate into the pericardial sac. Constrictive pericarditis is an uncommon condition in which a non-distensible, thickened, fibrotic pericardium develops over time.

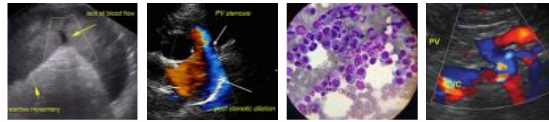
**Clinical Signs:** One will observe the following clinical signs, which often present in combination: ascites, lethargy, exercise intolerance, pale mucous membranes, weak pulses, *pulsus paradoxus*, and respiratory distress.

**Diagnostics:** Survey radiographs will reveal hepatomegaly, cardiomegaly (generalized or sectorial globoid), and small pulmonary vessels. Pulmonary edema is typically not found, although one may discover concurrent pulmonary metastatic disease. An ECG will show electrical alternans or small complexes, but often the changes are very subtle and difficult to detect.

Echocardiography is usually considered the gold standard for diagnosing pericardial effusion. Findings include:



<b>PATIENT</b>	Anechoic space between the heart and the pericardium.
Rocky Whitney	
<b>SPECIES</b>	<ul style="list-style-type: none"> <li>Abnormal side-to-side cardiac motion.</li> <li>Decreased chamber size (right ventricle [RV] and left ventricle [LV]).</li> <li>Presence of a pericardial or cardiac mass.</li> <li>Tamponade with early diastolic RA and RV collapse.</li> </ul>
Canine	
<b>BREED</b>	Cytology is helpful in the diagnosis of lymphoma, septic pericarditis, and idiopathic effusion, but not in cases of neoplasia.
Golden Retriever	
<b>SEX</b>	According to a study that found troponin I levels to be higher in dogs with neoplastic pericardial effusion, the cardiac troponin I assay can be helpful in the diagnosis hemangiosarcoma.
MN	
<b>AGE</b>	<b><u>Prognosis:</u></b>
8yr	Cardiac hemangiosarcoma: < 8 months with surgical debulking and chemotherapy.
<b>WEIGHT</b>	<ul style="list-style-type: none"> <li>Chemodectoma (aortic derived): MST 730 days post pericardectomy.</li> <li>Idiopathic: 50% complete resolution post cardiocentesis; curative with pericardectomy, which can be done via thoracotomy, or thoracoscopy, or using a balloon to tear the pericardium.</li> <li>Mesothelioma: Poor.</li> <li>Restrictive pericarditis: Poor, especially when the pericardium has not been surgical stripped.</li> </ul>
67.8lb	
<b>INTERPRETED BY</b>	
Eric Lindquist, DMV DABVP, Cert. IVUSS	
<b>IMAGING PERFORMED BY</b>	<b><u>References:</u></b>
Sara Hansen	— Cagle LA, Epstein SE, Owens SD, et al. Diagnostic yield of cytology analysis of pericardial effusion in dogs. <i>J Vet Int Med</i> 2014;28:66-71.
<b>HOSPITAL NAME</b>	Feigenbaum H. Pericardial disease. In: Feigenbaum H, ed. <i>Echocardiography</i> , 5 <sup>th</sup> ed. Philadelphia, PA: Lippincott, Williams & Wilkins; 1994:556-588.
West Eugene AH	
<b>REFERRING VET</b>	Jackson J, Richter KP, Launer DP. Thorascopic partial pericardectomy in 13 dogs. <i>J Vet Int Med</i> 1999;13:529-33.
Powers	
<b>INVOICE</b>	Johnson MS, Martin M, Binns S. A retrospective study of clinical findings, treatment and outcome in 143 dogs with pericardial effusion. <i>J Small Anim Prac</i> 2004;45:546-52.
14288ag	
<b>DATE</b>	Kienle RD, Thomas WP. Echocardiography. In: Nyland TG and Mattoon JS, eds. <i>Small Animal Diagnostic Ultrasound</i> , 2 <sup>nd</sup> ed. Philadelphia, PA: WB Saunders; 2000:354-423.
07/06/2023	



**PATIENT**

Rocky Whitney

Miller MW, Sisson DD. Pericardial disorders. In: Ettinger SJ and Feldman EC, eds. *Textbook of Veterinary Internal Medicine, 5<sup>th</sup> ed.* Philadelphia, PA: WB Saunders; 2000:923-36.

**SPECIES**

Canine

Rajagopalan V, Jesty SA, Craig LE, et al. Comparison of presumptive echocardiographic and definitive diagnoses of cardiac tumors in dogs. *J Vet Int Med* 2013;27:1092-96.

**BREED**

Golden Retriever

Shaw SP, Rozanski EA, Ruhs JE. Cardiac troponins I and T in dogs with pericardial effusion. *J Vet Int Med* 2004;18:322-24.

**SEX**

MN

Sidley JA, Atkins CE, Keene BW, et al. Percutaneous balloon pericardiotomy as a treatment for recurrent pericardial effusion in 6 dogs. *J Vet Intern Med* 2002;16:541.

**AGE**

8yr

Sisson D, Thomas WP. Pericardial disease and cardiac tumors. In: Fox PR, Sisson D, Moise NS, eds. *Textbook of Canine and Feline Cardiology, 2<sup>nd</sup> ed.* Philadelphia, PA: WB Saunders; 1999:679-701.

**WEIGHT**

67.8lb

Sisson D, Thomas WP, Reed J, et al. Intrapericardial cysts in the dog. *J Vet Int Med* 1993;7:364-69.

**INTERPRETED BY**

Eric Lindquist, DMV  
DABVP, Cert. IVUSS

**IMAGING  
PERFORMED BY**

Sara Hansen

**HOSPITAL NAME**

West Eugene AH

**REFERRING VET**

Powers

**INVOICE**

14288ag

**DATE**

07/06/2023