



**PATIENT PRESENTING CLINICAL SIGNS**

Ginger Callahan Acute vomiting, and anorexia tachycardia concern for toxicity R/O neoplasia Current meds P Lyte Metro  
 Abnormal PE/Chem/CBC/UA Results: decreased HCT WBC PH increased ALT HWT neg CPL neg

**SPECIES**

Canine

**ULTRASONOGRAPHIC EXAMINATION OF THE HEART**

**BREED**

Border Collie Mix

**SEX**

Spayed Female

**AGE**

11 years

**WEIGHT**

37 lbs

The echocardiogram in this patient demonstrated normal **left atrial** size based on 3 separate methods of LA evaluation. The cranial and caudal **mitral** valve leaflets presented normal linear structure, extension in systole, and union in diastole with normal kinesis. The **left ventricle** presented thicknesses with linear contour and was not dilated nor restricted. The **myocardium** presented normal echogenicity without subjective evidence of significant fibrotic or ischemic disease. **Contractility** of the ventricular walls was adequate and in normal range for this patient evidenced by the fractional shortening measurement and subjective evaluation of the different regions of the myocardium. The **left ventricular outflow** tract demonstrated normal laminar flow and subjective structural integrity. A slight, hypoechoic, nodular change was noted in the **right auricle** and measured approximately 1.5 cm. There is concern for emerging hemangiosarcoma. **Tricuspid** valvular assessment demonstrated adequate linear morphology and kinesis. The **right ventricle** was of normal size (1/3 diameter of LV), chordae structure, myocardial echogenicity and thickness. **Pulmonary outflow** tract assessment revealed normal valve structure, laminar flow, and diameter (approx.1:1 pa/ao ratio). No visible **pericardial** or free pleura fluid was noted. Mild **pericardial** effusion was noted in this patient. Ascites was noted.

**INTERPRETED BY**

Eric Lindquist, DMV  
 DABVP, Cert. IVUSS

**IMAGING PERFORMED BY**

Jenn

**HOSPITAL NAME**

Rockaway AH

**REFERRING VET**

Dr. Kahn

**INVOICE**

99455

**DATE**

4/22/22

**ULTRASONOGRAPHIC FINDINGS**

Pericardial effusion.  
 Normal echocardiogram with slight nodular change in the right auricle. Concern for hemangiosarcoma.

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	33	63	0.11
CANINE CARDIAC PARAMETERS	HR (BPM)	AV VMAX (m/s)	PV MAX (m/s)	BODY WEIGHT	LA (2D short axis Base view)	LVIDd (Avg; 2D and m-mode short axis)	LVIDs (Avg; 2D and m-mode short axis)
NORMAL PARAMETER	50-100	0.7-1.7	0.7-1.6		(cm)	(cm)	(cm)
PATIENT	162	1.5	0.7	37 lbs	3.44 max	3.05	



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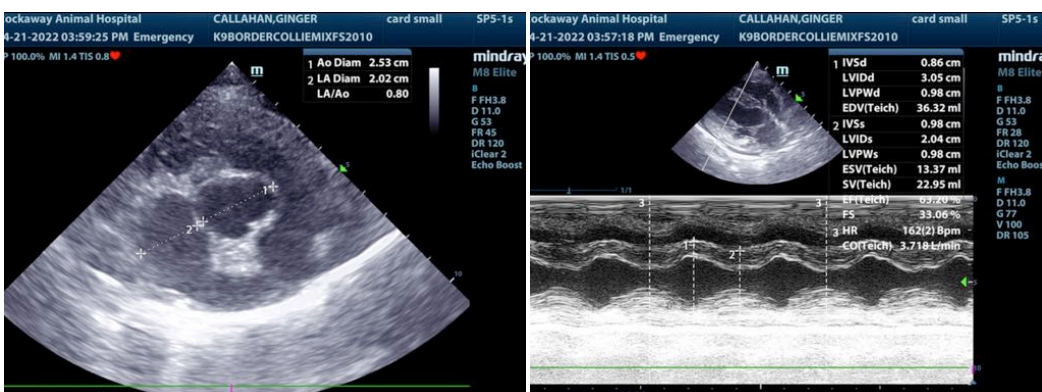
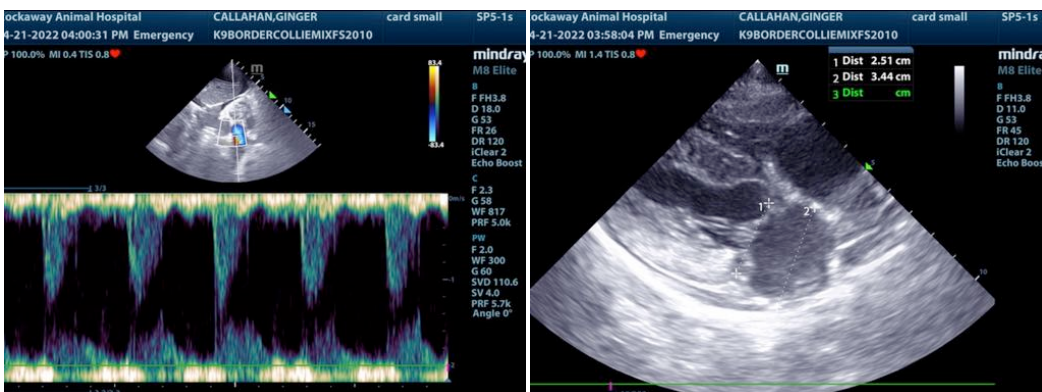
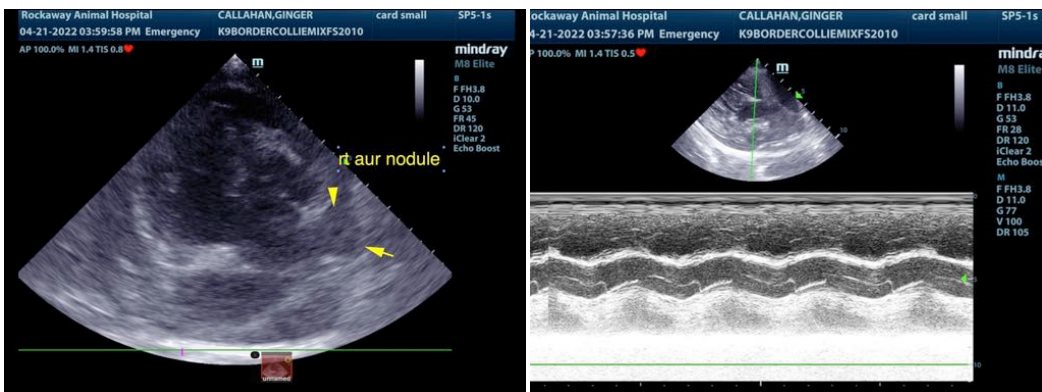
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**INTERPRETATION OF THE FINDINGS & FURTHER RECOMMENDATIONS**

The pericardial effusion is fairly minor; however, ascites is present. I am concerned for an obstructive disease process in the caudal mediastinum. If not already performed chest radiographs are warranted or better yet chest CT to assess the caudal mediastinal region. The pericardial effusion is fairly minor; therefore, pericardiocentesis is not overtly necessary from a therapeutic standpoint. However, this may be helpful from a diagnostic standpoint.





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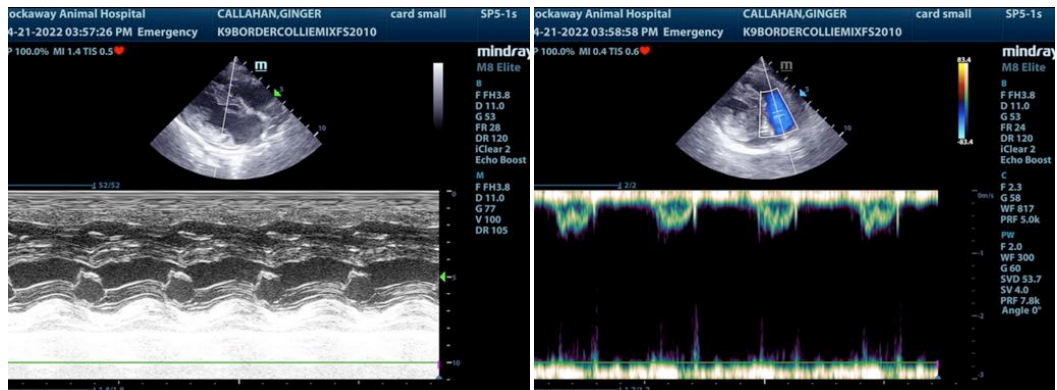
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The information and recommendations provided are based on the images presented by the referring veterinarian/sonographer. No evaluation can be communicated regarding pathology that was not visible in the image/video clips provided.

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.

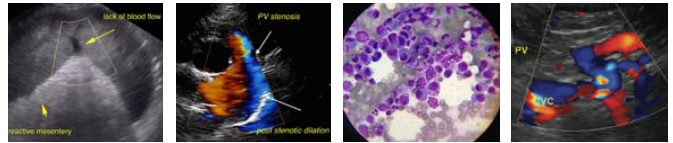
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**Pericardial Effusion and Cardiac Neoplasia**

<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:



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- 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

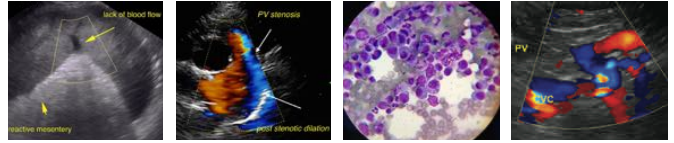
The majority of neoplastic masses consist of hemangiosarcoma and heart-based tumors (chemodectomas or ectopic thyroid adenocarcinoma). Idiopathic pericardial effusion is a diagnosis of exclusion; the effusion is typically hemorrhagic. Approximately 50% of dogs will be cured with a single pericardiocentesis, while some dogs will require multiple pericardiocenteses 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:

- Anechoic space between the heart and the pericardium.
- Abnormal side-to-side cardiac motion.
- Decreased chamber size (right ventricle [RV] and left ventricle [LV]).
- Presence of a pericardial or cardiac mass.
- Tamponade with early diastolic RA and RV collapse.



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Cytology is helpful in the diagnosis of lymphoma, septic pericarditis, and idiopathic effusion, but not in cases of neoplasia.

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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.

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**Prognosis:**

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- Cardiac hemangiosarcoma: < 8 months with surgical debulking and chemotherapy.
- Chemodectoma (aortic derived): MST 730 days post pericardectomy.
- Idiopathic: 50% complete resolution post cardiocentesis; curative with pericardectomy, which can be done via thoracotomy, or thorascopy, or using a balloon to tear the pericardium.
- Mesothelioma: Poor.
- Restrictive pericarditis: Poor, especially when the pericardium has not been surgical stripped.

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**References:**

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Cagle LA, Epstein SE, Owens SD, et al. Diagnostic yield of cytology analysis of pericardial effusion in dogs. *J Vet Int Med* 2014;28:66-71.

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Feigenbaum H. Pericardial disease. In: Feigenbaum H, ed. *Echocardiography, 5<sup>th</sup> ed.* Philadelphia, PA: Lippincott, Williams & Wilkins; 1994:556-588.

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Jackson J, Richter KP, Launer DP. Thorascopic partial pericardectomy in 13 dogs. *J Vet Int Med* 1999;13:529-33.

**REFERRING VET**

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Johnson MS, Martin M, Binns S. A retrospective study of clinical findings, treatment and outcome in 143 dogs with pericardial effusion. *J Small Anim Prac* 2004;45:546-52.

**INVOICE**

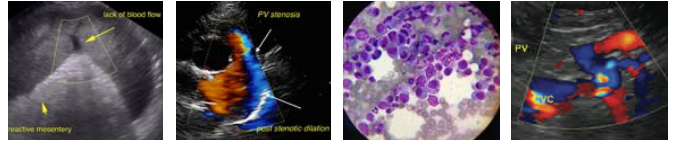
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Kienle RD, Thomas WP. Echocardiography. In: Nyland TG and Mattoon JS, eds. *Small Animal Diagnostic Ultrasound, 2<sup>nd</sup> ed.* Philadelphia, PA: WB Saunders; 2000:354-423.

**DATE**

4/22/22

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.



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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.

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

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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.

**SEX**

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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.

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

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