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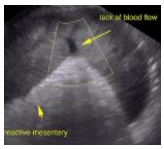
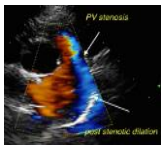
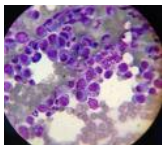
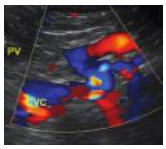

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**PATIENT**
Buddy Dufour

**SPECIES**
Canine

**BREED**
English Setter

**SEX**
MN

**AGE**
12 yur

**WEIGHT**
48 lb

**INTERPRETED BY**
Eric Lindquist, DMV DABVP, Cert. IVUSS

**IMAGING PERFORMED BY**
Dr. Ebersole

**HOSPITAL NAME**
Scanvet

**REFERRING VET**
Dr. Barengo

**INVOICE**
10673ag

**DATE**
05/26/2022

## PRESENTING CLINICAL SIGNS

History: Completely normal until collapsed yesterday afternoon. Repeatedly collapsing since then, lethargic and quiet.
Abnormal PE/Chem/CBC/UA Results: PE: Sternal to lateral recumbent, tachypneic, mm pale pink, weak femoral pulses and muffled heart sounds. RADS: rounded heart, possible fluid in abdomen BW: ALT181, TP 5.1, Glob 1.8, Alb 3.3. Hct 54%. USG Pericardial tap done while running ECG, removed 120 mL blood. HR slowed, more comfortable. Normal ECG rythym.

## ULTRASONOGRAPHIC EXAMINATION OF THE ABDOMEN AND HEART

| 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 | | | 1.5 | 1.07 | 52 | 84 | NM |
| **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 | 107 | 200 | 143 | | | 2.65 | |

***The cardiac measurements were presented post pericardiocentesis.

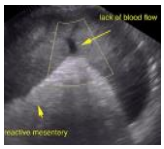
### *Cardiac Presentation*

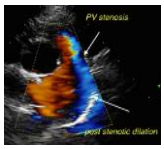
The echocardiogram in this patient revealed severe pericardial effusion with pericardial tamponade and collapse of the right auricle. Echogenic masses noted in the pericardial space, strongly suggestive for hemangiosarcoma. Mild potential for underlying clots yet the structures appear to be too organized for clot formation. The right auricular and right ventricular free wall junction revealed irregular tissue which may be related to an underlying neoplastic infiltration within the wall. A separate right ventricular free wall mass was noted measuring approximately 3.0 x 2.0 cm deriving from the right ventricular free wall myocardial wall. Pericardiocentesis was significantly effective as the heart prior to the tap was significantly volume contracted and shocky with hypocontractility. Post pericardial tap the heart revealed mild remaining pericardial fluid without collapse of the right auricle contractility and volumes appear to be fairly normal.

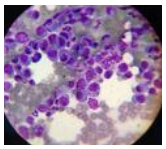
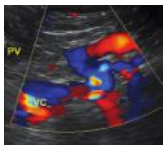
### *Urinary System*

The urinary bladder, trigone, and pelvic urethra presented normal thicknesses and normal tone. The ureters were not visible which is normal. No uroliths or sediment were visualized and anechoic urine was present. No evidence of inflammatory or neoplastic changes were noted. Ureteral papillae were normal.

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.



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The capsules were acceptably uniform without significant irregularities. The left kidney measured 5.9 cm in length. The right kidney measured 5.0 cm in length.

### *Adrenal Glands*

Both adrenal glands were visualized and recognized as having normal shape, size, position and echogenicity for this breed. The phrenic vasculature, glandular echogenicity and detail were unremarkable. Capsule, cortex, and medullary definition were normal for this age patient. The left adrenal gland measured 0.78 cm caudal pole width by 0.69 cm cranial pole width. The right adrenal gland measured by 0.6 cm caudal pole width by 0.8 cm cranial pole width.

### *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 images submitted revealed a mixed hypoechoic mass measuring 2 cm with a passive congestion pattern with secondary mild to moderate ascites.

The gallbladder presented acceptably thin walls with primarily anechoic content. The cystic and common bile ducts were normal. No pathological hepatic lymphadenopathy was evident. No overt structural evidence of inflammatory, infiltrative or regenerative pathology was evident.

### *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. Enhanced mesentery was noted around the small intestine.

### *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*

Mild to moderate ascites noted. Enhanced mesentery noted in the small intestine.

## ULTRASONOGRAPHIC FINDINGS

- Right ventricular free wall mass with pericardial effusion, tamponade effect and passive congestion
- Left hepatic mass with same echotexture as the cardiac mass, suggestive for concurrent neoplasia likely hemangiosarcoma.

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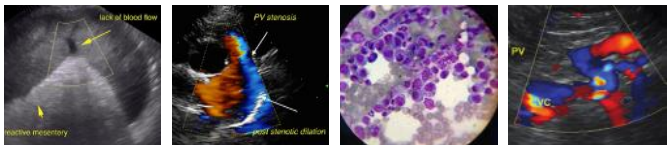

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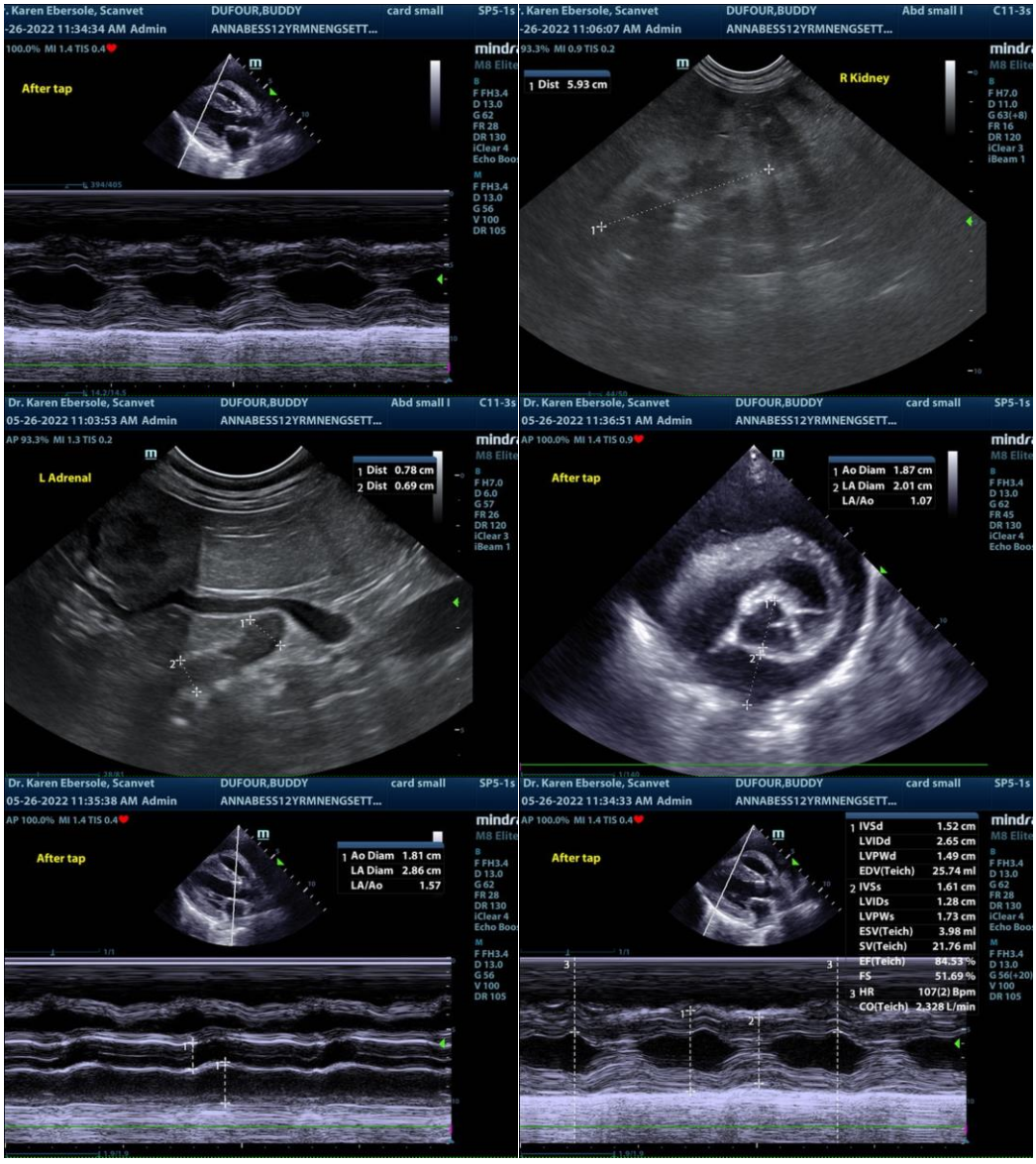
## INTERPRETATION OF THE FINDINGS & FURTHER RECOMMENDATIONS

Cytospin of the pericardial tap +/- FNA of the liver lesion to assess for potential hemangiosarcoma is warranted. This could be very difficult to diagnose cytologically. Empirical doxorubicin therapy could be considered as well as repetitive pericardiocentesis as necessary based on clinical presentation.



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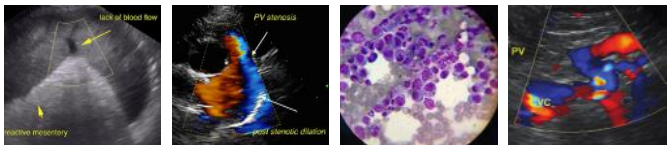

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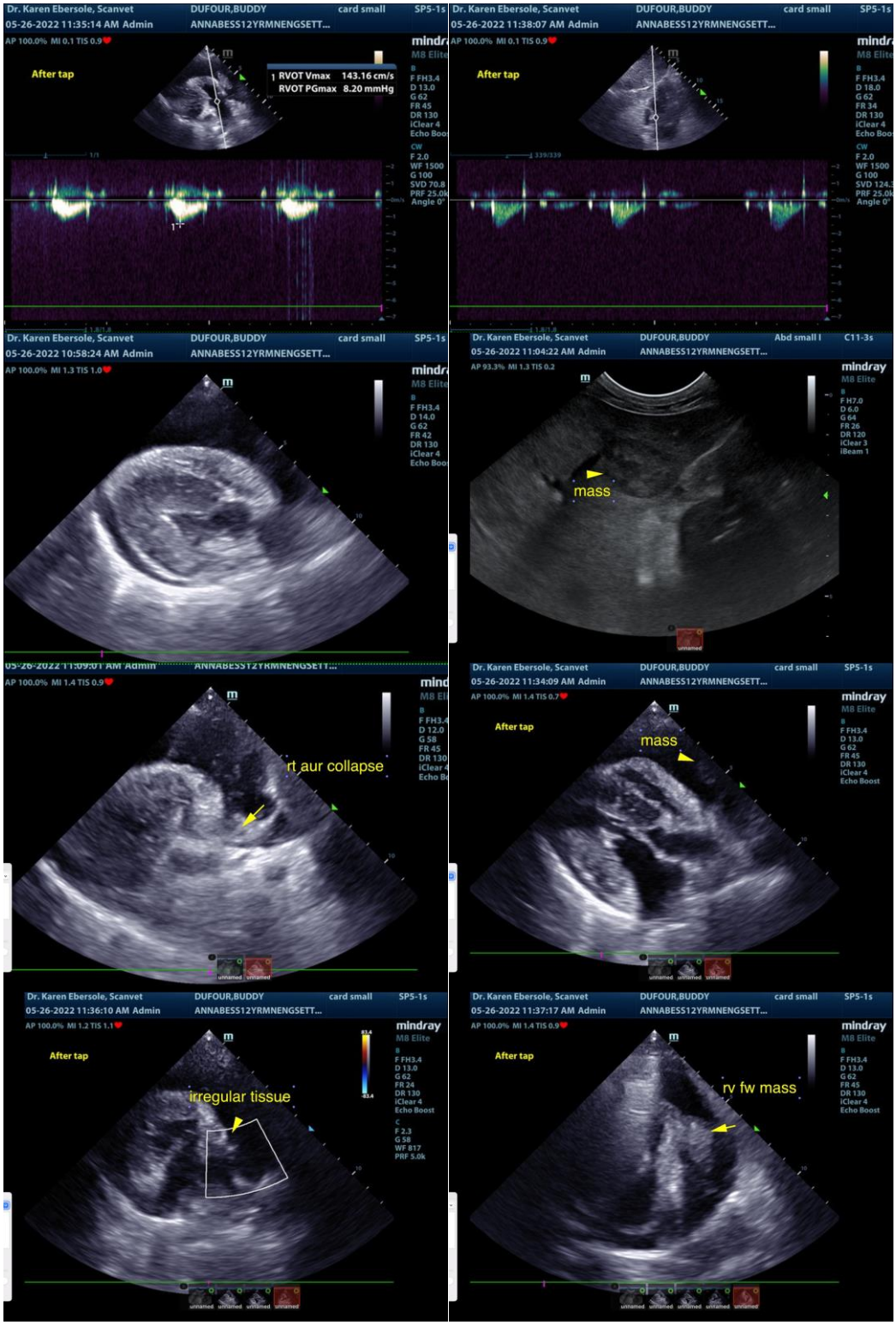


**The information and recommendations provided are based on the images presented by the referring veterinarian. No evaluation can be communicated regarding pathology that was not visible in the image/video clips provided.**

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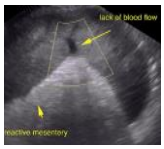
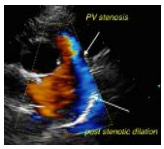
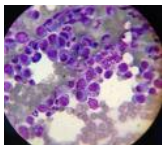
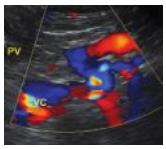

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Thank you for this referral. If the clinical or image interpretation does not parallel your findings or if I can be of any further assistance please contact me.

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

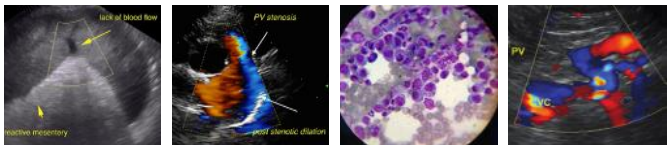
# Pericardial Effusion and Cardiac Neoplasia

*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:

- 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



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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:

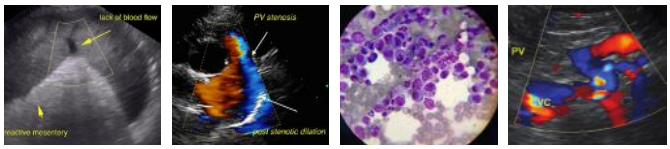
- Anechoic space between the heart and the pericardium.
- Abnormal side-to-side cardiac motion.
- Decreased chamber size (right ventricle [RV] and left ventricle [LV]).
- Presence of a pericardial or cardiac mass.
- Tamponade with early diastolic RA and RV collapse.

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

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.

**Prognosis**:

- 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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