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**Third Thursday  
Rounds**

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**Pericardial Effusion**

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## Common Clinical Signs

- The most common clinical signs of pericardial effusion are related to low cardiac output and poor perfusion. Syncope, weakness and collapse can occur. Decreased gastrointestinal perfusion can result in vomiting, diarrhea and decreased appetite.
- Shortness of breath and tachypnea are often reported.
- Cardiac tamponade can result in elevated venous pressures, so patients can develop abdominal distension from ascites.

## Exam Findings

- Pale/cyanotic mucous membranes, weak pulses, low body temperature, cool extremities
- Muffled heart sounds
- Tachycardia, tachyarrhythmias
- Increased respiratory rate and effort
- Femoral pulse abnormalities: weak pulses, pulse deficits, pulsus paradoxus
- Evidence of elevated cardiac pressure: jugular venous distension or pulsation, abdominal effusion
- Loud, left apical systolic heart murmur is present in dogs with a left atrial tear

## Diagnosis

- ECG findings are variable. Sinus tachycardia, atrial or ventricular premature complexes, and electrical alternans are possible findings
- The systemic blood pressure can be normal or decreased, depending on the rate of effusion.
- Laboratory testing
- CBC is indicated to look for thrombocytopenia, evidence of infectious disease and anemia.
- Serum chemistry is indicated to rule out systemic causes. Decreased cardiac output often causes elevated BUN, creatinine, ALT, and ALP.
- Coagulation testing: PT and PTT should be tested in patients with possible exposure to anticoagulant rodenticide.

## Thoracic radiographs

- The cardiac silhouette is enlarged. Pleural effusion, abdominal effusion, enlarged caudal vena cava may be present.
- The pulmonary parenchyma can also be evaluated for evidence of metastasis, particularly in patients with cardiac hemangiosarcoma.

## Ultrasound

- Ultrasound is the quickest way to diagnose pericardial effusion. The patient should also be checked for concurrent pleural and abdominal effusion.
- Cardiac tamponade is diagnosed when the right atrium is collapsed from the high pressure in the pericardial space.
- Echocardiography can be used to assess for cardiac masses, mitral valve disease and cardiomyopathy.
- Abdominal ultrasound for staging is indicated in patients with neoplasia, or if a systemic disease causing vasculitis is suspected.

## Cytology on pericardial effusion

- Cytology is often non-diagnostic if the effusion is hemorrhagic, but can identify some neoplasms such as lymphoma and infectious causes.

## CT scan

- CT can be utilized to evaluate the location and extent of cardiac masses. The lungs and abdomen can also be checked for metastasis.

## Initial Stabilization

### Crystalloid fluid bolus

- Indicated for most dogs presenting with shock
- Contraindicated when left atrial tear or congestive heart failure are the suspected causes

### Pericardiocentesis

- Indicated for patients with tamponade
- This should be performed as soon as possible in patients with pericardial effusion secondary to neoplasia
- May result in continued hemorrhage in patients with effusion secondary to coagulopathy or left atrial tear

### Diuretic therapy

- Indicated when effusion is secondary to congestive heart failure, such as cats with cardiomyopathy
- May be part of treatment plan for dogs with a left atrial tear
- Contraindicated in patients with cardiac neoplasia, idiopathic or infectious cause, as this can lower venous filling pressure and worsen perfusion

### Abdominocentesis

- Rarely needed when ascites is secondary to pericardial effusion; usually the ascites is reabsorbed quickly after pericardiocentesis

## Causes of Pericardial Effusion

### Cardiac Neoplasia

- Right atrial hemangiosarcoma
  - There is a high rate of re-effusion and metastasis, resulting in survival times of weeks to months.
  - The diagnosis can often be made on echocardiogram or cardiac CT
  - The effusion is hemorrhagic and cytology is rarely diagnostic.
  - Staging includes cardiac, thoracic and abdominal imaging with ultrasound or CT.
  - Treatment includes mass resection in some patients, can consider pericardiectomy, chemotherapy or radiation to slow tamponade

- Chemodectoma
  - Brachycephalic dog breeds are predisposed
  - Masses are slow growing and slow to metastasize
  - Diagnosis can be made on echocardiogram or cardiac CT
  - Treatment with pericardiectomy, chemotherapy or radiation results in survival times of years.
- Mesothelioma and lymphoma
  - Less common and have a variable prognosis.
  - The effusion is usually not hemorrhagic in these cases; cytology and fluid analysis may be diagnostic.

### Left atrial tear

- This is a sequela of mitral regurgitation secondary to chronic valvular disease in dogs. Chronic mitral regurgitation can cause damages atrial tissue to rupture, resulting in rapid hemorrhage into the pericardial space.
  - The severity of this disease depends on the degree of tamponade, blood clot formation and healing of the atrial tissue
  - The diagnosis is made on echocardiogram. It should be suspected in dogs with known mitral valve disease or those with a loud, left apical systolic heart murmur.
  - The treatment is general supportive care and time. Pericardiocentesis is only performed at our hospital if the patient is in severe shock. Treatment with furosemide may be indicated in patients with concurrent pulmonary edema.
  - After healing of the atrial tissue and resolution of the effusion, dogs have survival times consistent with the stage of their valvular disease.
- Congestive heart failure
  - Congestive heart failure is the most common cause of pericardial effusion in cats, and can occur in dogs.
  - The diagnosis can be made on echocardiogram and by ruling out systemic causes.
  - Pericardiocentesis should be performed if tamponade is present. Diuretic therapy is indicated in these patients and the effusion usually resolved in several days.

### Less common causes of pericardial effusion:

- Systemic diseases, such as coagulopathy, vasculitis and uremia
- Bacterial and fungal disease can cause pericardial effusion, as can FIP
- Idiopathic pericardial effusion is reported but rarely seen at our hospital.