

Pericardial Effusion

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Pericardial effusion is an uncommon but life-threatening clinical condition reported in various species in which the pericardial space is filled with excessive fluid. Subsequently, cardiac function can be compromised and result in decreased or inadequate cardiac output. This PowerPage will cover the basic principles, common causes, and treatment of pericardial effusion.

Key Points

- In health, only a small amount of fluid is present within the pericardial space
- Clinical signs of pericardial effusion arise when the pericardial space becomes filled with excessive amounts of fluid
 - The amount of fluid and rate at which the space fills with fluid will dictate the onset, severity and extent of clinical signs (rapid filling of pericardial space will result in more severe and acute clinical signs whereas slow and progressive filling may result in more subtle signs as the heart is able to compensate over time)
- There are numerous causes of pericardial effusion, depending on the species
- **Cardiac tamponade** develops when the **intrapericardial pressure equals or exceeds right atrial pressure** resulting in cardiovascular and hemodynamic compromise
- **Pericardiocentesis** may have to be performed as an emergency and life-saving procedure and/or as a diagnostic procedure to evaluate the pericardial fluid

Pathogenesis

- In health, the pericardium consists of the outermost fibrous pericardium and the parietal and visceral layers of the serous pericardium
 - The pericardial space resides between the parietal and visceral layers of the serous pericardium
- Normally, a minute amount of fluid is present within the pericardial space; pathologic pericardial effusion occurs when abnormal amounts of fluid accumulate within the pericardial space
- As fluid accumulates, the ability of the pericardium to stretch is exceeded, the volume and pressure within the pericardial space continues to increase, and cardiac function is compromised secondary to decreased diastolic filling
- **Cardiac tamponade**, a form of cardiogenic shock, develops when the intrapericardial pressure equals or exceeds right atrial pressure
 - Cardiac tamponade causes impairment of:
 - Venous return
 - Ventricular filling
 - Stroke volume
 - Cardiac output.
 - The volume of fluid necessary to cause cardiac tamponade depends of fluid accumulation

Differential Diagnoses for Causes of Pericardial Effusion

- Causes of pericardial effusion (by species) include:
 - **Dogs:**
 - Cardiac neoplasms:
 - Hemangiosarcoma (most common neoplastic cause of pericardial effusion)
 - Chemodectoma
 - Mesothelioma
 - Lymphosarcoma
 - Thyroid carcinoma
 - Right-sided heart failure
 - Atrial rupture
 - Coagulopathy (rodenticide toxicity)
 - Bacterial infections
 - Idiopathic pericardial effusion
 - **Cats:**
 - Congestive heart failure
 - Feline infectious peritonitis
 - Cardiac neoplasm
 - Lymphosarcoma (most common neoplasm of heart)
 - Carcinomas
 - Hemangiosarcoma
 - Aortic body tumors
 - Fibrosarcomas
 - **Horses:**
 - Extension of viral infection (i.e. equine viral arteritis, equine influenza)
 - Septicemia
 - Extension of bacterial infection from lung
 - Neoplasia
 - Idiopathic (most common)
 - **Cattle:**
 - Ingestion and penetration of a foreign object (Traumatic reticuloperitonitis/traumatic pericarditis or Hardware disease)
 - Ingestion of a foreign object may settle in the reticulum; subsequently, the object may penetrate the reticulum and cause localized or generalized peritonitis
 - If the pericardium and/or myocardium, which lies just cranial to the reticulum, are penetrated by the foreign body, pericarditis and pericardial effusion may develop
 - Extension of bacterial or viral infections of lungs



Clinical Signs

- Non-specific signs may be present including:
 - Fever, anorexia, depression weight loss
 - Dyspnea
 - Abdominal distension (small animals)
 - Peripheral edema (large animals)
 - Colic (horses)
- **Attenuated heart sounds (muffled from effusion around heart)**
- **Jugular vein distension** (from increased right atrial pressure)
- **Poor peripheral pulse quality**
- Elevated heart and respiratory rate
- Hepatomegaly and ascites possible

Diagnosis

- **Clinicopathologic Findings**
 - Anemia (secondary to blood loss or chronic disease)
 - Elevations in coagulation parameters (if effusion related to rodenticide toxicity)
 - Pre-renal azotemia and non-specific electrolyte abnormalities
 - **Pulsus paradoxus**
 - Exaggeration of the normal inspiratory decrease in systolic blood pressure
- **Radiography**
 - Small animals – thoracic radiography may demonstrate:
 - Enlargement of cardiac silhouette (rounded appearance)
 - Pleural effusion and enlargement of the caudal vena cava
 - Hepatomegaly or decreased abdominal detail (from ascites) may be observed
 - Cattle – thoracic radiography may demonstrate:
 - Fluid and gas accumulation in pericardium
 - Metallic foreign object may be detected
- **Electrocardiography**
 - Sinus tachycardia
 - Ventricular premature contractions
 - Low voltage QRS complexes may be seen
 - **Electrical alternans**
 - Pattern of alternating variation in R wave amplitude
- **Echocardiography**
 - Gold standard for diagnosing pericardial effusion
 - Appears as anechoic fluid in pericardial space
- **Pericardiocentesis**
- Fluid is frequently hemorrhagic
 - Rarely may detect neoplastic cells if neoplasia is the primary cause of pericardial effusion



Treatment

Small Animal:

- Pericardiocentesis
 - Should be implemented immediately if cardiac tamponade is present
 - Complications can include ventricular premature complexes, laceration of the coronary artery, and sudden death
- Chemotherapy
 - If underlying cause of effusion is a treatable neoplasm
- Pericardiectomy
 - Treatment of choice for idiopathic pericardial effusion

Horses:

- Idiopathic cases can be treated with placement of an indwelling chest tube into pericardial sac and subsequent drainage and lavage of the pericardial space followed by local infusion of antimicrobials

Cattle:

- Treatment of traumatic reticuloperitonitis involving the heart is typically unrewarding and is directed at salvage or short-term survival
- Repeated pericardial drainage and lavage can be implemented for short-term management

References

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