Acute Pericarditis — Causes and Treatment

Pericarditis is an inflammation of the pericardium resulting from infection, autoimmune disease, radiation, surgery or myocardial infarction, or after cardiac surgery. It is manifested as fever, pleuritic chest pain that increases with lying supine, and audible pericardial rub by auscultation. Diagnosis is made by clinical suspicion with, supported by diffuse ST elevation in ECG and sometimes pericardial effusion by echocardiography. It is usually a self-limiting condition within 2—6 weeks, therefore management is usually conservative. Constrictive pericarditis is a well-known complication that is characterized by thickening and rigidity of the pericardium.

For further details on "Constrictive Pericarditis", please see our separate article on that subject.

Definition of Pericarditis

Pericarditis is the condition of an inflamed pericardium, the visceral sac that covers the heart. Pericarditis has many etiologies including infection, autoimmune disease, uremia, radiation, surgery and myocardial infarction.
The pericardium has two parts and three layers. The **fibrous pericardium** is the outer layer and is composed of connective tissue. The **serous pericardium** is composed of two layers: the visceral pericardium attached to the outermost layer of the heart, the epicardium, and the **parietal pericardium** which lines the inside of the pericardial sac. The parietal pericardium is fused to the fibrous pericardium. The pericardial cavity between the visceral and the pericardial layers is filled with serous fluid.

**Epidemiology of Acute Pericarditis**

**Spread of acute pericarditis**

Acute pericarditis is diagnosed in about **1 in 1000 hospital admissions**. It is more common in adults compared to children. Uremic pericarditis is seen in patients with chronic renal failure. **Purulent pericarditis** (pericarditis with pus in the pericardial space, as the result of bacterial infection) has become rare in the developed world with the regular use of **antibiotics** but is still common in the developing world.

**Etiology of Acute Pericarditis**

**Causes of acute pericarditis**

There are many causes of acute pericardial inflammation:

| Viral infection             | • Coxsackievirus b*  
|                            | • Influenza*        
|                            | • HIV              
|                            | • Echovirus        |
| Bacterial infection        | • Tuberculosis*    
|                            | • Streptococcus species  
|                            | • Pseudomonas       
|                            | • Staphylococcus species |
| Fungal Infection           | • Histoplasma      
|                            | • Blastomyces       
|                            | • Coccidioides      
|                            | • Aspergillus       |
| Autoimmune Disease         | • Rheumatoid arthritis  
|                            | • Systemic lupus erythematosus*  
|                            | • Sarcoidosis       |
| Renal failure              | • Uremia
Cardiovascular
- Myocardial infarction*
- Aortic dissection
- Takotsubo cardiomyopathy

Cancer
- Lung cancer
- Breast cancer
- Leukemia
- Lymphoma

Medication
- Penicillin
- Cromolyn sodium

Open heart surgery and trauma

Irradiation
- Iatrogenic to cancer treatment of the chest

Idiopathic*

*the most common causes of acute pericarditis

Pathology and Pathophysiology of Acute Pericarditis

The pericardium has four functions: it restricts the heart and prevents excess dilation, it produces a chamber at a negative pressure that aids in the atrial filling, it provides a frictionless environment, and it isolates the heart from the rest of the body.

An inflamed pericardium shows a polymorphonuclear infiltrate on microscopy and vascularization. Inflammatory signaling may stimulate the release of fluid that could result in an effusion or fibrinous reactants that could result in a constrictive complication. Tuberculosis, sarcoidosis or fungal infections will show a granulomatous reaction with multinucleated giant cells and epithelioid cells on microscopy. The accumulation of urea, a metabolic toxin, in the pericardial space results in inflammation of the parietal and visceral layers.

Symptoms of Acute Pericarditis

Signs of acute pericarditis

Acute pericarditis is characterized by the following signs and symptoms:

- **Persistent substernal chest pain** that radiates to the trapezius or to the neck that is **Improved by leaning forward** and made worse by lying supine, coughing, inhaling
- Symptoms of the underlying disease
- **Auscultation**: Friction rub between visceral and parietal layers
- **ECG**: Concave ST segment elevations in all leads except V1, PR elevated in aVR
- Other Symptoms: **a dry cough, fatigue, fever**

*Note: Some symptoms of pericarditis are similar to those seen in acute coronary syndrome but it is distinguished because it changes with body position.*
Diagnosis of Acute Pericarditis

Diagnosis requires abnormal findings on ECG (see above) with a history of chest pain that changes with body position. Elevated BUN or creatinine are present in the case of uremia. A positive blood culture implies an infectious etiology. Retrospective diagnosis can be made on autopsy if pericardial adhesions are found. A chest X-ray should be taken to rule out effusion.

Differential Diagnoses of Acute Pericarditis

- Acute coronary syndrome
- Angina pectoris
- Coronary artery vasospasm
- Esophageal spasm
- Gastroesophageal reflux disease
- Pulmonary embolism

Therapy of Acute Pericarditis

Treatment of acute pericarditis

In general, provide oxygen, monitor via ECG and serial blood pressure evaluations. Rule out myocardial infarction by EKG and cardiac enzymes (troponin, CK-MB, LDH). Treat pain with morphine. Otherwise, the treatment depends on etiology.

- Treat with NSAIDs such as aspirin.
- Adjuvant therapy consists of colchicine.

Also, treat the underlying condition:

- Antibiotics to treat tuberculosis or other bacterial etiology
- Treat uremia with dialysis
Progression and Prognosis of Acute Pericarditis

Hospitalization for hemodynamically stable patients with normal laboratory results is rarely necessary.

Viral and idiopathic pericarditis is often uncomplicated and self-limiting. Post-myocardial infarct pericarditis is usually a sign of a large infarct and increased mortality. Purulent pericarditis is associated with 40 % mortality while tuberculous pericarditis is closer to 50 % mortality. Uremic pericarditis has a much lower mortality rate.

Review Questions

The solutions are located below the sources.

1. Which cardiovascular symptom is most likely to be observed in a patient with pericarditis?
   A. Chest pain improves while coughing
   B. Chest pain relieved by leaning forward
   C. A high-pitched diastolic murmur heard on auscultation
   D. A displaced apical click heard on auscultation

2. Uncomplicated acute pericarditis can be treated with which of the following?
   A. Administer prednisone
   B. Cardiac catheterization
   C. Pericardiocentesis
   D. Administer ibuprofen

3. Besides chest pain, what other symptom is associated with pericarditis, especially in bacterial pericarditis?
   A. Fever
   B. Holosystolic heart murmur
   C. S4 cardiac murmur
   D. Janeway lesions

References


**Correct answers:** 1B, 2D, 3A

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