Myocarditis and Pericarditis

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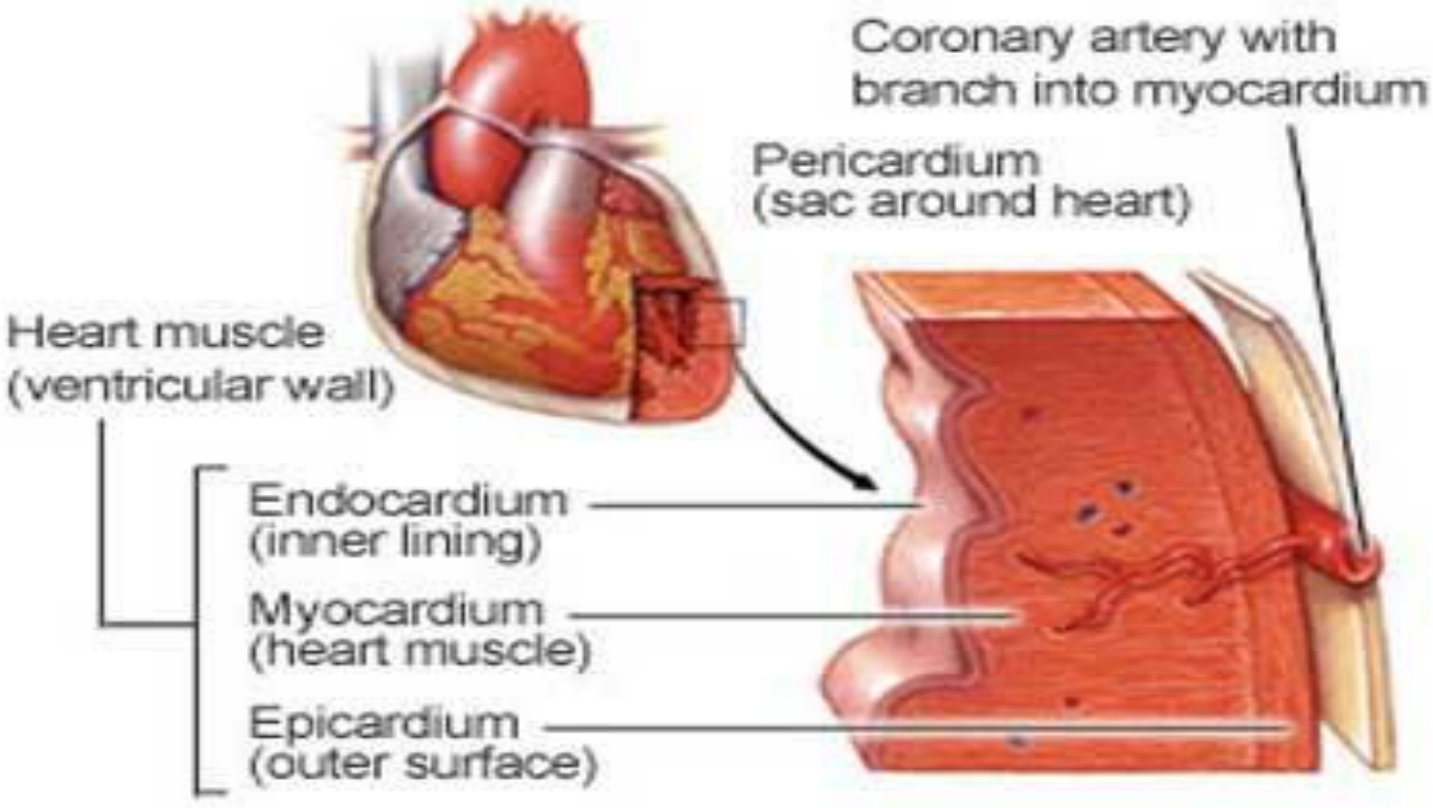
Objectives

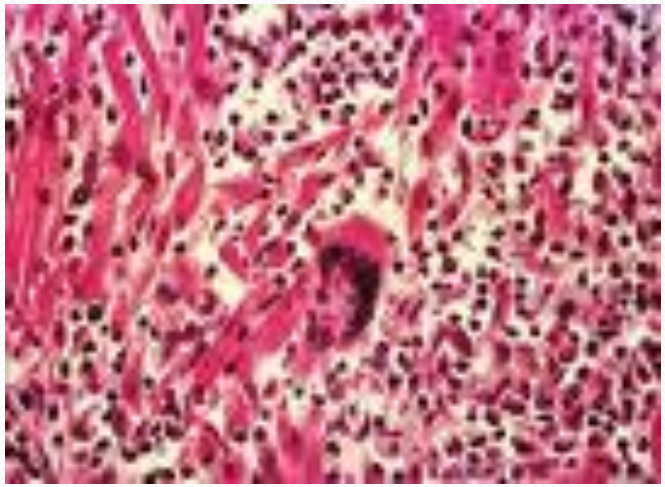
- Describe the epidemiology, risk factor for myocarditis.
- Explain the pathogenesis of myopericarditis.
- Differential between the various types of myocarditis and pericarditis.
- Name various etiological agents causing myocarditis and pericarditis.
- Describe the clinical presentation and differential diagnosis of myocarditis and pericarditis.
- Discuss the microbiological and non microbiological methods for diagnosis of myocarditis and pericarditis.
- Explain the management ,complication and prognosis of patient with myocarditis and/or pericarditis.

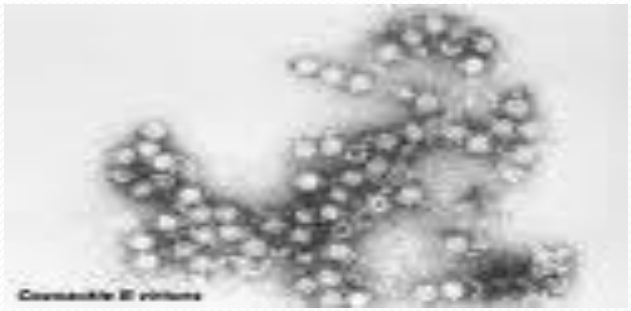
Myocarditis

- **Myocarditis** is inflammatory disease of the heart muscle.
- Mild & self-limited with few symptoms **OR** severe with progression to congestive heart failure & dilated cardiac muscle.
- localized **or** diffuse
- Myocarditis can be due to a variety of **infectious** and **non infectious** causes.
- **Viral infection is the most common cause**
- Others like toxins ,drugs and hypersensitivity immune response.



Myocarditis





Epidemiology ,Etiology and Risk Factors

- **Epidemiology** : no accurate estimate of incidence as many cases are mild & brief and diagnosis is not made.
- **Coxsackie virus B** is the most common cause of myocarditis
- **Other virus** like Coxsackie virus A, Echoviruses, Adenoviruses ,Influenza, EBV, Rubella, Varicella, Mumps, Rabies, Hepatitis viruses and HIV.
- **Bacterial causes** include *Corynebacterium diphtheriae*, Syphilis ,Lyme disease or as a complication of bacterial endocarditis.

- **Parasitic** cause includes Chagas diseases, *Trichinella spiralis*, *Taxoplasma gondii* and *Echinococcus*.
- Others organisms includes *Rickettsiae*, Fungi, *Chlamydia*, enteric pathogens, *Legionella* and *Mycobacterium tuberculosis*.
- **Giant cell myocarditis** due to Thymoma, SLE (*Systemic Lupus Erythematosus*) or Thyrotoxicosis.

Infectious	Noninfectious
Viruses 1. Coxsackie B 2. HIV	Systemic Diseases 1. SLE 2. Sarcoidosis 3. Vasculities(Wegener's disease) 4. Celiac disease
Bacterial 1. *Corynebacterium diphtheriae* (diphtheria)	Neoplastic infiltration
Protozoan 1. *Trypanosoma cruzi* (Chagas disease)	Drugs & Toxins 1. Ethanol 2. Cocaine 3. Radiation 4. Chemotherapeutic agents - Doxorubicin
Spirochete 1. *Borrelia burgdorferi* (Lyme	

Clinical Presentation

- **Highly variable** ; days to weeks after onset of acute febrile illness or with heart failure without any known antecedent symptoms .
- **Fever, headache, muscle aches, diarrhea, sore throat and rashes similar to any viral infection**
- Chest pain, arrhythmias ,sweating , fatigue and may present with congestive heart failure.

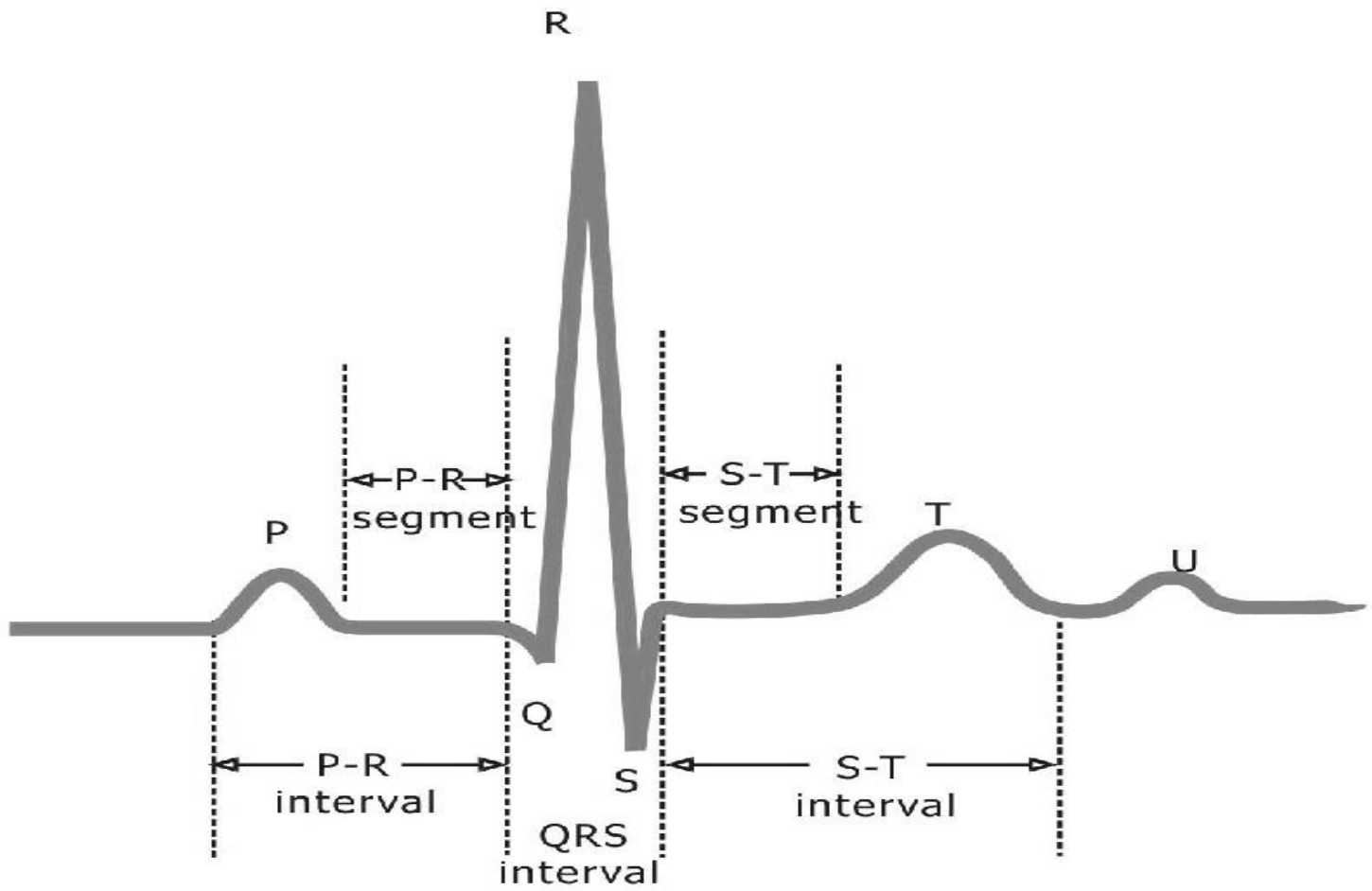
Differential Diagnosis

- Acute Myocarditis
- Vasculitis
- Cardiomyopathy (due to drugs **or** radiation)

Diagnosis

- WBCs, ESR, Troponine and CK-MB usually **elevated**
- **ECG** (nonspecific ST-T changes and conduction delays are common)
- **Blood cultures**
- **Viral serology** and other specific test for Lyme disease, diphtheria and Chagas disease may be indicated on a case by case basis.
- **Chest X-rays** : show cardiomegaly
- Radiology : **MRI** and **Echocardiogram**
- Heart muscle **biopsy**

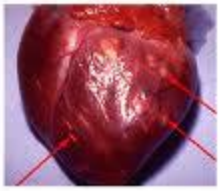
ECG of normal heart

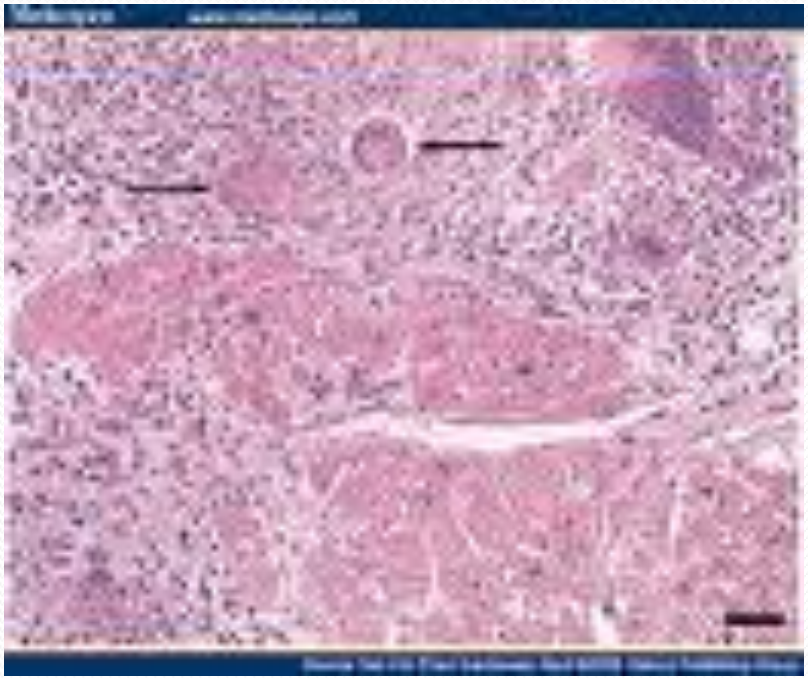


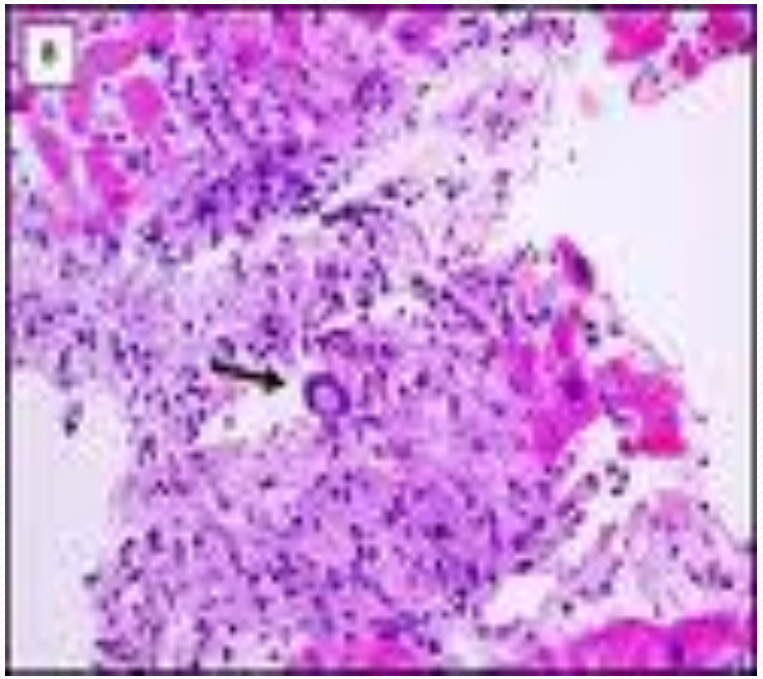
Endomyocardial Diagnosis

- Pathologic exam may reveal lymphocytic inflammatory response with necrosis, but this is **not sensitive** because of the patchy areas of distribution.
- "Dallas" criteria for histopathologic diagnosis
- "**Giant cells" may be seen**.

Giant cells-myocarditis







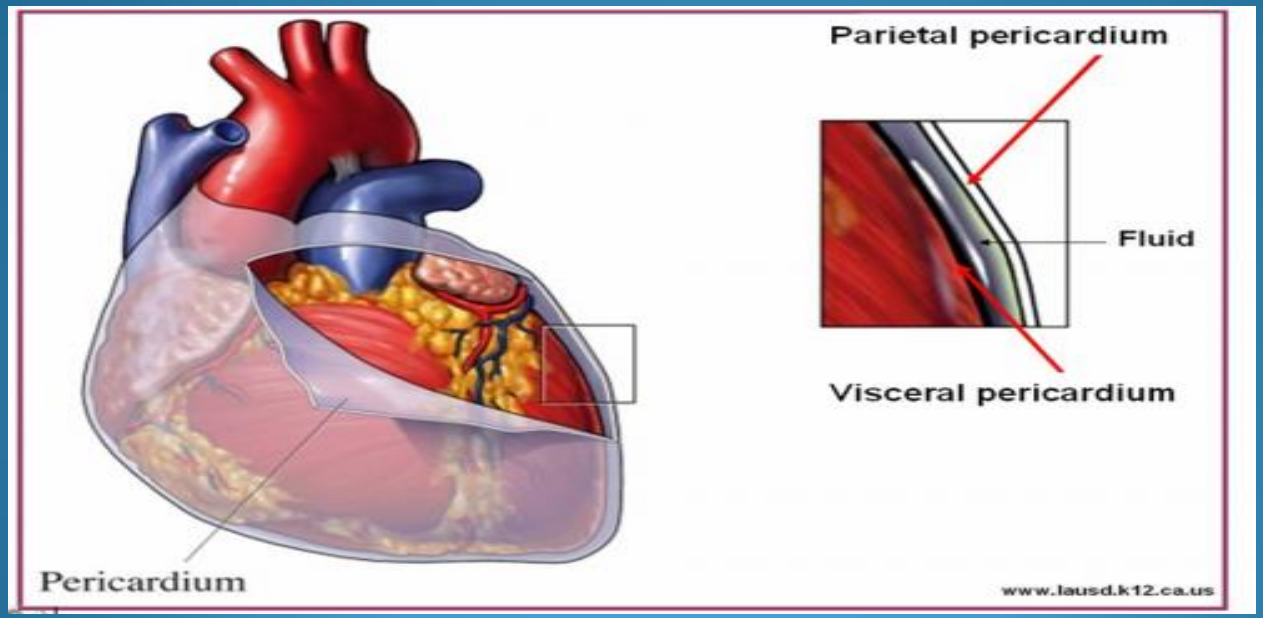
Management

- **Often supportive;**
  - Restricted physical activity in heart failure.
- Specific antimicrobial therapy is indicated when an infecting agent is identified.
- Treatment of heart failure arrhythmia
- Other drugs indicated in special situations like anticoagulant, NSAID (nonsteroidal antiinflammatory drugs) , steroid or immunosuppressive immunomodulatory agents.
- Heart transplant

Management

- Most cases of viral myocarditis are self limited.
- One third of the patients are left with lifelong complications, ranging from mild conduction defects to severe heart failure.
- Patient should be followed regularly every 1-3 months.
- **Sudden death may be the presentation of myocarditis in about 10% of cases.**

Acute Pericarditis



Pericarditis

- **Pericarditis** is an inflammation of the pericardium usually of infectious etiology (viruses, bacterial, fungal or parasitic)

Viral Pericarditis:

- Coxsackievirus A and B, Echovirus are the most common causes.
- Other viruses includes Herpes viruses, Hepatitis B , Mumps, Influenza, Adenovirus ,Varicella and HIV.

Pathophysiology

- **Contiguous spread**
  - lungs, pleura, mediastinal lymph nodes, myocardium, aorta, esophagus, liver.
- **Hematogenous spread**
  - septicemia, toxins, neoplasm, metabolic
- **Lymphangetic spread**
- **Traumatic or irradiation**

Pathophysiology

- Inflammation provokes a fibrinous exudate with or without serous effusion
- The normal transparent and glistening pericardium is turned into a **dull, opaque, and "sandy" sac**
- Can cause pericardial scarring with adhesions and fibrosis.

- **Bacterial Pericarditis** usually a complication of pulmonary infections (e.g. pneumonia ,empyema):

S. pneumonia, M. tuberculosis, S. aureus, H. influenzae, K. pneumoniae & Legionella.

- HIV patients may develop pericardial effusions (*M.tuberculosis* , *M. avium* complex).
- **Disseminated fungal infection** (*Histoplasma*, *Coccidioides*)
- **Parasitic infections** (disseminated toxoplasmosis, contagious spread of *Entamoeba histolytica*)are rare causes.

Types of Pericarditis

- **Caseous Pericarditis** commonly **tuberculous** in origin.
- **Serous Pericarditis** due to **autoimmune** diseases (rheumatoid arthritis, SLE).
- **Fibrous Pericarditis** a **chronic** pericarditis usually suppurative, caseous, or encased in a thick layer of scar tissue.

Types of Effusive Fluid

- **Serous**
  - Transudative - heart failure
- **Suppurative**
  - Pyogenic infection with cellular debris and large number of leukocytes
- **Hemorrhagic**
  - Occurs with any type of pericarditis especially with infections and malignancies
- **Serosanguinous**

Constrictive Pericarditis

- Idiopathic
- Radiotherapy
- Cardiac surgery
- Connective tissue disorders
- Dialysis
- Bacterial infection

Clinical presentation

- Patients with pericarditis will present with **sudden** pleuretic chest pain, fever, dyspnea and a **friction rub**.
- Patient with **tuberculous** pericarditis has **insidious** onset of symptoms.
- On examination exaggerated pulses , paradoxus JVP and tachycardia.
- As the pericardial pressure increases, palpitations , presyncope or syncope may occur.

Tuberculous Pericarditis

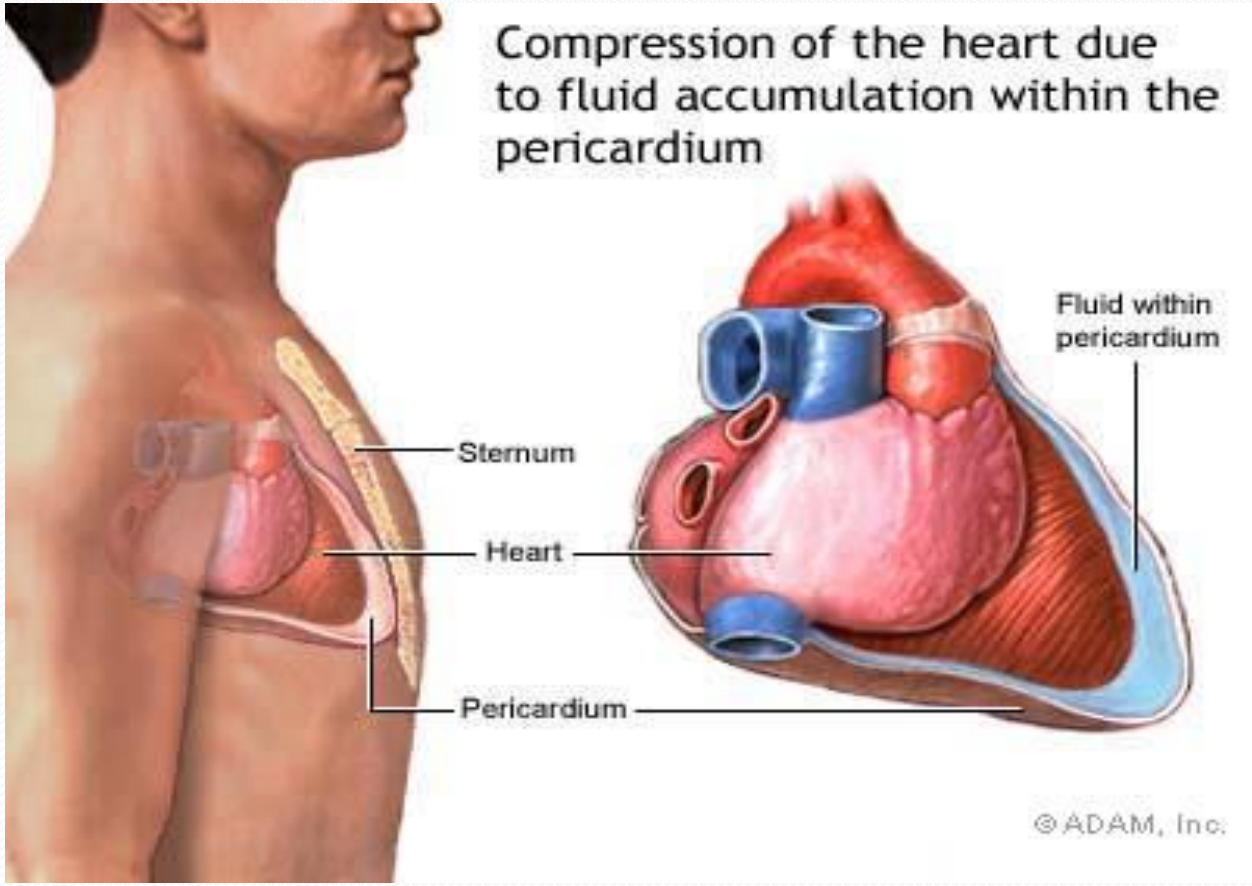
- Incidence of pericarditis in patients with pulmonary TB ranges from 1 – 8 %
- Physical findings: fever, pericardial friction rub, hepatomegaly
- Tuberculin skin test usually positive
- Fluid smear for AFB often negative
- Pericardial **biopsy** more definitive

Acute Pericarditis Differential Diagnosis

- Acute myocardial infarction
- Pulmonary embolism
- Pneumonia
- Aortic dissection

Diagnosis

- **ECG** will show ST elevation, PR depression and T-wave inversion may occur later.
- Blood culture
- Leukocytosis and an elevated ESR are typical
- Other routine testing : urea and creatinine.
- Tuberculin skin test is usually positive in tuberculous pericarditis.
- Chest x-ray may show enlarged cardiac shadow or calcified pericardium and CT scan show pericardial thickening >5mm.
- Pericardial fluid or pericardial biopsy specimens for fungi, antinuclear antibody tests and Histoplasmosis complement fixation indicated in endemic area.


Compression of the heart due to fluid accumulation within the pericardium
Fluid within pericardium
Sternum
Heart
Pericardium
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Management

- Management is largely supportive for cases of idiopathic and viral pericarditis including bed rest , NSAIDS (non-steroidal anti-inflammatory drugs) and Colchicine.
- Corticosteroid is controversial and anticoagulants usually contraindicated.
- Specific antibiotics must include activity against *S. aureus* and respiratory bacteria.
- Antiviral:

Acyclovir for *Herpes simplex* or *Varicella* . **Ganciclovir** for CMV .

Management

- **Pericardiocentesis** to relief tamponade.
- Patients who recovered should be observed for recurrence.
- Symptoms due to viral pericarditis usually subsided within one month.

Pericardiocentesis