

Myocarditis and Pericarditis

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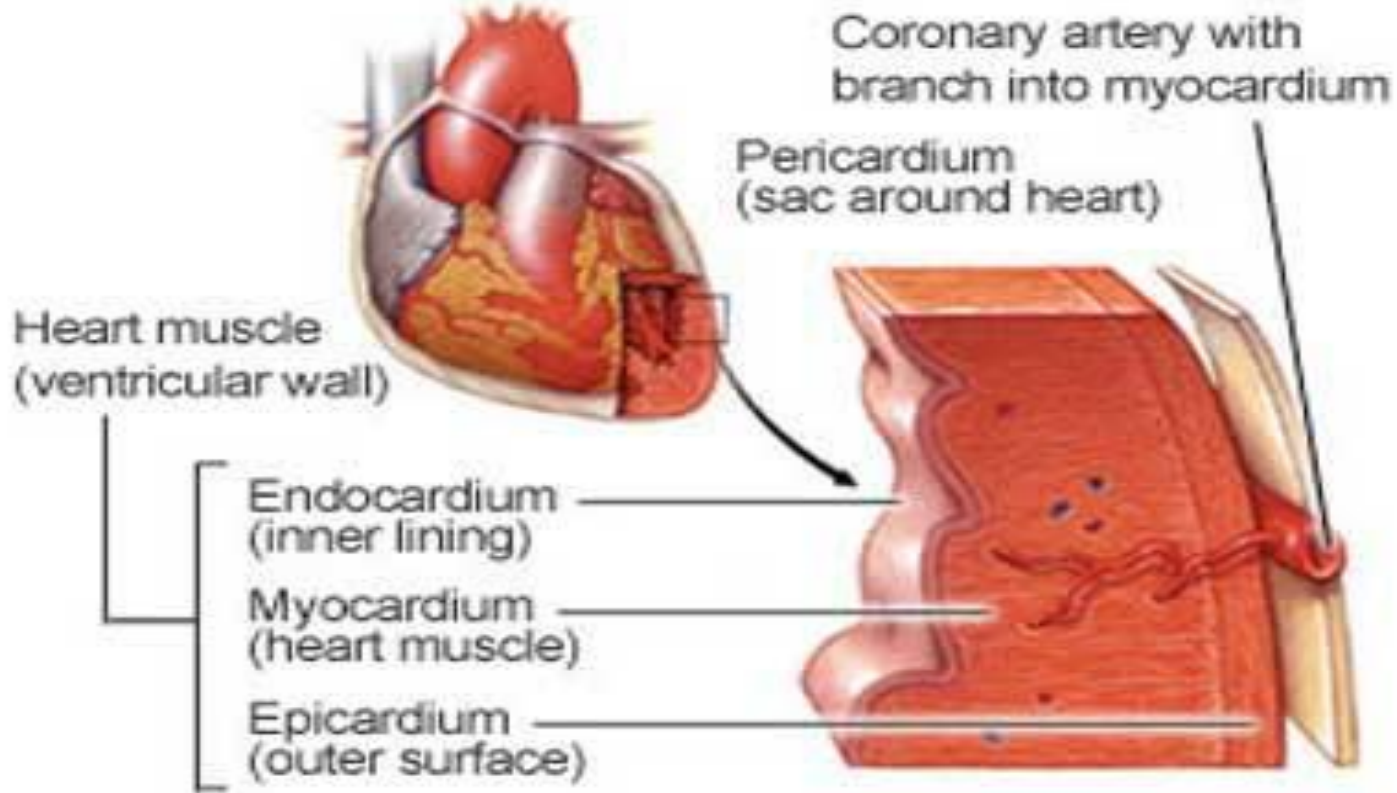
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Objectives

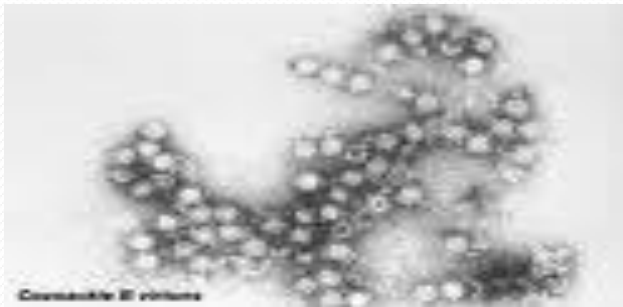
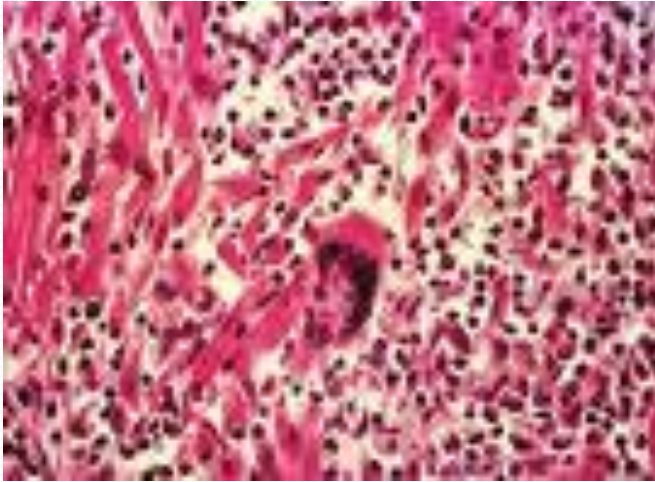
- Describe the epidemiology, risk factor for myocarditis.
- Explain the pathogenesis of myopericarditis.
- Differential between the various types of myocarditis and pericarditis.
- Name various etiological agents causing myocarditis and pericarditis.
- Describe the clinical presentation and differential 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 eg. Toxins, drugs & hypersensitivity immune response.
- **Viral infection is the most common cause**



Myocarditis



Epidemiology ,Etiology and Risk Factors

- **Epidemiology** : no accurate estimate of incidence as many cases are mild & brief and diagnosis is not made.
- **Etiology** : **Coxsackie virus B** is the most common cause of myocarditis.

Other virus : **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.

Etiology-continue

- Parasitic causes includes Chagas diseases, *Trichinella spiralis*, *Toxoplasma gondii* and *Echinococcus*.
- **Others organisms includes *Rickettsiae*, Fungi, *Chlamydia*, enteric pathogens, *Legionella* and *Mycobacterium tuberculosis*.**
- **Giant cell myocarditis** due to Thymoma, SLE (*systemic lupus erythromatosis*) or Thyrotoxicosis.

Infectious	Noninfectious
<p>Viruses</p> <ol style="list-style-type: none"> 1. Coxsackie B 2. HIV 	<p>Systemic Diseases</p> <ol style="list-style-type: none"> 1. SLE 2. Sarcoidosis 3. Vasculities(Wegener's disease) 4. Celiac disease
<p>Bacterial</p> <ol style="list-style-type: none"> 1. <i>Corynebacterium diphtheriae</i> (diphtheria) 	<p>Neoplastic infiltration</p>
<p>Protozoan</p> <ol style="list-style-type: none"> 1. <i>Trypanosoma cruzi</i> (Chagas disease) 	<p>Drugs & Toxins</p> <ol style="list-style-type: none"> 1. Ethanol 2. Cocaine 3. Radiation 4. Chemotherapeutic agents - Doxorubicin
<p>Spirochete</p> <ol style="list-style-type: none"> 1. <i>Borrelia burgdorferi</i> (Lyme 	

Clinical Presentation of myocarditis

- **Highly variable** :may occur 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 most viral infections
- **Chest pain, arrhythmias ,sweating , fatigue and may present with congestive heart failure.**

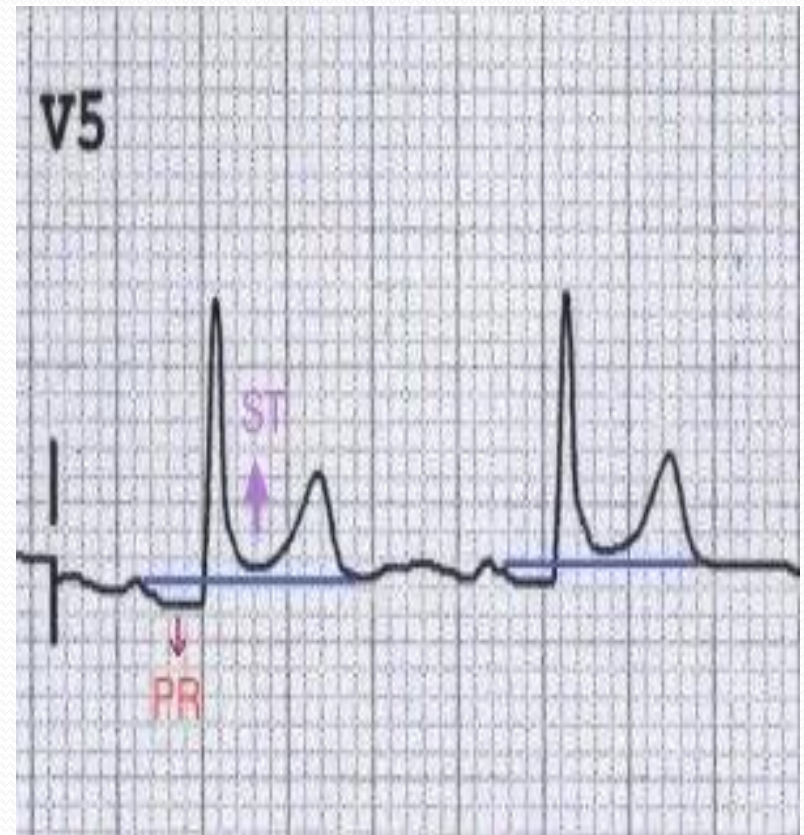
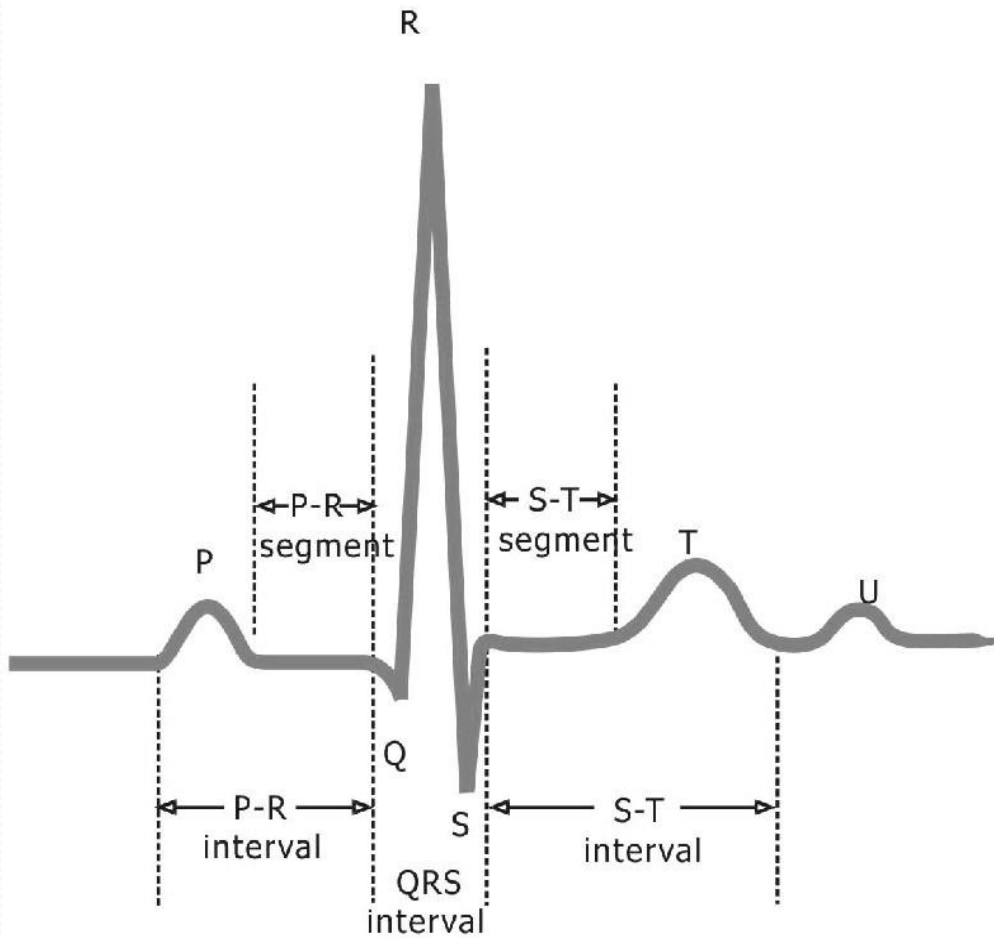
Differential Diagnosis

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

Diagnosis of myocarditis

- WBCs, ESR, Troponin 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**

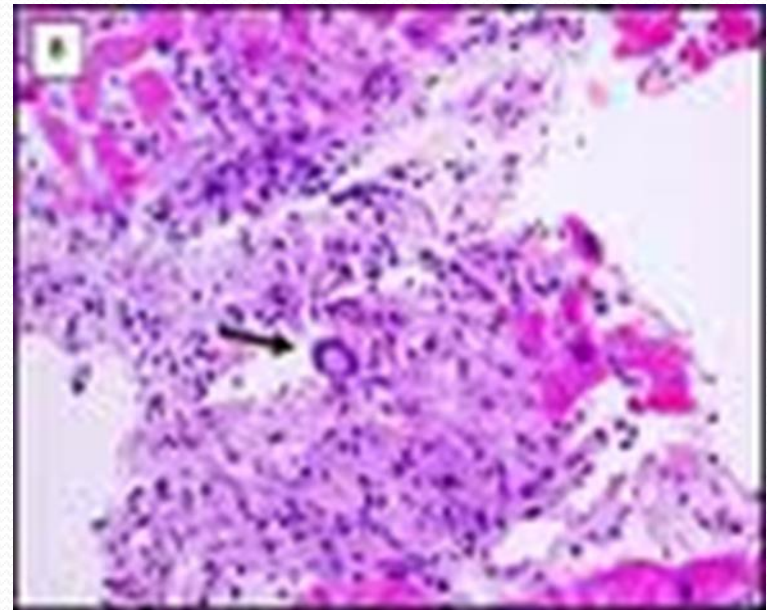
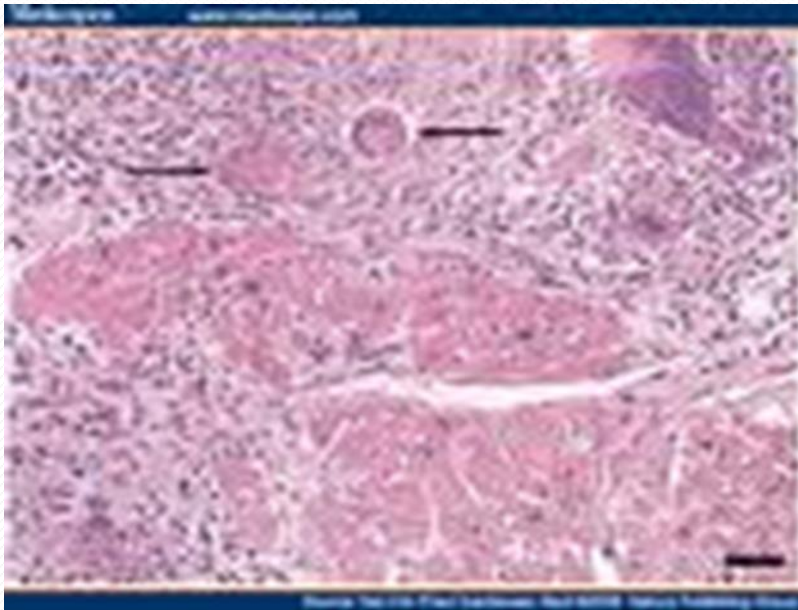
ECGs of normal heart & heart with myocarditis



Endomyocardial Diagnosis

Pathologic examination is not sensitive . It may reveal lymphocytic inflammatory response with necrosis.

“Giant cells” may be seen.



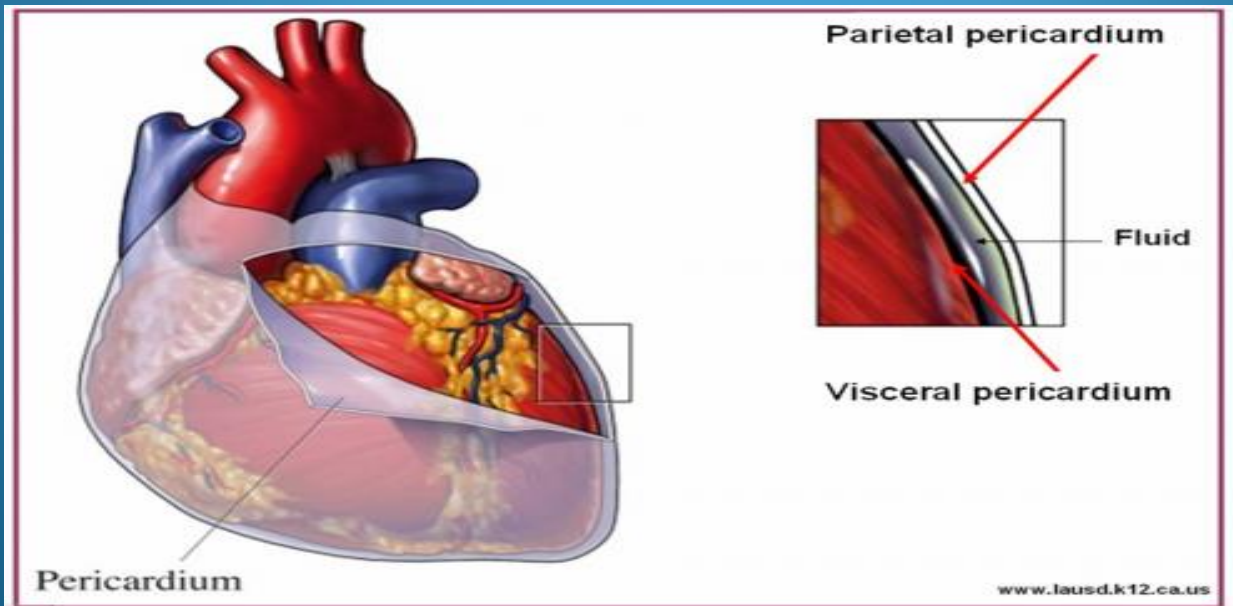
Management of myocarditis

- **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 of myocarditis

- **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)
- **Etiology :**

Viral Pericarditis:

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

- **Bacterial Pericarditis** usually a complication of pulmonary infections (e.g. pneumonia ,empyema):
organisms :*S. pneumonia*, ***M. tuberculosis***, *S. aureus*,
H. influenzae, *K. pneumoniae* & *Legionella*.
HIV patients may develop pericardial effusions caused by: *M.tuberculosis* or *M. avium* complex.
- **Disseminated fungal infection** caused by :
Histoplasma, *Coccidioides*.
- **Parasitic infections** eg.disseminated toxoplasmosis,
contagious spread of *Entamoeba histolytica* - are rare causes.

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.

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

causes:

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

Clinical presentation of pericarditis

Acute pericarditis:

- **Sudden** pleuritic chest pain (positional retrosternal)
- Dyspnea
- Fever
- **On examination** : Pericardial rub, exaggerated pulses , paradoxus JVP and tachycardia.
- As the pericardial pressure increases, palpitations , presyncope or syncope may occur.

Chronic pericarditis:

- Tuberculous pericarditis has **insidious** onset .

Tuberculous Pericarditis

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

Acute Pericarditis

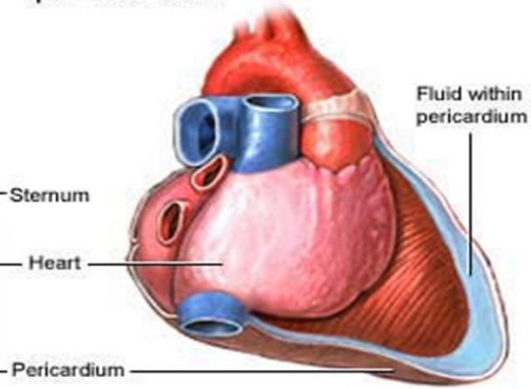
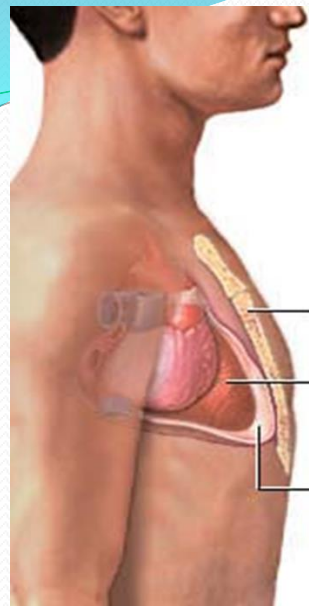
Differential Diagnosis

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

Investigations & 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.
- **Immunology /Serology** : Antinuclear antibody tests and Histoplasmosis complement fixation indicated in endemic area.

Compression of the heart due to fluid accumulation within the pericardium



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Concave-up ST elevation



PR segment depression

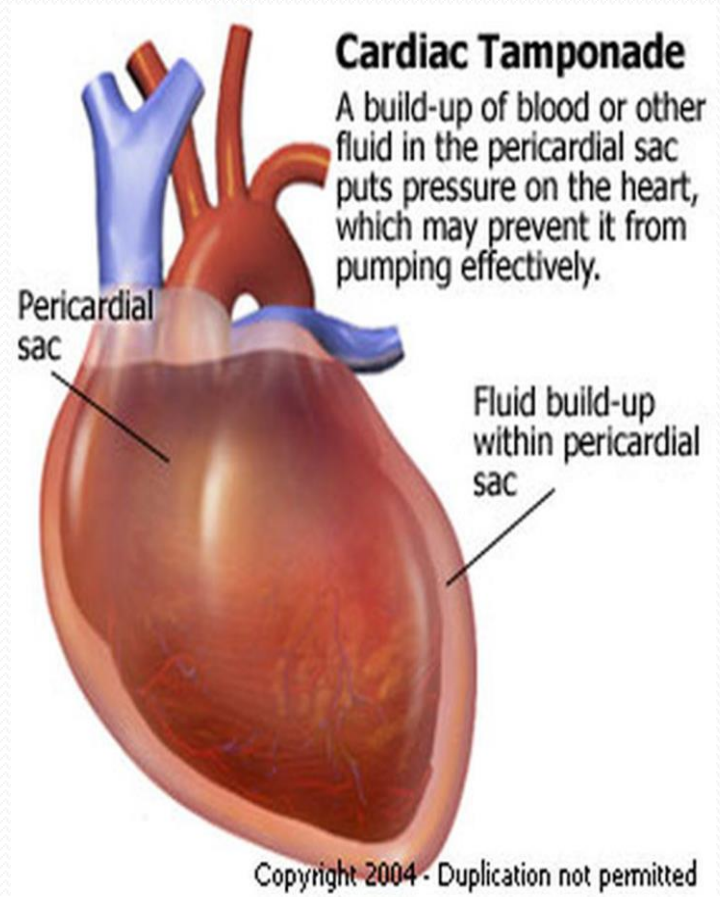
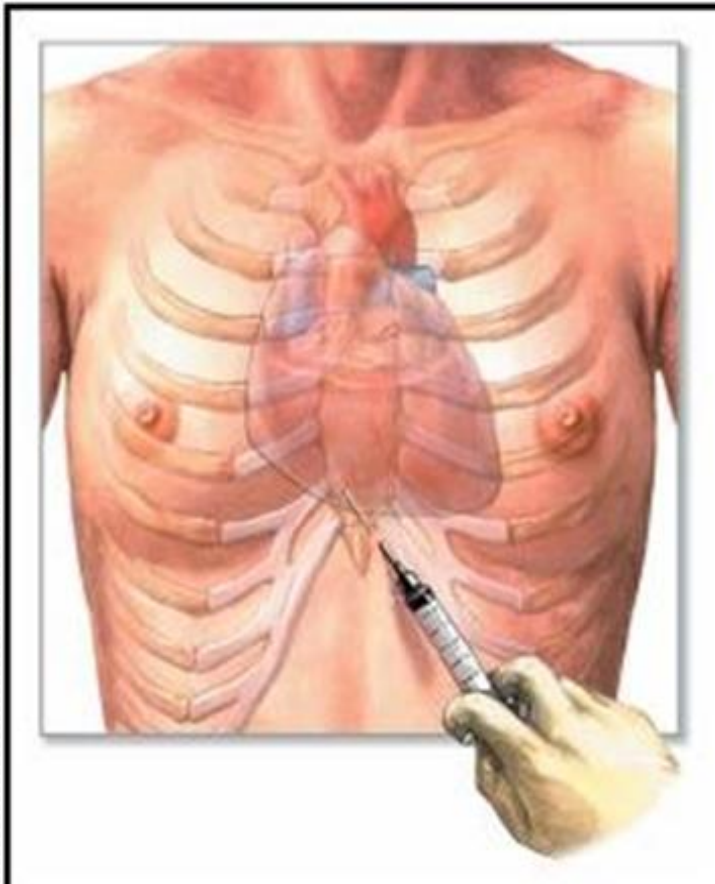
Management of pericarditis

- Management is largely supportive for cases of idiopathic and viral pericarditis including bed rest , NSAIDS and Colchicine.
- Corticosteroid use 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 .

Pericardiocentesis



Management of pericarditis

- **Pericardiocentesis** : a therapeutic procedure to remove fluid from the pericardium (to relief Tamponade).
- Patients who recovered should be observed for recurrence.
- Symptoms due to viral pericarditis usually subsided within one month.