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MEDICINE
KING SAUD UNIVERSITY
436

Lecture :
Myocarditis and pericarditis

important
Extra notes
Doctors notes

"لا حول ولا قوة إلا بالله العلي العظيم" وتقال هذه الجملة إذا دهم الإنسان أمر عظيم لا يستطيعه ، أو يصعب عليه القيام به .

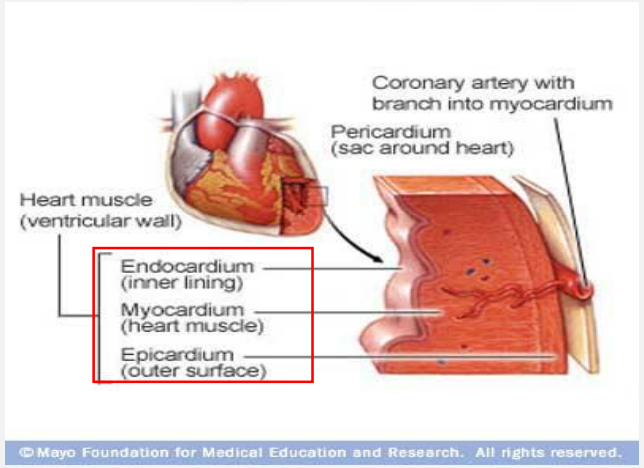
Objectives:

- 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.

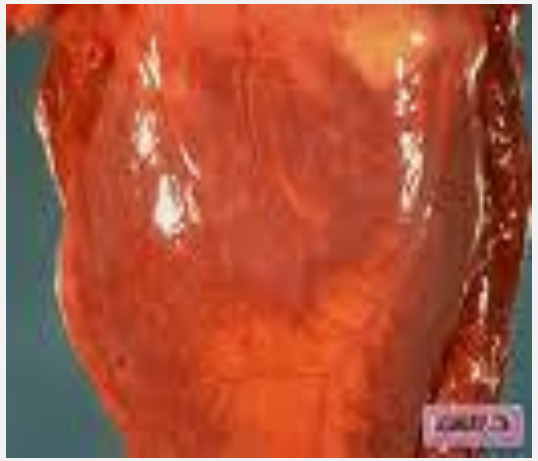
Myocarditis:

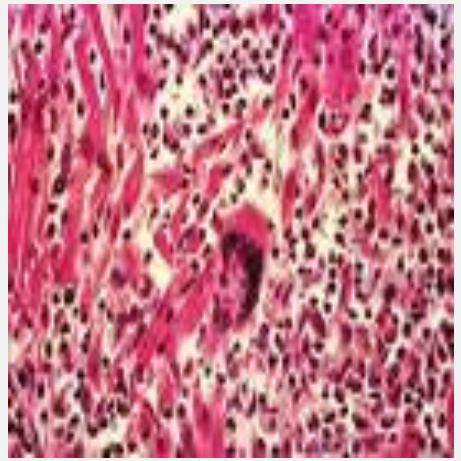
Introduction:

- **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.
- Very 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



Inflamed heart





Myocarditis: Epidemiology \ Etiology \ Risk Factors

- **Epidemiology :**
  - ✓ no accurate estimate of incidence as many cases are mild & brief and diagnosis is not made.
- **Etiology :**
  (in the next slide as a table)

- Giant cell myocarditis due to Thymoma, SLE (systemic lupus erythromatosis) or Thyrotoxicosis.

(*the patients don't usually go to the hospital because : they either present with flu-like symptoms or they die suddenly 10%)

Infectious	Noninfectious
Viruses:	Systemic Diseases
✓ Coxsackie virus B (an RNA) is the **most common** cause. ✓ HIV ✓ Other virus : Coxsackie virus A, Echoviruses, Adenoviruses ,Influenza, EBV, Rubella, Varicella, Mumps, Rabies, Hepatitis viruses	1. SLE 2. Sarcoidosis 3. Vasculities(Wegener's disease) 4. Celiac disease
Bacterial:	Neoplastic infiltration
1. Corynebacterium diphtheriae (**cause** diphtheria) (cause heart block) 2. **Treponema pallidum** (**cause** Syphilis داء الزهري) 3. Borrelia burgdorferi (**cause** Lyme disease) it's Spirochete* 4. or as a complication of bacterial endocarditis	———
Parasite:	Drugs & Toxins
1. Trypanosoma cruzi (**cause** Chagas disease) 2. Trichinella spiralis 3. Taxoplasma gondii (from cats) 4. Echinococcus (prevalent in Africa)	1. Ethanol 2. Cocaine 3. Radiation 4. Chemotherapeutic agents : Doxorubicin
Others organisms :	
Rickettsiae*, Fungi, Chlamydia*, enteric pathogens (salmonella typhi), , Legionella* and Mycobacterium tuberculosis.	

C. Diptheria: gram positive bacilli
T. Pallidum: spirochete
B. Burgdorferi: spirochete
*** Gram negative non spore forming**

Myocarditis:

Clinical Presentation of myocarditis

- Highly variable :may occur days to weeks after onset of acute febrile (with fever) illness or with heart failure without any known antecedent symptoms .
- Fever, headache, muscle aches, diarrhea, sore throat and rashes similar to most viral infections
- Presenting symptoms: Chest pain, arrhythmias ,sweating , fatigue and may present with congestive heart failure.

Differential Diagnosis

(They have the same symptoms as myocarditis)

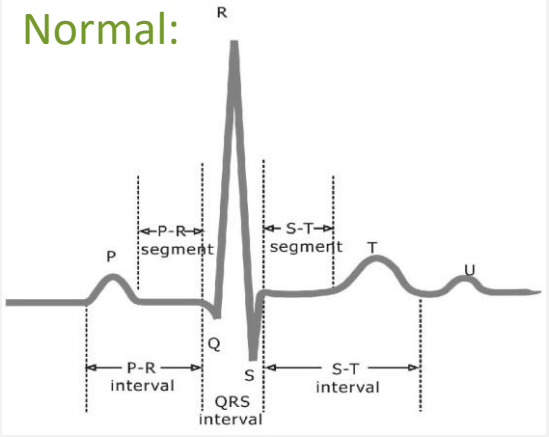
- Acute Myocarditis
- Vasculitis
- Cardiomyopathy (due to drugs or radiation)

Myocarditis:

Diagnosis of myocarditis

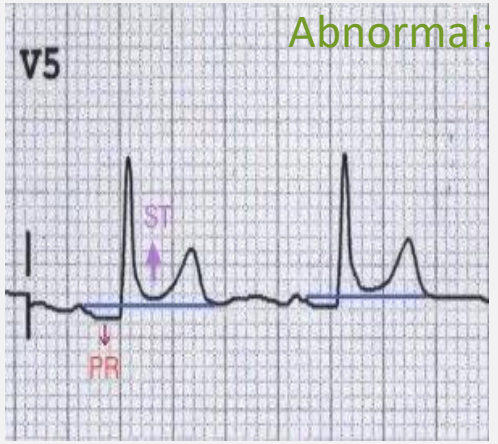
- **Hematology** :WBCs, ESR, CBC
- **biochemistry** :Troponin and CK-MB* usually elevated ECG (nonspecific ST-T changes and conduction delays are common)
- **microbiology** :Blood cultures / Viral serology (blood sample to look for antibodies IgM,IgG) and other specific test for Lyme disease, diphtheria and Chagas disease may be indicated on a case by case basis.
- Radiology : Chest X-rays shows cardiomegaly (enlarged cardiac size) / ECG changes (but not specific like in pericarditis) / MRI and Echocardiogram
- Heart muscle biopsy (the last step)

Normal:



ECGs of normal heart & heart with myocarditis

Abnormal:

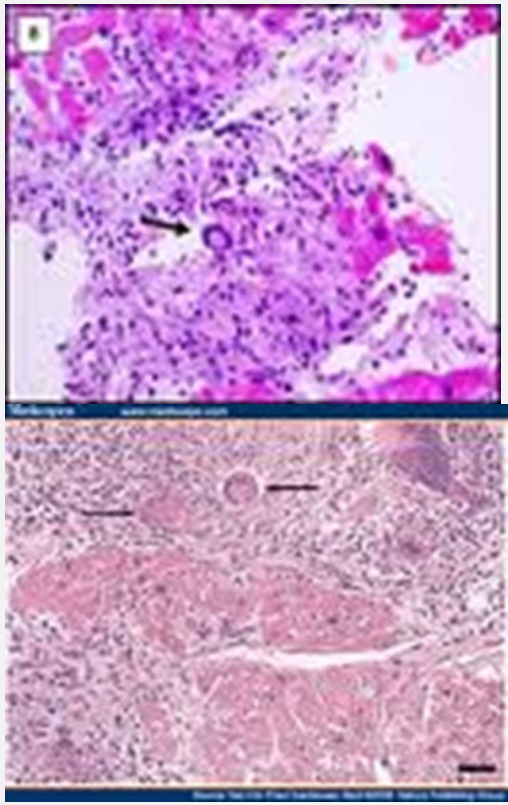


*CK-MB : Creatine Kinase – Muscle and Brain. CK-MB is specific for heart (cardiac marker) // CBC and Serology commonly done to detect Virus

Myocarditis:

Endomyocardial Diagnosis

- Pathologic examination is not sensitive because of the patchy areas of distribution. . It may reveal lymphocytic inflammatory response with necrosis.
- "Giant cells" may be seen
- "Dallas" criteria for histopathologic diagnose **(only in males slides).**



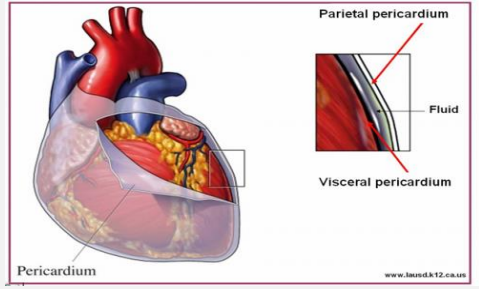
Myocarditis:

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 (last option)
- Most cases of viral myocarditis are self limited.
- Isolate and bed-rest
- 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.

Coxsackie virus B is usually self limiting there is no need for antiviral.

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 (gram positive cocci) , M. tuberculosis (the most common) , S. aureus (gram positive cocci), H. influenza (gram negative coccobacilli), K. pneumoniae (gram negative bacilli) & Legionella.
    - ✓ HIV patients may develop pericardial effusions caused by: M.tuberculosis or M. avium complex .
  - Disseminated fungal infection caused by: * usually affect immunosuppressed patients*
    - ✓ Histoplasma, Coccidioides.
  - Parasitic infections :
    - ✓ eg.disseminated toxoplasmosis*, contagious spread of Entamoeba histolytica - are **rare causes**.

(طفيليات تنتقل عن طريق القطط)

Pericarditis:

Pathophysiology:

spread

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

- 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 (for that it will not move).

*Within time of inflammation fibrosis occur , cause restriction during diastole = heart can't expand
* If there is pus in the pericardium effusion that means it's a bacterial infection.

Pericarditis:

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.*it causes destruction of the heart *

Types of Effusive Fluid:

- **Serous:**
  - ✓ Transudative - heart failure
- **Suppurative:** (discharge pus)
  - ✓ Pyogenic infection with cellular debris and large number of leukocytes
- **Hemorrhagic:**
  - ✓ Occurs with any type of pericarditis especially with infections and malignancies
- **Serosanguinous:** (suppurative + serous)

Pericarditis:

Constrictive Pericarditis:

Causes:

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

Clinical presentation of pericarditis:

- Acute pericarditis*:
  - Sudden pleuritic chest pain (stabbing pain) prominent (positional retrosternal)
  - Dyspnea
  - Fever
  - Friction rub
  - On examination : Pericardial rub, exaggerated pulses , paradoxus JVP and tachycardia.
  - As the pericardial pressure increases, palpitations , presyncope or syncope may occur.
- Chronic pericarditis:
  - Patient with Tuberculous pericarditis has insidious onset of symptoms .

*Very severe pleural pain which generate from the back and goes away if he sit down .

Pericarditis:

Tuberculous Pericarditis :(chronic)

- 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 Pericardial biopsy : to detect granuloma.

- (If not caused by virus, it can be commonly TB (it can affect any organ including commonly pericarditis , after lung and extrapulmonary)
- (In TB, Pericarditis fluid is -ve of the mycobacterium because it contains mycolic acid that have a waxy material that causes it to stick to the tissues)

Tuberculin skin test : to detect pre-exposure to TB but It can cross reactions if the patient had vaccine.

Pericarditis:

Investigations & Diagnosis:

- ECG (specific) will show ST elevation, PR depression and T-wave inversion may occur later.
- Echocardiogram
- Blood culture
- Leukocytosis and an elevated ESR are typical
- Other routine testing : urea and creatinine.
- Tuberculin (PPD) 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.

Acute Pericarditis:

Differential Diagnosis:

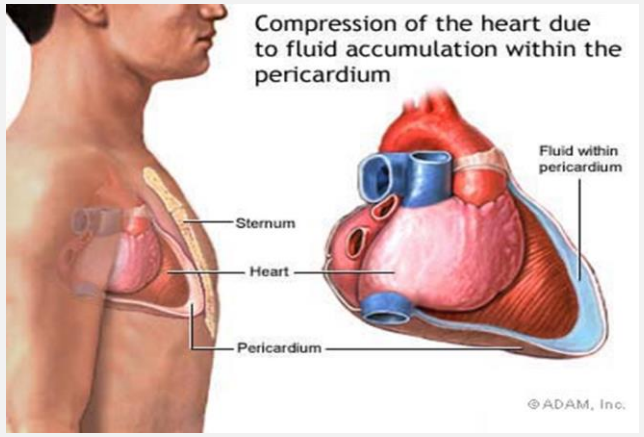
- Acute myocardial infarction
- Pulmonary embolism
- Aortic dissection
- Pneumonia

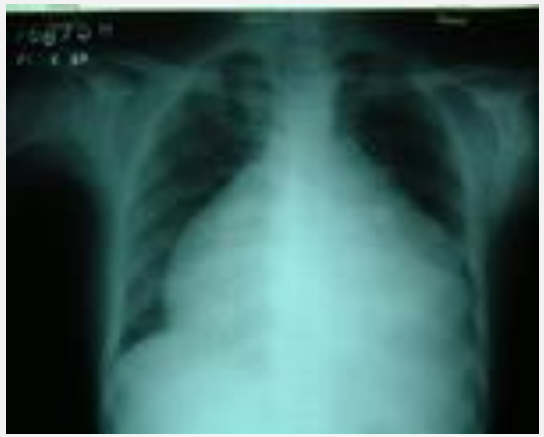
BUT the identified symptom of acute pericarditis is the pericardial rub.

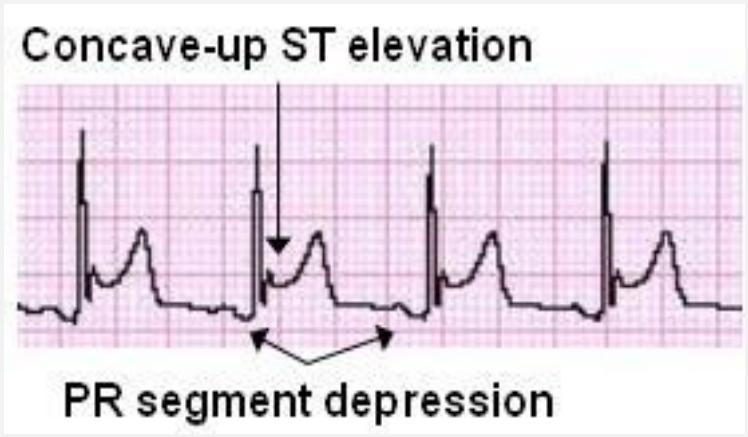
Pericarditis:

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 .







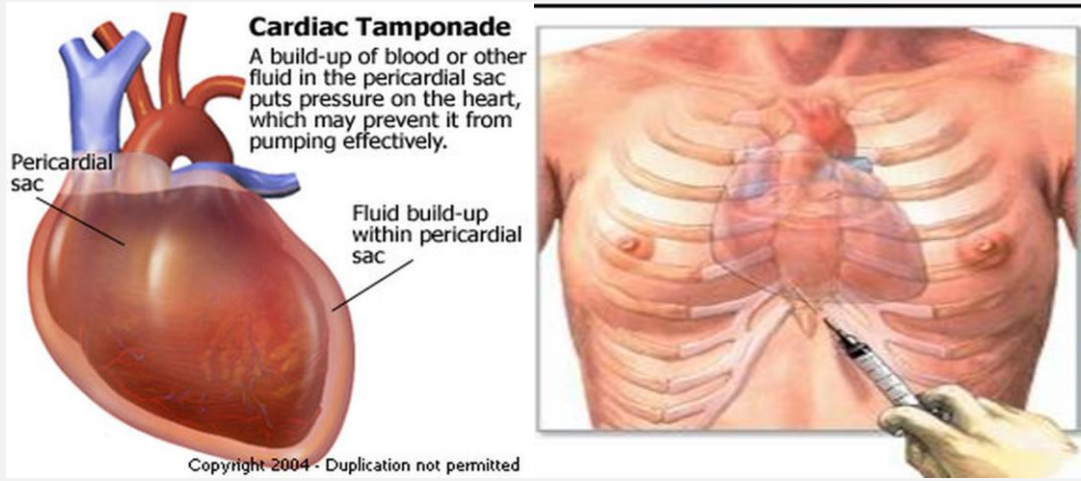
Accumulation of Fluid will cause restricted movement of heart and dyspnea

Pericarditis:

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.
- Uremic, rheumatic, collagen in 30% of patients include pericardial effusion and tamponade, constrictive Pericarditis and pleural effusion.
- Restrictive Pericarditis and heart failure.

Pericardiocentesis



*Management similar to Myocarditis But steroid more effective here

GOOD LUCK!

MICROBIOLOGY TEAM:

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- Omar albabtain
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- Khalid Alhusainan
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