PERICARDIAL DISEASE

FAROUK MOOKADAM MD FRCPC FACC MSC (HRM)
PROF CARDIOVASCULAR DISEASES, U OF A
MEDICAL DIRECTOR CARDIO ONCOLOGY MDA

AUG 9TH 2022

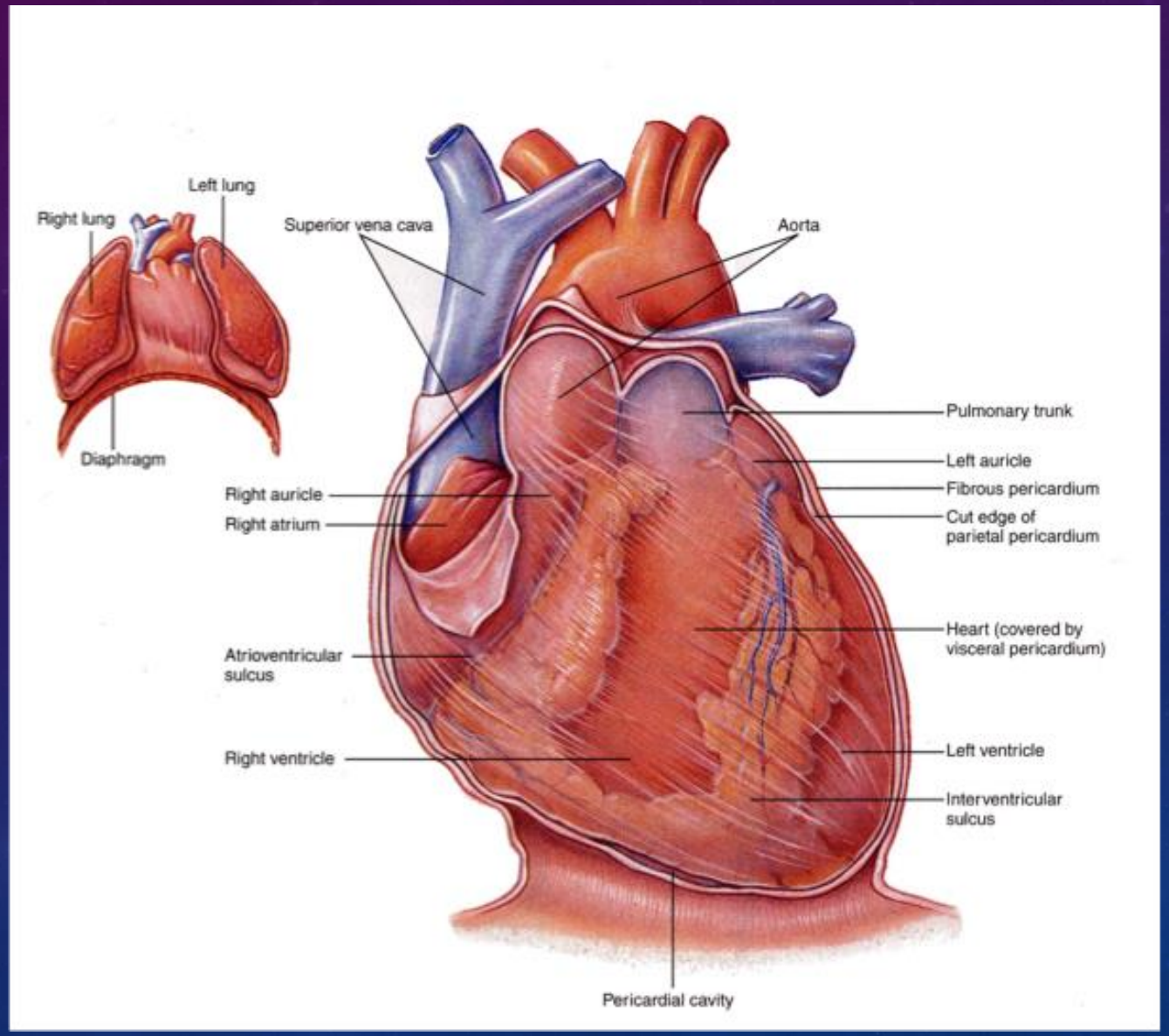
GOALS AND OBJECTIVES

1. Describe the classic presentation of acute pericarditis and 4 diagnostic criteria
2. Know the ECG findings seen in acute pericarditis
3. Describe the differential diagnosis for acute pericarditis and know the high risk features that may require hospitalization
4. Describe the first-line GDMT for *acute* pericarditis.
5. Describe the pathophysiology and diagnostic criteria of tamponade
6. Describe the clinical syndrome, evaluation and diagnosis of constrictive pericarditis. Describe the difficulties making the diagnosis by non-invasive means and how the diagnosis can be made with invasive hemodynamic evaluation

INTRODUCTION

- The pericardium is a fibroelastic sac made up of visceral and parietal layers separated by a (potential) space, the pericardial cavity.
- The normal pericardial cavity contains 15- 50 mL of an ultrafiltrate of plasma or pericardial fluid
- Production balanced by resorption

PERICARDIUM



DISEASES OF THE PERICARDIUM
CLINICAL SYNDROMES

- Acute and recurrent pericarditis
- Pericardial effusion without major hemodynamic compromise
- Cardiac tamponade
- Constrictive pericarditis
- Effusive-constrictive pericarditis

DEFINITIONS

- ***Acute pericarditis*** refers to inflammation of the pericardial sac.

- ***Myopericarditis, or perimyocarditis***, is used for cases of acute pericarditis that also demonstrate features consistent with myocardial inflammation

DIAGNOSTIC CRITERIA FOR ACUTE PERICARDITIS

- **TYPICAL CHEST PAIN**
- **PERICARDIAL FRICTION RUB**
- **TYPICAL ECG CHANGES (widespread ST elevation)**
- **NEW OR WORSENING PERICARDIAL EFFUSION**

Imazio M, Trinchero R. Triage and management of acute pericarditis. Int J Cardiol 2006, doi:10.1016/j.ijcard.2006.07.100.

REGARDING PERICARDITIS WHICH STATEMENT IS TRUE

A. Incessant pericarditis lasts for >4-6 weeks, but <3 months without remission

B. Recurrent pericarditis is pericarditis that recurs after a symptom-free interval of at least 4-6 weeks. ASA/NSAIDs until symptom relief + colchicine (for 6 months)

C. Chronic pericarditis is pericarditis lasting >3 months.

D. A and C

E. All of the above

CONSIDERING ECG CHANGES IN ACUTE PERICARDITIS. WHICH OF THE FOLLOWING ARE CORRECT

A. Upsloping ST elevation
B. P-R elevation aVR (Neg in other leads)
C. Diffuse leads affected
D. No reciprocal changes
E. Ask Dr Expert
F. All of the above

ECG DIFFERENTIATION FROM ACUTE MYOCARDIAL INFARCTION

- **Both present with chest pain and elevations in cardiac biomarkers**

- **ECG changes in acute pericarditis differ from those in acute ST-elevation MI (STEMI) in several ways**

PATIENT A

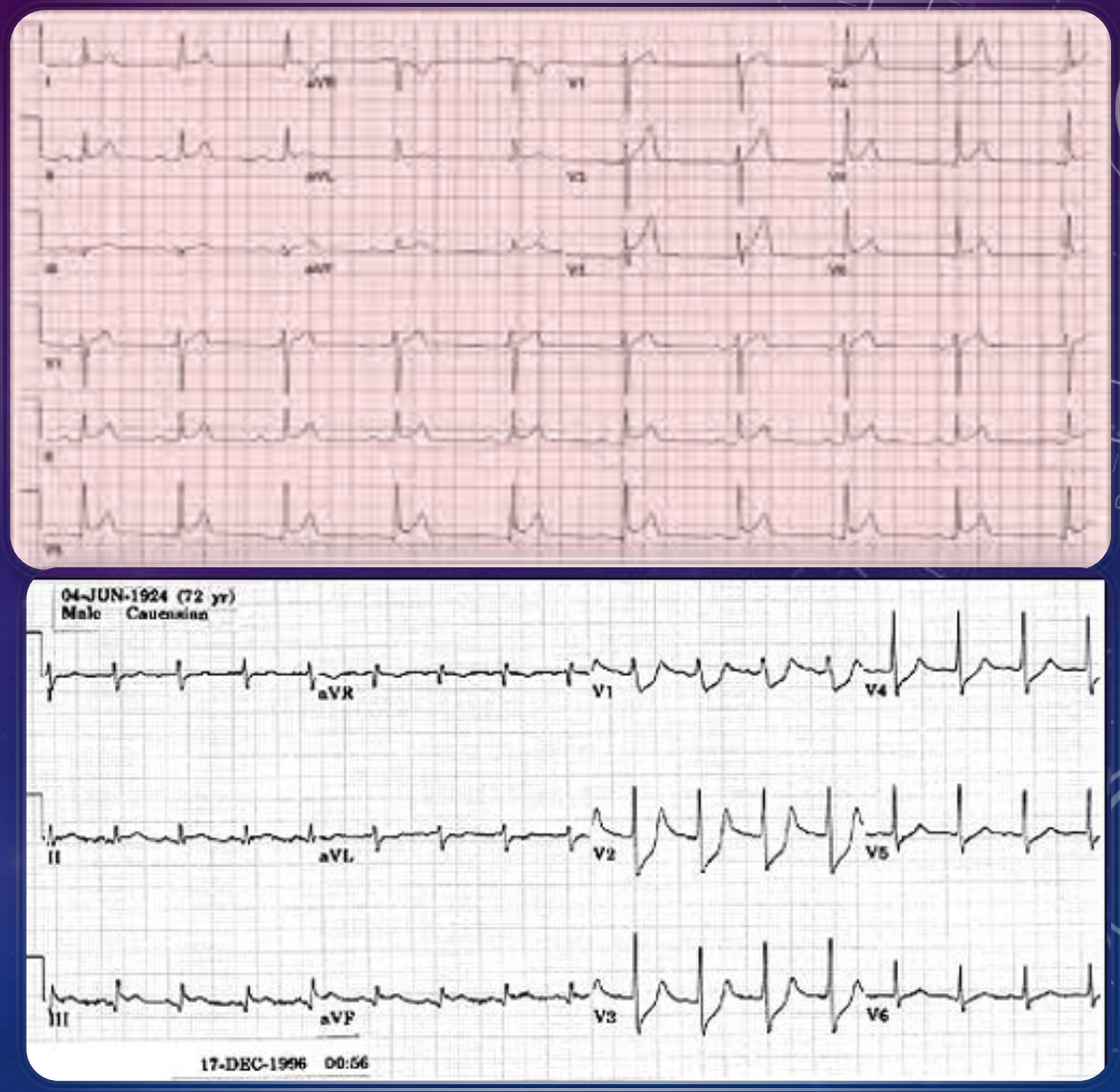
- 52 yr old male presents with Chest Pain, radiates to the neck. Otherwise healthy, jogs regularly, pride in fitness level, fully vaccinated 3 rd booster 2 weeks ago and goes to the gym 4 times a week for 90 minutes

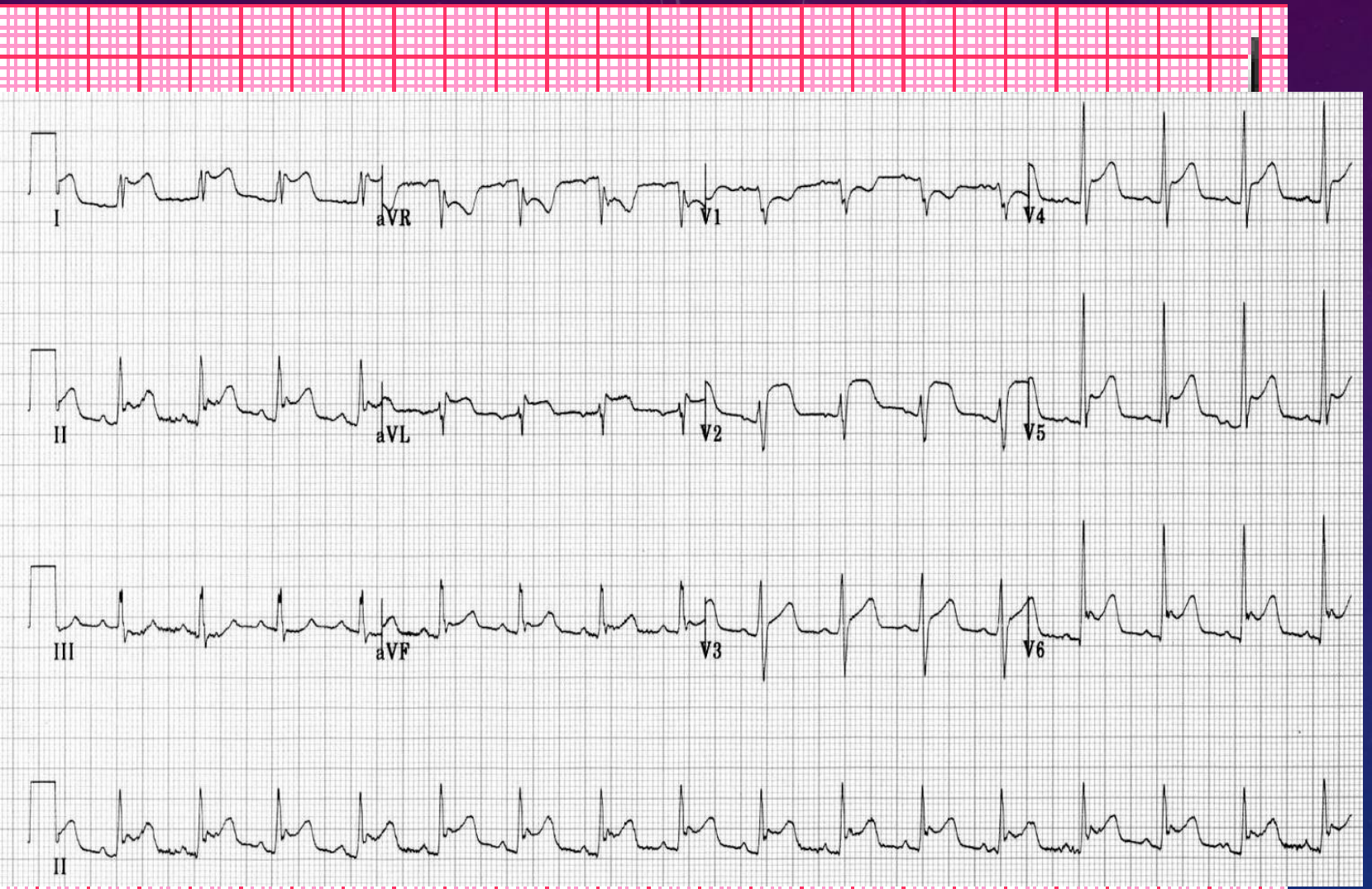
PATIENT B

42 F , HTN, Remote smoker, 4 yr yrs, HIV positive on retrovirals, presents with Chest Pain. Not vaccinated, recently developed chest pain in the preceding 2 weeks, waxes and wanes. Unclear of precipitating or relieving factors. Awoke her from sleep last evening

WHICH ECG REPRESENTS PATIENT A VS PATIENT B

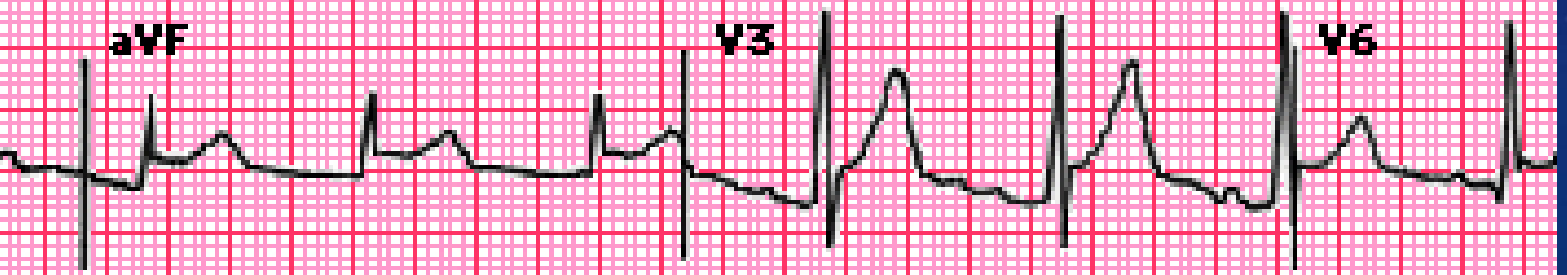
- Diffuse ST
- <5 mm ST elevation
- P-R elevation aVr
- No reciprocal changes
- No Localising changes





THE ECG

- Upsloping ST elevation
- P-R elevation aVR (Neg in other leads)
- Diffuse leads affected
- No reciprocal changes



ACUTE MI
EVOLVING ECG CHANGES

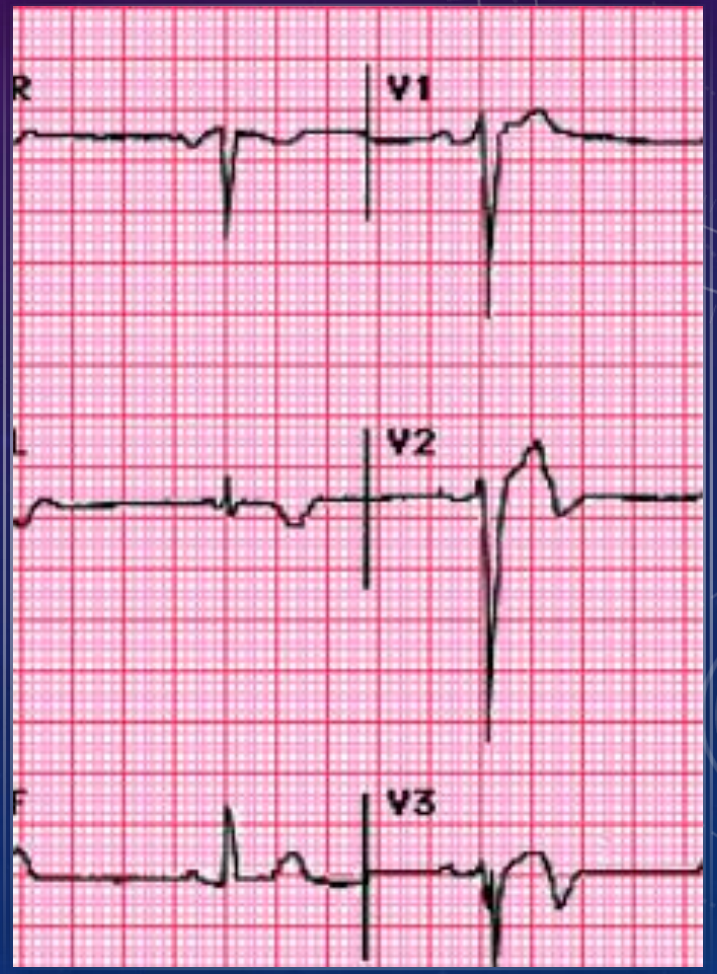
Morphology: Dome shaped. >5mm height

Distribution – ST-segment elevations in STEMI limited to anatomical groupings of leads that correspond to the localized vascular area

Reciprocal changes – Acute STEMI is often associated with reciprocal ST-segment changes, which are not seen with pericarditis, except in leads aVR and V1.

Concurrent ST and T-wave changes – ST-segment elevation and T-wave inversions do not generally occur simultaneously in pericarditis

PR segment – PR elevation in aVR with PR depression in other leads due to a concomitant atrial current of injury



IN PATIENTS PRESENTING WITH ACUTE PERICARDITIS SYMPTOMS. THE DIFFERENTIAL DIAGNOSIS MAY BE….

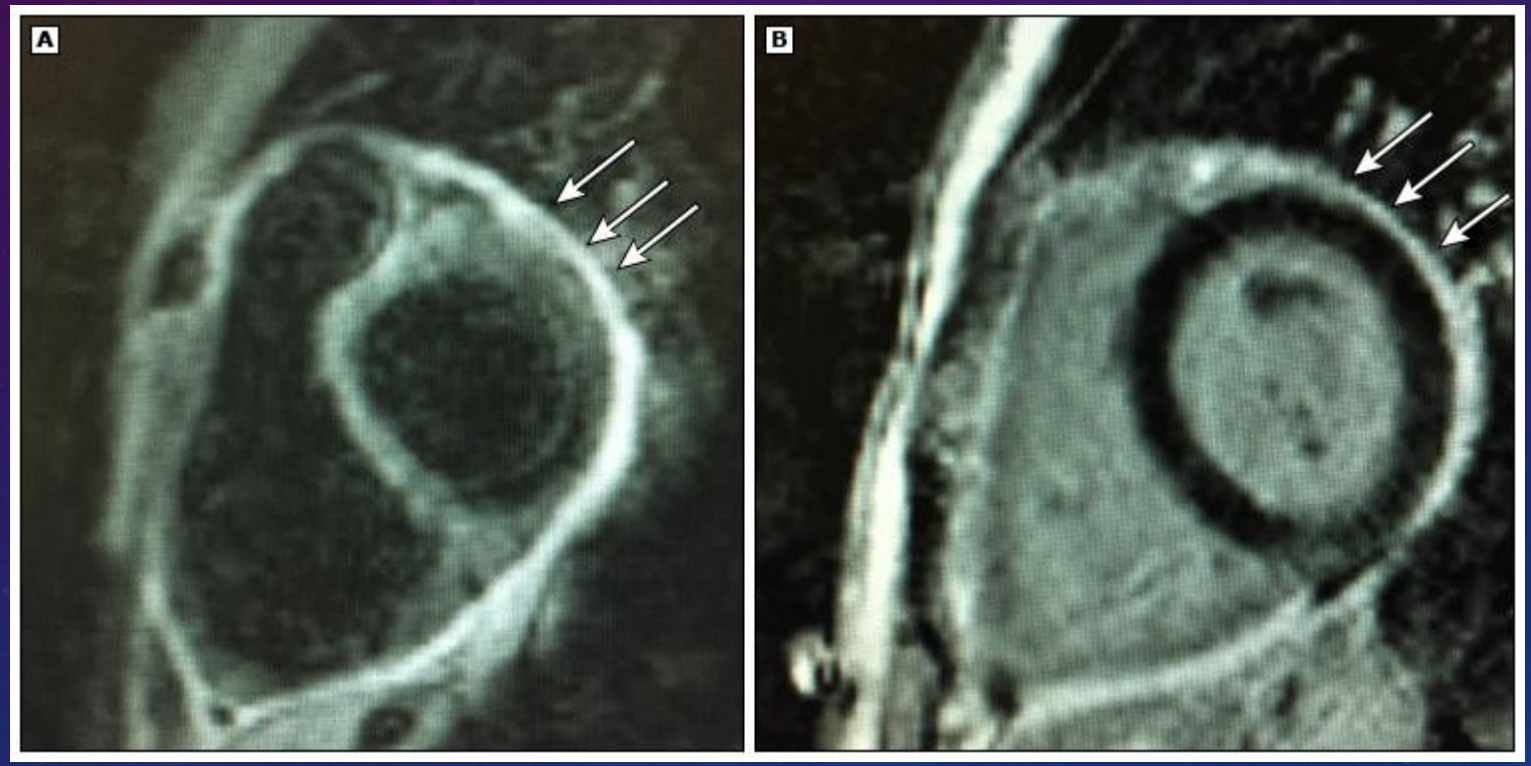
A. Bornholm's Disease
B. Tietz's Syndrome
C. Boerhave's Syndrome
D. Prinzmetal's Disease
E. Acute Aortic Syndromes
F. All of the Above

COMPUTED TOMOGRAPHY (CT)

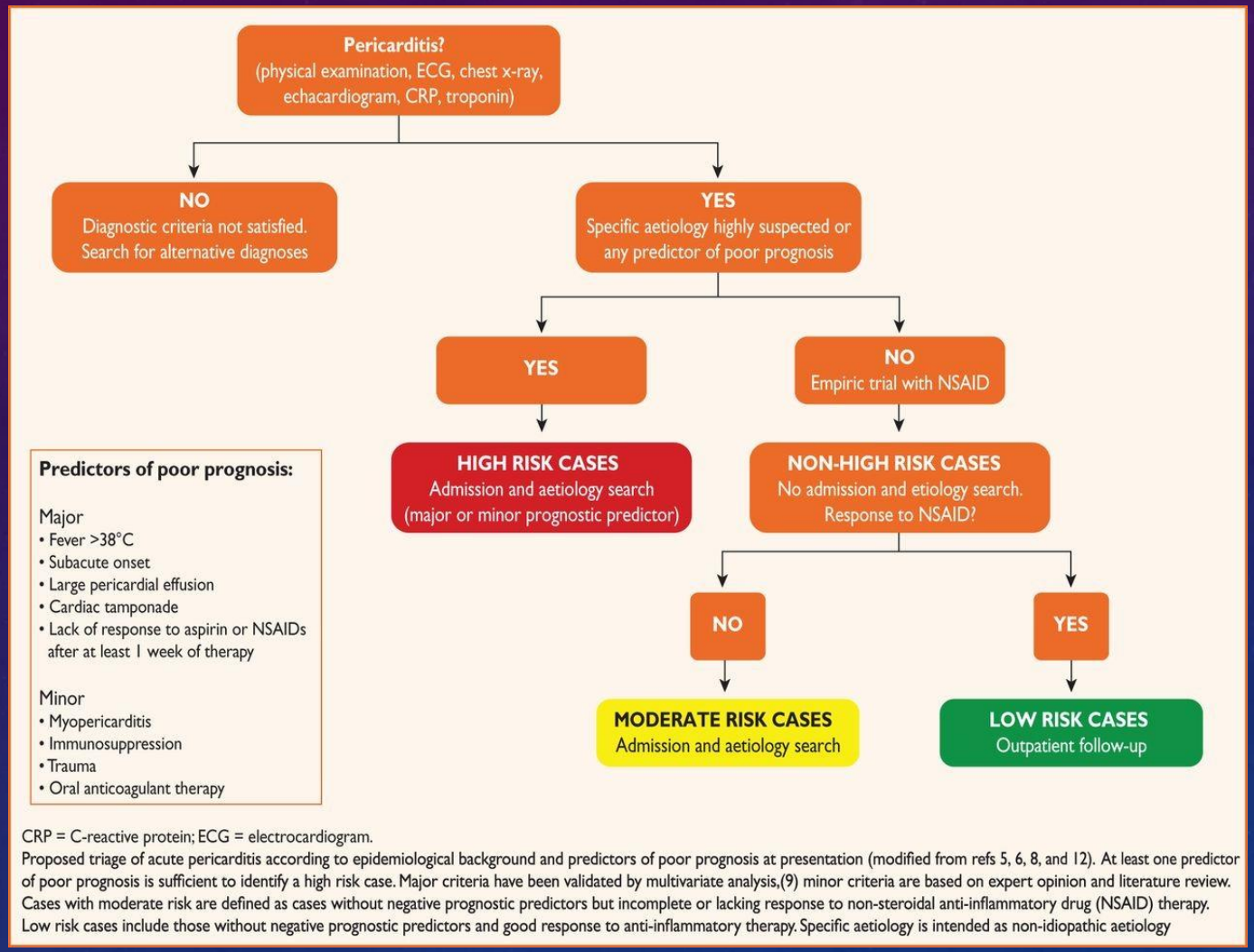
- Useful to confirm the diagnosis and to evaluate concomitant pleuropulmonary diseases and lymphadenopathies, thus suggesting a possible cause(ie tuberculosis, lung cancer)
- Pericardial thickening with effusion suggestive of acute pericarditis.
- Contrast, enhancement of the thickened visceral/parietal surfaces confirms active inflammation.
- CT allows differentiation of exudative fluid (20-60 Hounsfield units), purulent pericarditis or transudative fluid (<10 Hounsfield units).

C MRI WITH GADOLINIUM ENHANCEMENT

EDEMA *LGE*



PROPOSED TRIAGE OF PERICARDITIS.



CRP = C-reactive protein; ECG = electrocardiogram.
Proposed triage of acute pericarditis according to epidemiological background and predictors of poor prognosis at presentation (modified from refs 5, 6, 8, and 12). At least one predictor of poor prognosis is sufficient to identify a high risk case. Major criteria have been validated by multivariate analysis,(9) minor criteria are based on expert opinion and literature review. Cases with moderate risk are defined as cases without negative prognostic predictors but incomplete or lacking response to non-steroidal anti-inflammatory drug (NSAID) therapy. Low risk cases include those without negative prognostic predictors and good response to anti-inflammatory therapy. Specific aetiology is intended as non-idiopathic aetiology

Eur Heart J, Volume 36, Issue 42, 7 November 2015, Pages 2921–2964, https://doi.org/10.1093/eurheartj/ehv318

TREATMENT OF ACUTE PERICARDITIS

- **NSAID for symptom relief; then taper over 2-4 weeks**
- **Colchicine 30 days**
- **Rx Underlying Condition**

If Present Admit to Hospital

Are any of the following high-risk markers present?

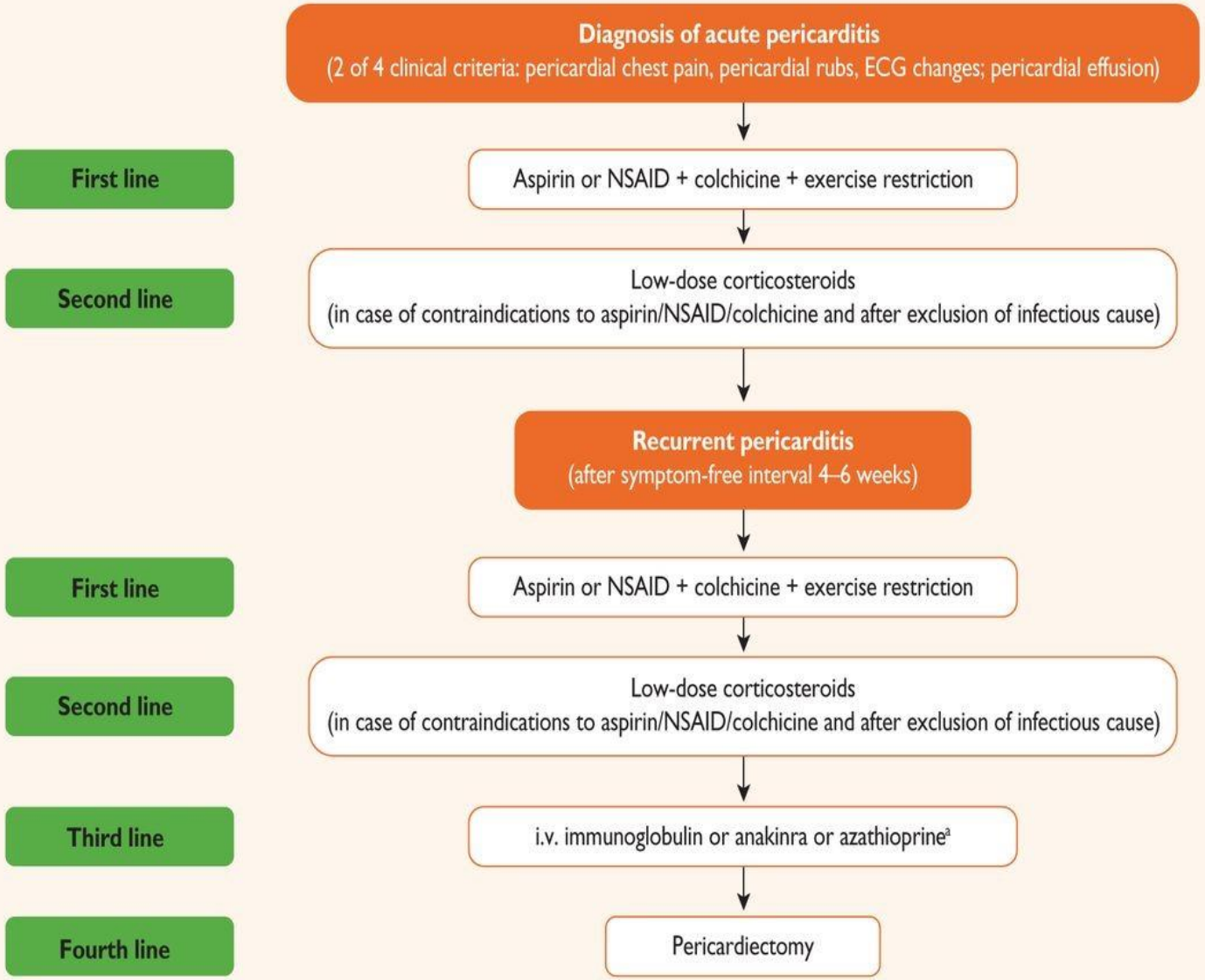
- Fever >38°C (100.4°F)
- Subacute course (without acute onset of chest pain)
- Hemodynamic compromise suggesting cardiac tamponade
- Large pericardial effusion seen by echocardiography
- Immunosuppression or immunodepressed patient
- Treatment with vitamin K antagonist or novel oral anticoagulant
- Acute trauma
- Elevated troponin suggesting myopericarditis

INCESSANT AND CHRONIC PERICARDITIS

- **The term ‘incessant’ has been adopted for cases with persistent symptoms without a clear-cut remission after the acute episode**
- **The term ‘chronic’ generally refers—especially for pericardial effusions—to disease processes lasting >3 months**
- **Relapsing/Recurrent pericarditis, after resolution of symptoms and withdrawal of medications there is a recurrence of symptoms >4-6 weeks later**

27 F 2ND TRIMESTER OF PREGNANCY PRESENTS WITH ACUTE PERICARDITIS. KNOWN POLYCYSTIC KIDNEYS. CREATE 2.2. DYDPEPSIA. TREATMENT SHOULD ENTAIL

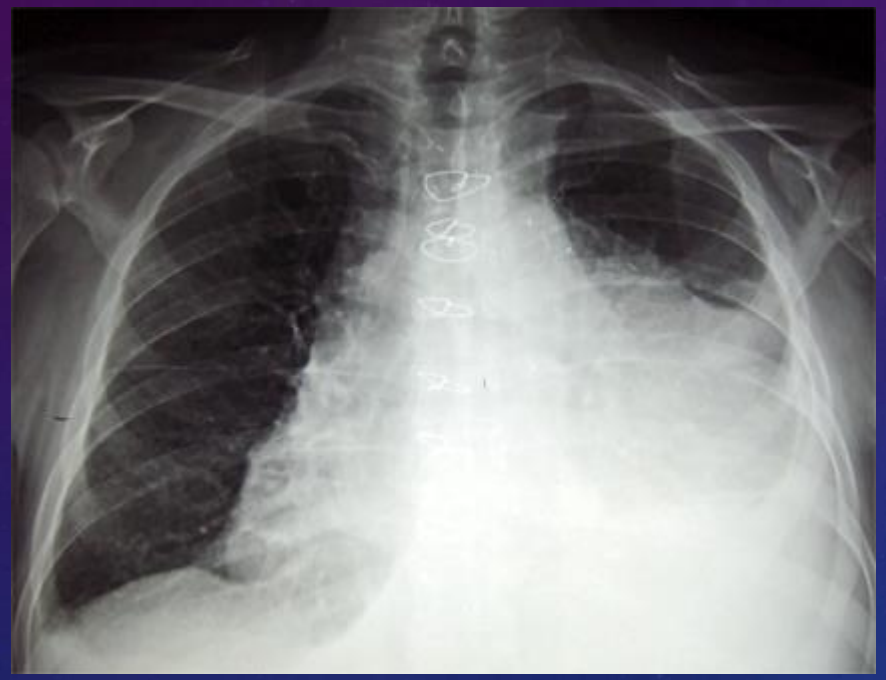
A. **Aspirin 750mg-1000 mg daily PO**
B. **Colchicine .5mg BID PO for 3 months**
C. **Naprosyn 375 mg BID PO with a PPI for the duration of 14 days**
D. **NSAID X 2weeks with colchicine and PPI for 3 months**
E. **None of the above**



Low-dose corticosteroids are considered when there are contraindications to other drugs or when there is an incomplete response to aspirin/NSAIDs plus colchicine; in this case physicians should consider adding these drugs instead of replacing other anti-inflammatory therapies.

[a]Azathioprine is steroid-sparing and has a slow onset of action compared with IVIG and anakinra. Cost considerations may apply considering the cheaper solution first (e.g. azathioprine) and resorting to more expensive options (e.g. IVIG and anakinra) for refractory cases.

ERLENMYER FLASK



- This patient is likely to present with:

A. Lung or Breast Cancer

B. Recent Cardiac Surgery

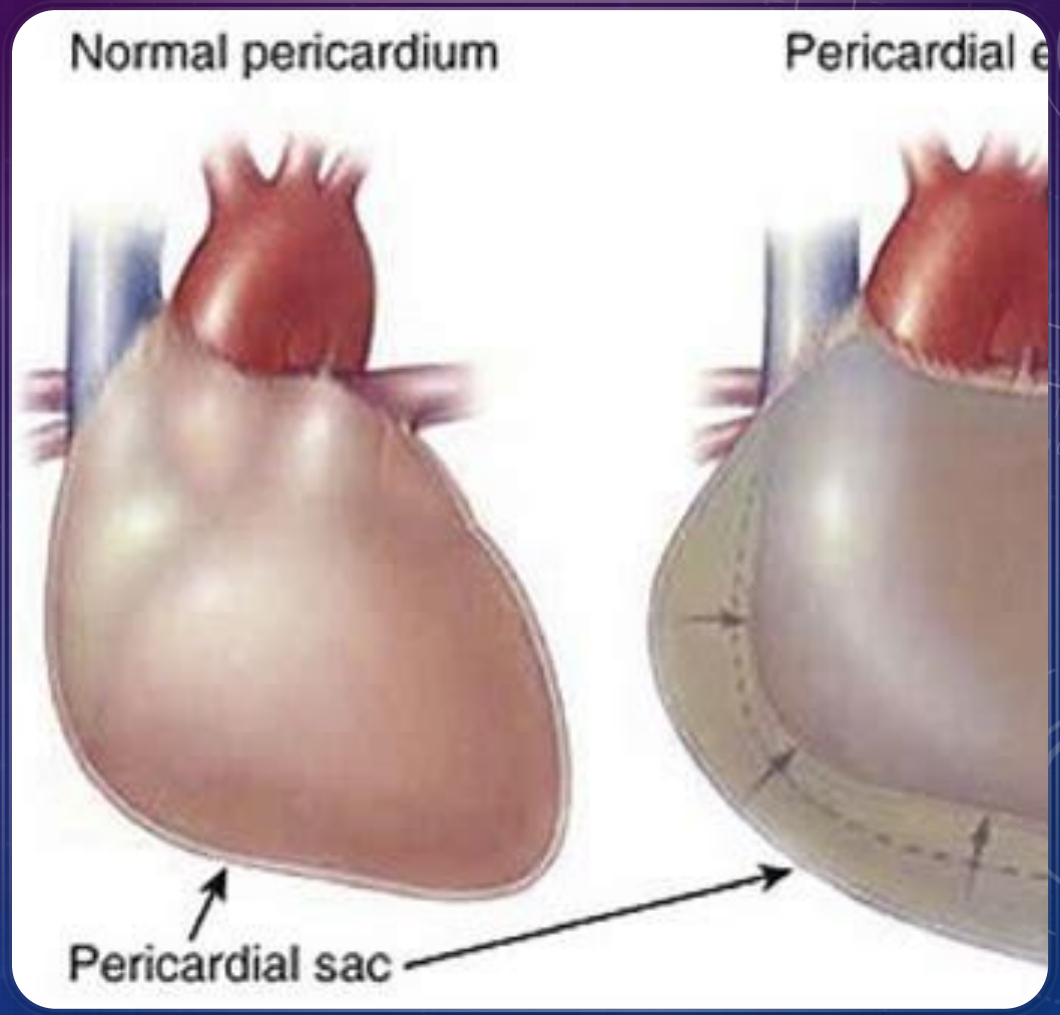
C. Recent Viral or Bacterial pericarditis

D. Systemic Rheumatologic Illness

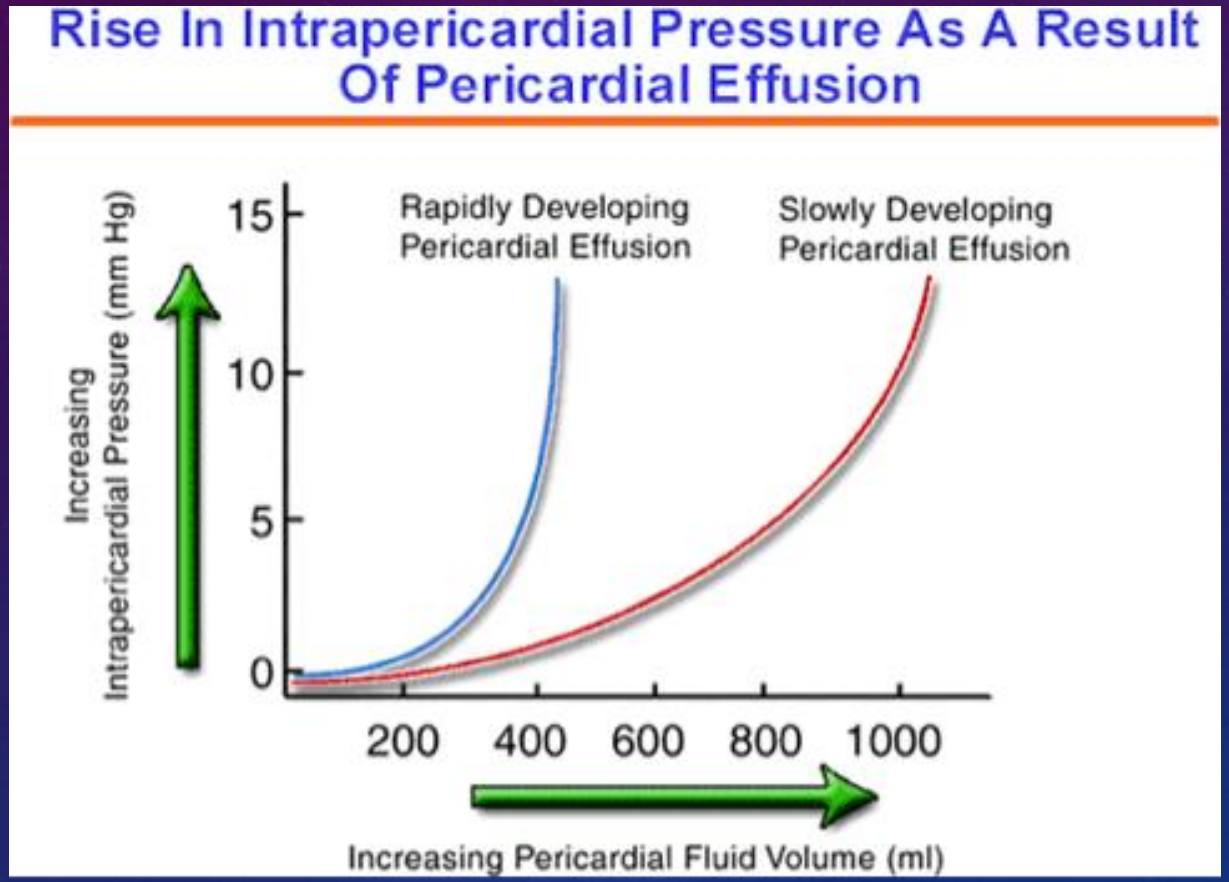
E. All of the above

PATHOPHYSIOLOGY

- Fluid accumulation compresses the heart
- Quick and small
- Slow and large
- Physical: Tachycardia; Hypotension; Distant Heart sounds, Elevated JVP; Pulsus Paradoxus
- ECG electrical alternans
- Echo Rules

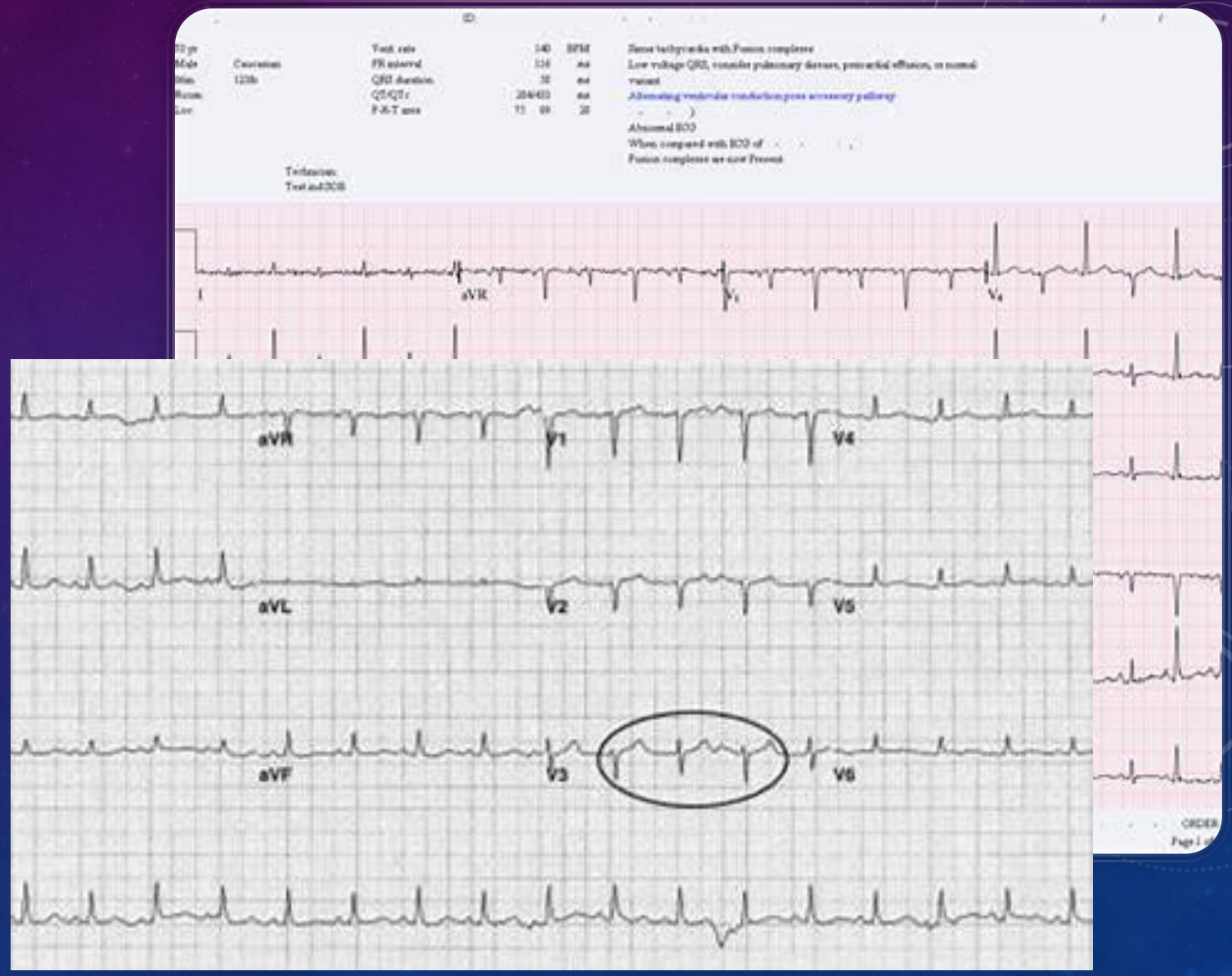


PERICARDIAL EFFUSION



DIAGNOSIS

- History
- Physical Exam
- Biomarkers. ESR, CRP, TROPONIN
- ECG
- CXR
- CT
- MRI



PERICARDIAL TAMPONADE

- Physiology
  - Compression of all cardiac chambers due to increased pericardial pressure
  - As the pressure increases the cardiac chambers become smaller and chamber diastolic compliance decreases

PERICARDIAL TAMPONADE

Physical Findings

- **Sinus tachycardia**
- **Elevated jugular venous pressure**
- **Pulsus paradoxus**

  Abnormally large decrease in systolic blood pressure (>10 mmHg) on inspiratio

  Direct consequence of ventricular interdependence

- **Pericardial rub**

LARGE PERICARDIAL EFFUSION

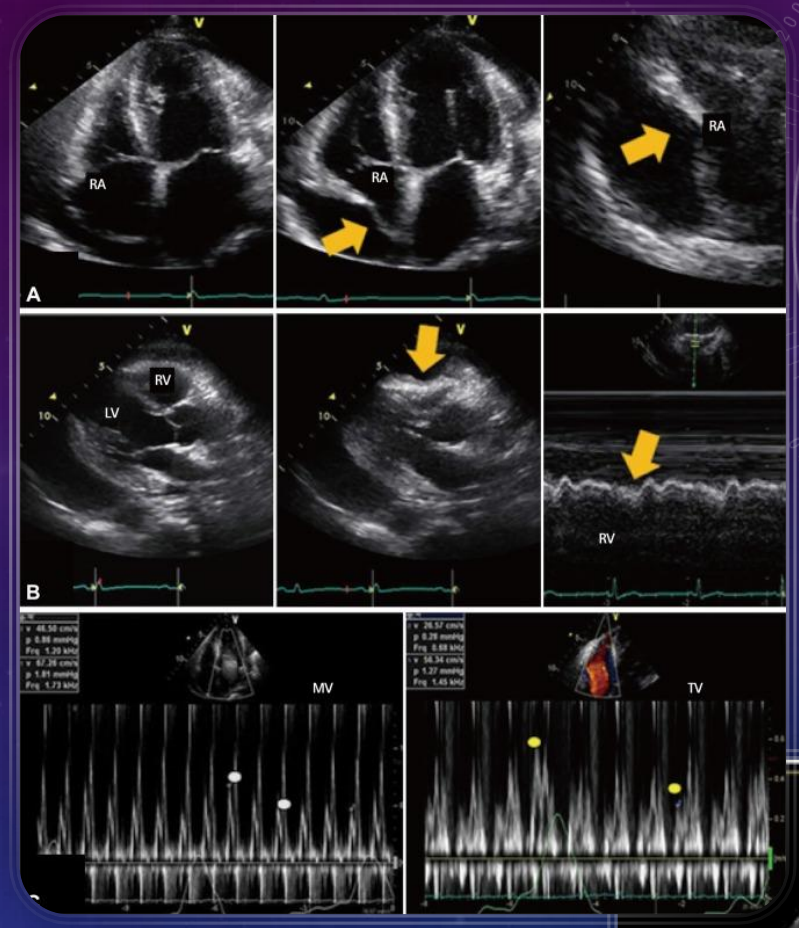
Swinging Heart

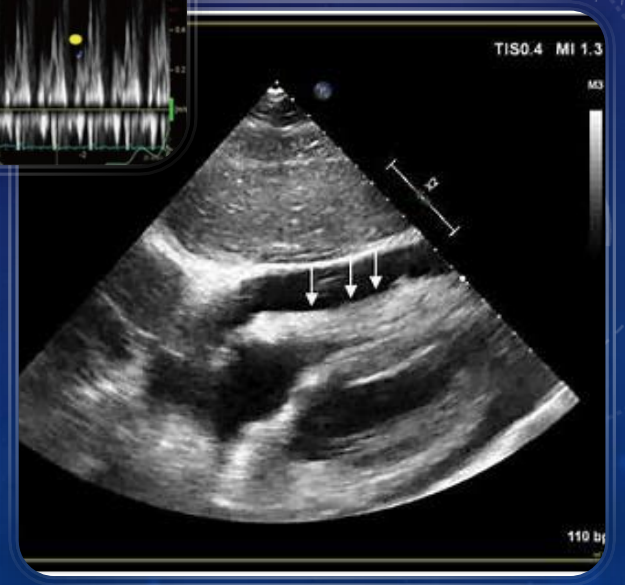
Late Diastolic RA Collapse

Early Diastolic RV collapse

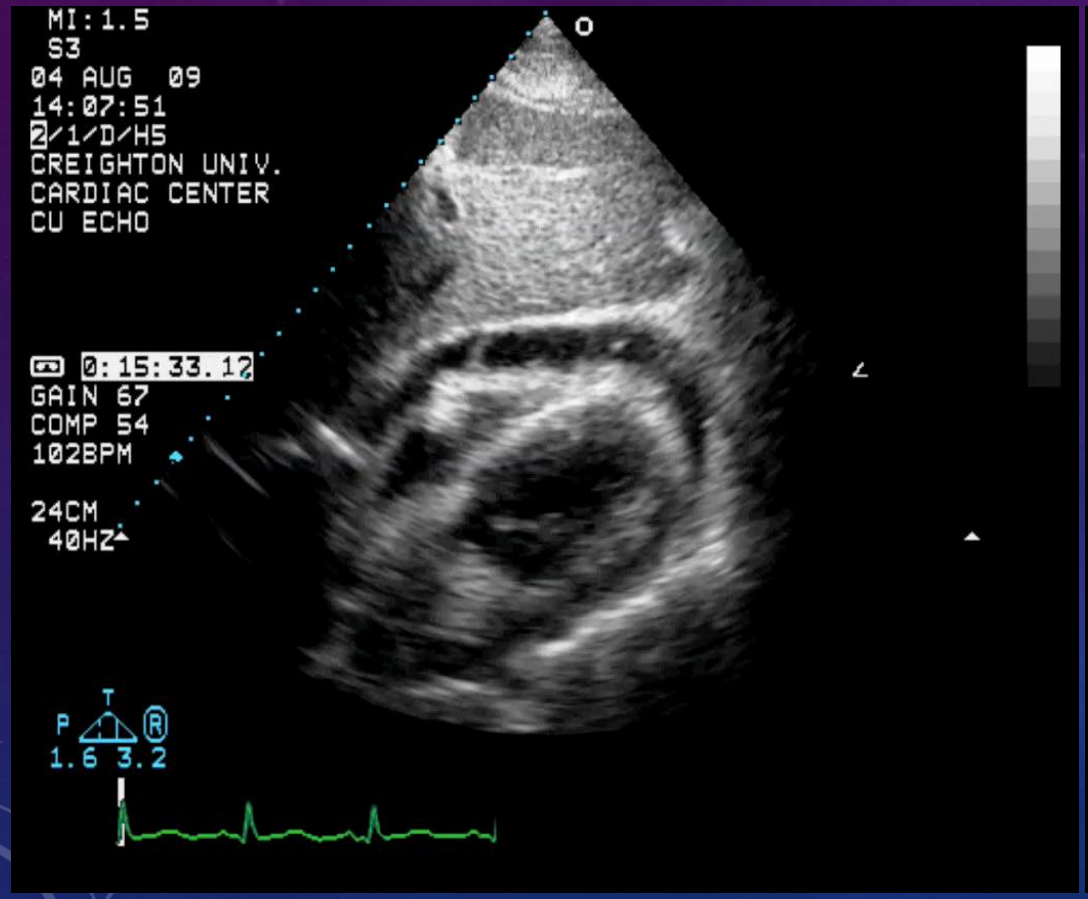
Septal Bounce

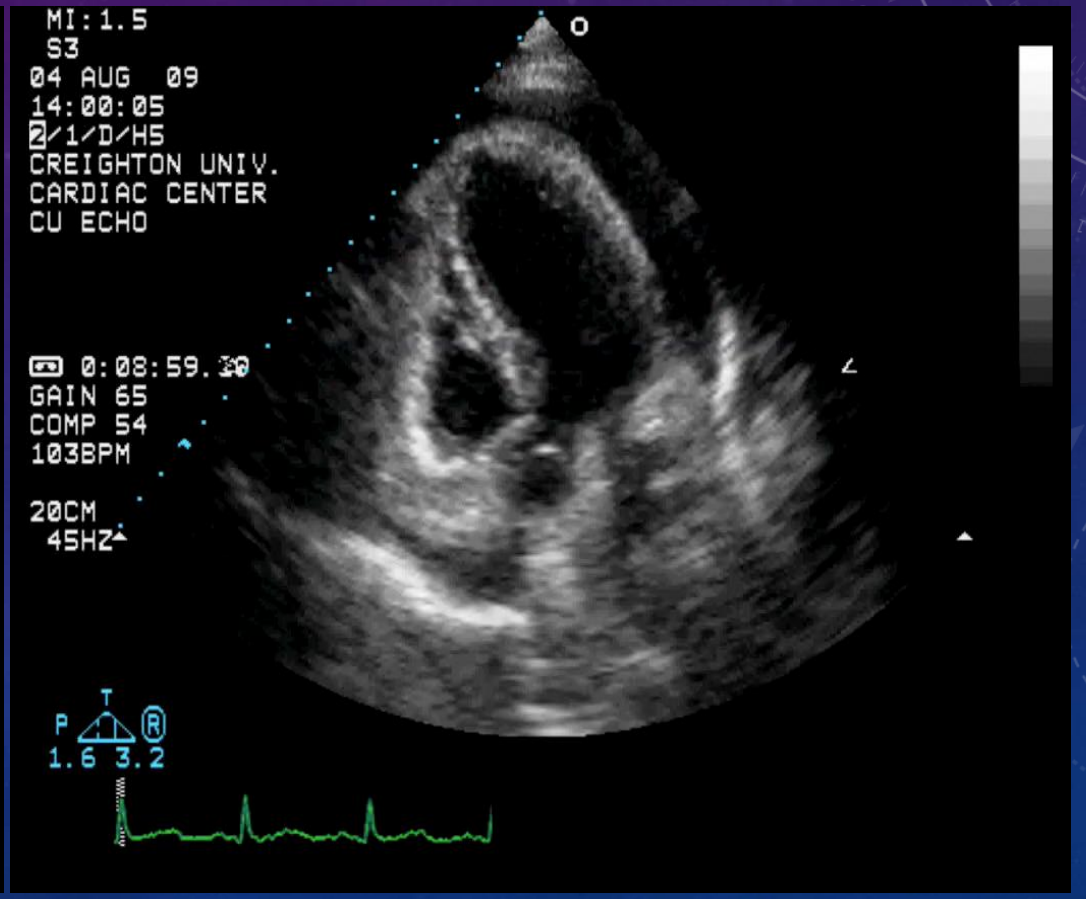
Ventricular interdependence





ECHOCARDIOGRAM

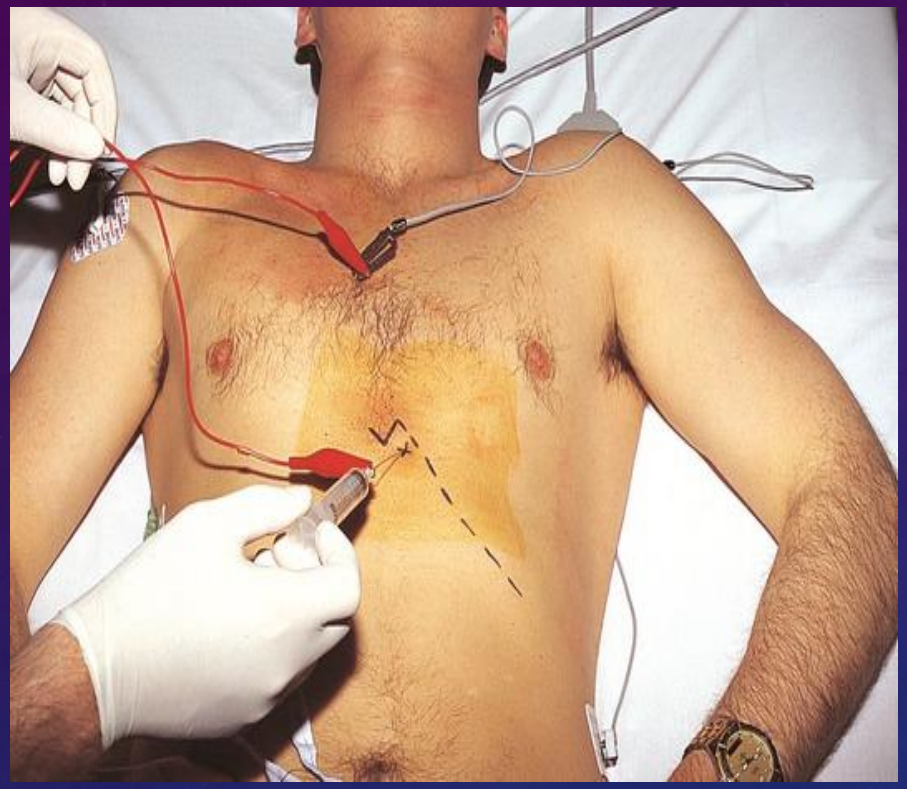




PERICARDIAL TAMPONADE TREATMENT

- Supportive care
  - Volume expansion
  - Inotropic support
    - In theory dobutamine is the preferred agent
- Pericardial drainage
  - Surgical
  - Catheter pericardiocentesis

PERICARDIOCENTESIS



- Transcutaneous by Echo
- Fluoroscopy
- Surgical/Window/Biopsy
- May unmask constriction
- Rx as acute pericarditis if elevated ESR, CRP, Pain

57 M DOE, FATIGUE, PERIPH EDEMA, HEPATOMEGALY, HEPATIC DYSFUNCTION, ASCITES, SAW 11 DIFFERENT SPECIALIST OVER A 3 YEAR PERIOD, MULTIPLE TESTS. REFERRED TO HEPATOLOGY WHO AFTER BIOPSY REFERRED TO US

Clinical Findings are likely to show

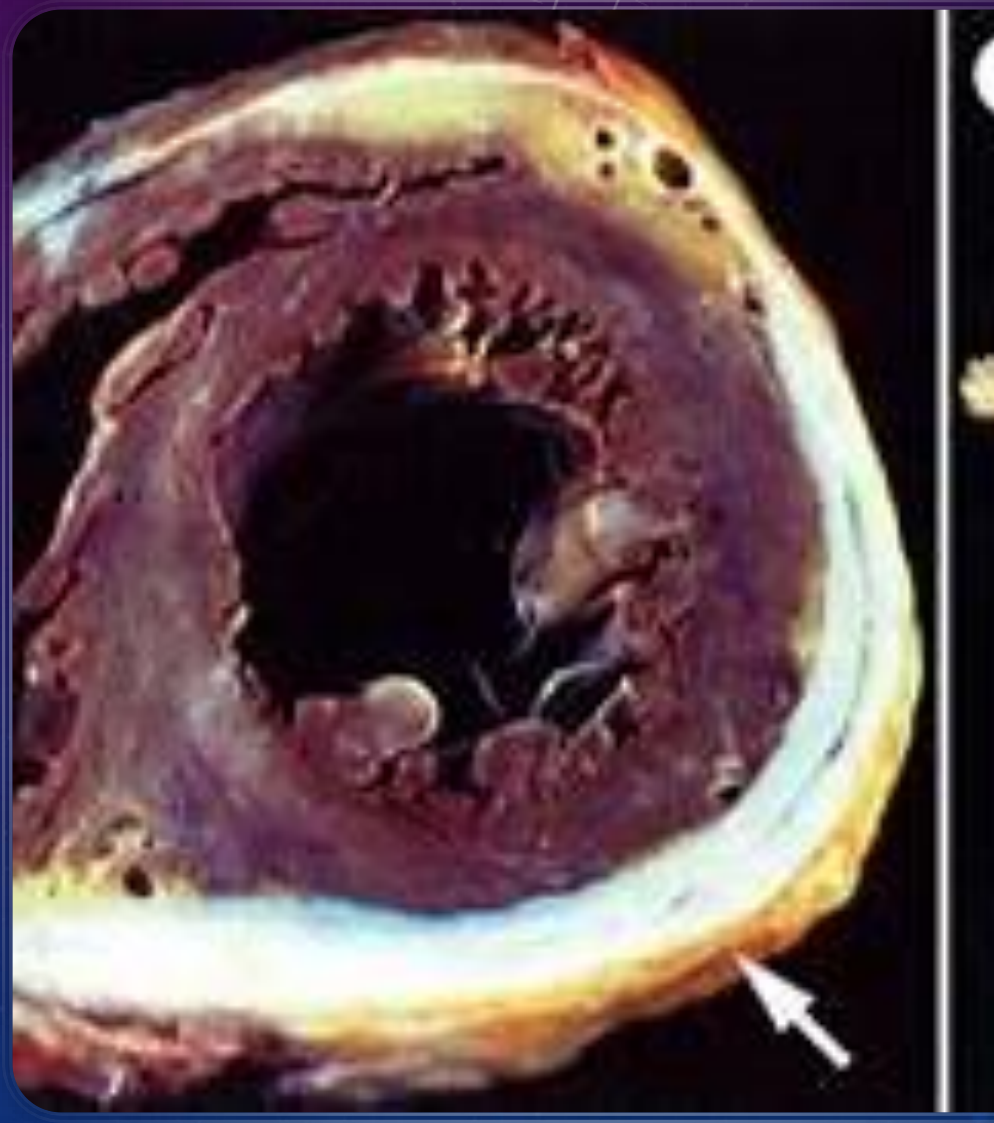
A. **Anasarca**

B. **Elevated neck veins with Kussmaul's sign**

C. **S3 equivalent on auscultation**

D. **2D Echo done in a private cardiology clinic –"Normal"**

E. **All of the above**



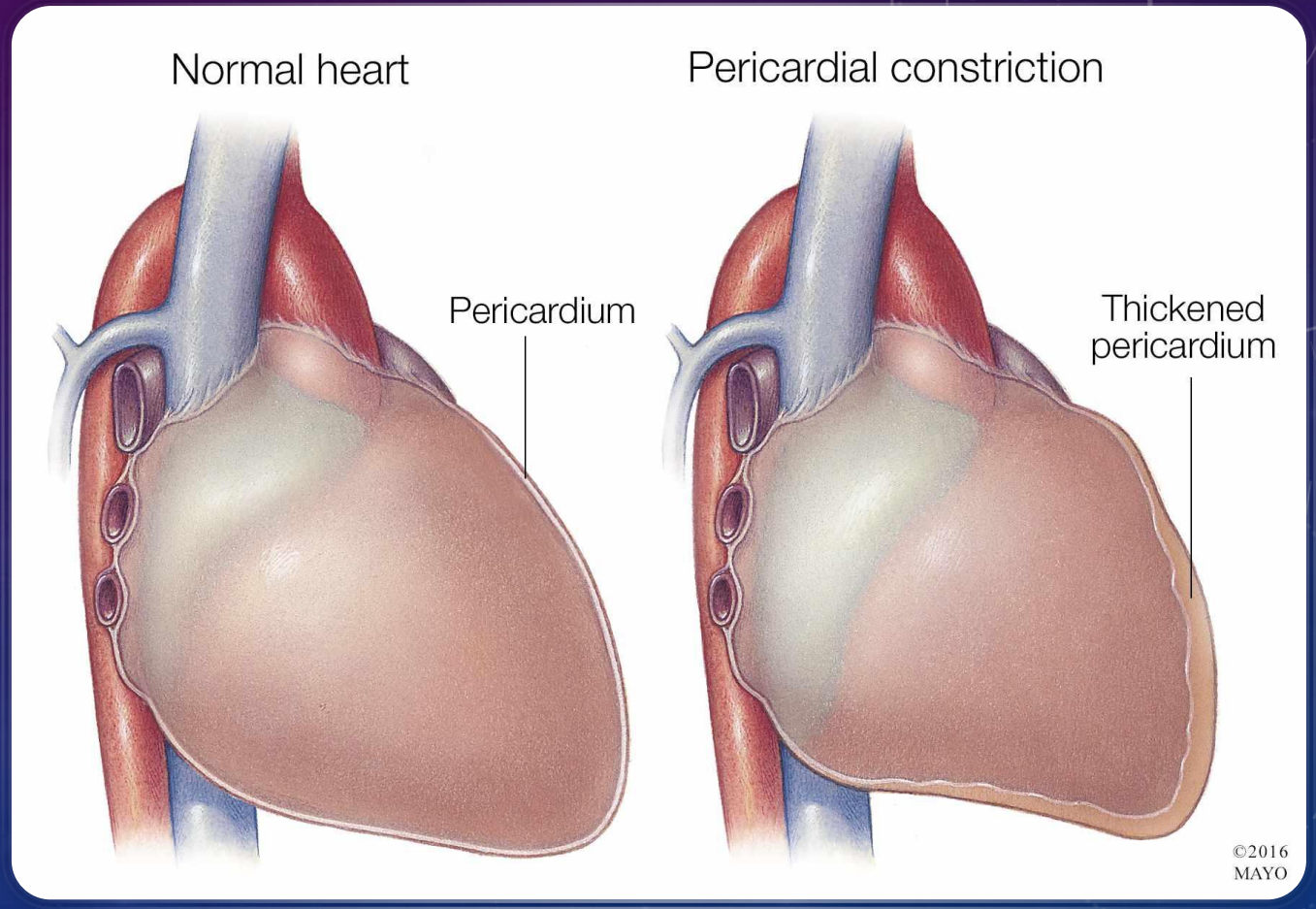
Chronic Constriction

IMPAIRED DIASTOLIC FILLING BECAUSE OF "CAGED HEART" IN A THICK, FIBROUS, SCARRED PERICARDIUM

- **Echo Doppler: Those features are**

1. **Respiratory variation in ventricular filling**
2. **Interventricular dependence**
3. **Augmented longitudinal motion of the heart.**

- *Respiratory variation in ventricular filling arises from the dissociation of intrathoracic-intracardiac pressure change and enhanced ventricular interaction*



CONSTRICTIVE PERICARDITIS

- History and Physical Exam
- Electrocardiogram/Radiographic
- Echocardiography
- Hemodynamics
- Laboratory data

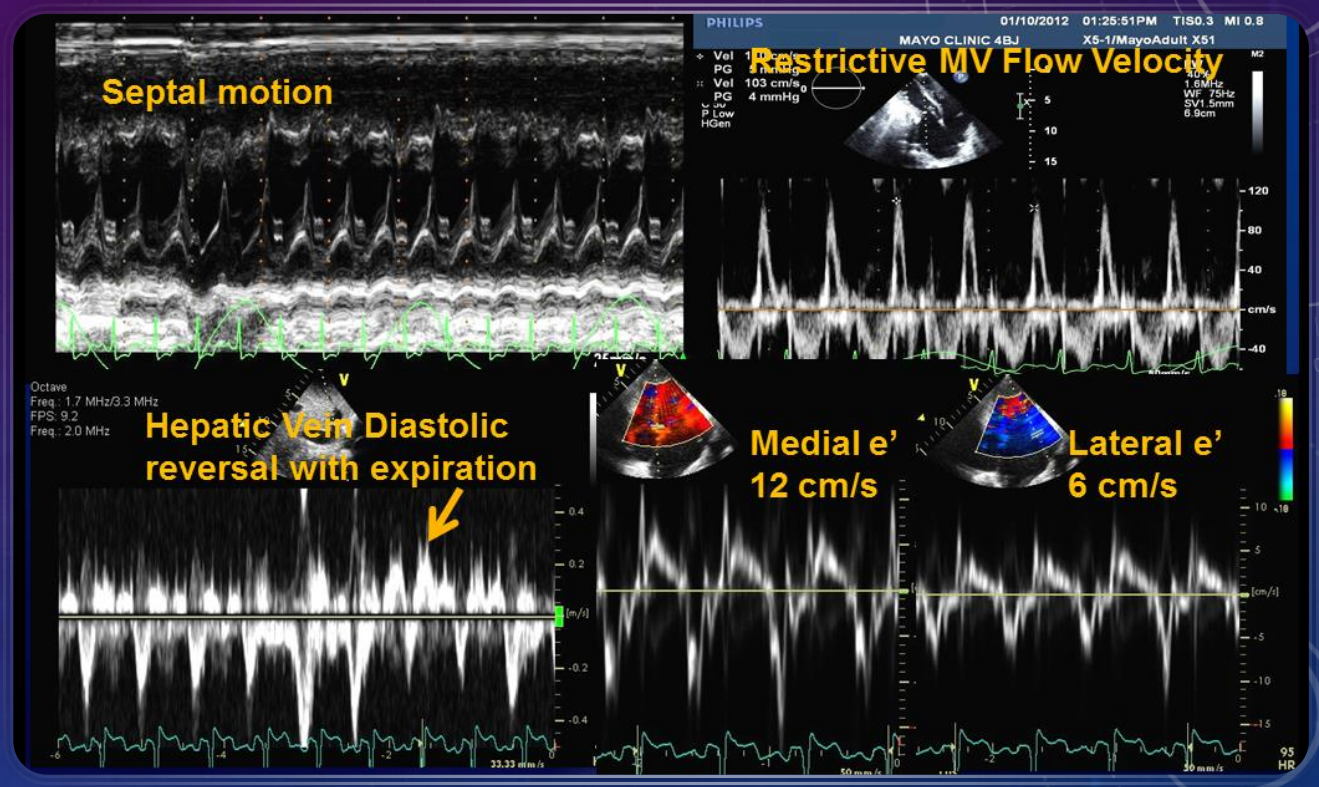
CHRONIC CONSTRICTION

Pericardial Calcification can be seen

- **ECG with ‘low voltages’**
- **Thickened pericardium on echo with interesting Doppler findings (abnormal diastolic function)**
- **Added imaging very beneficial. CXR/CT/MRI**
- **Causes: post Acute Pericarditis; Prior Cancer with Chest Radiation; Prior Cardiac surgery; TB**

ECHO RULES

- Rarely Need invasive hemodynamics
- Diastolic Pressure Equalisation
- CMRI
- Biopsy



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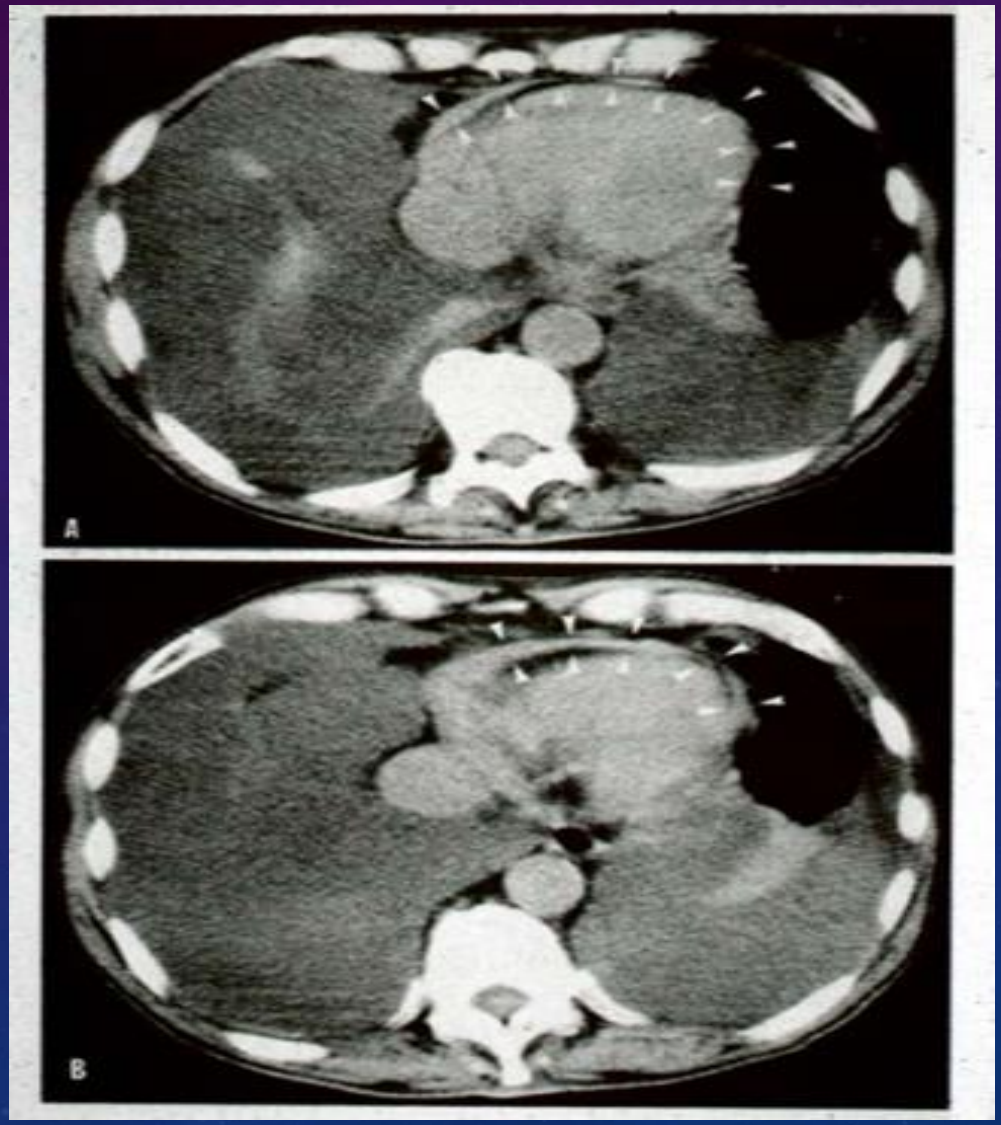
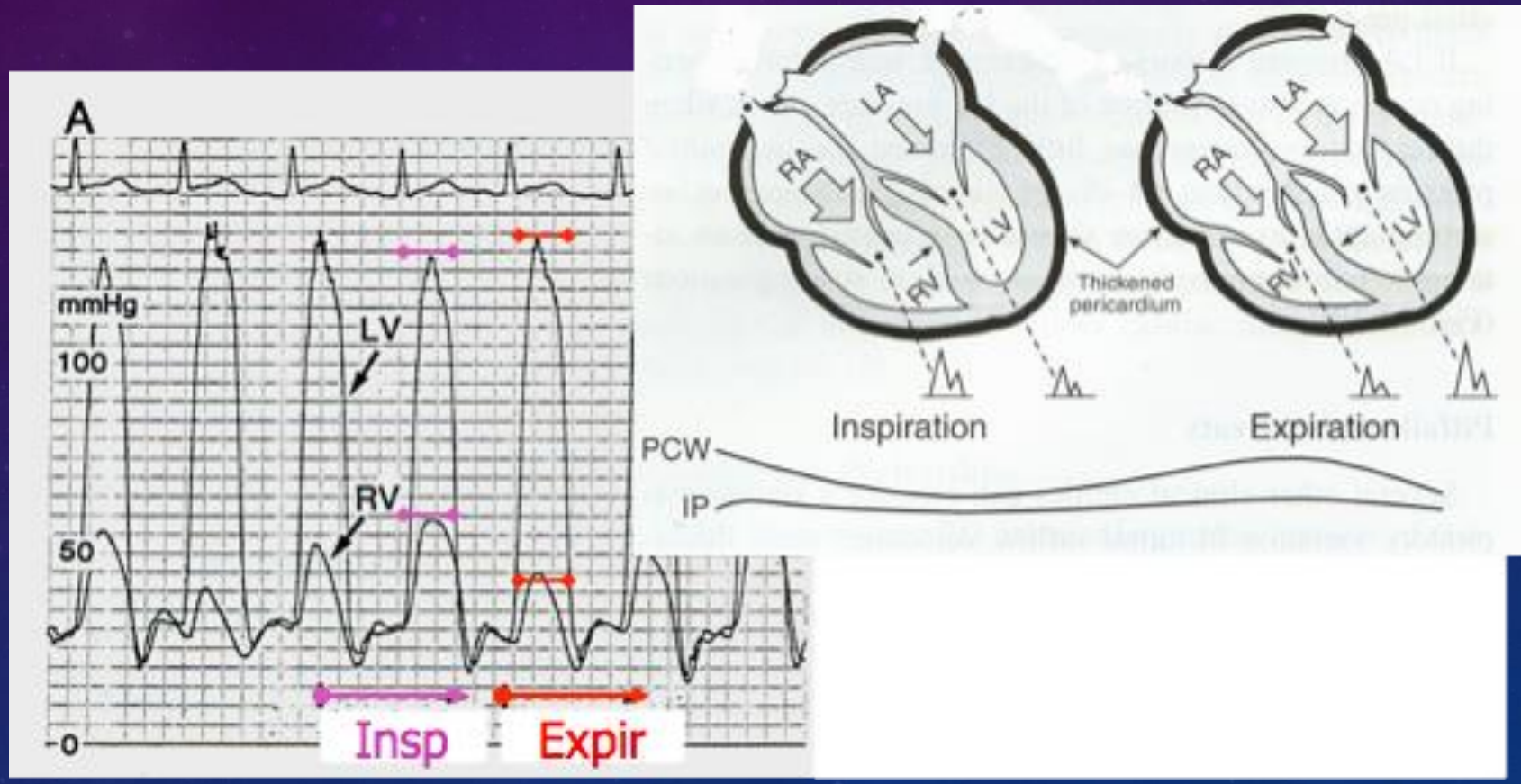
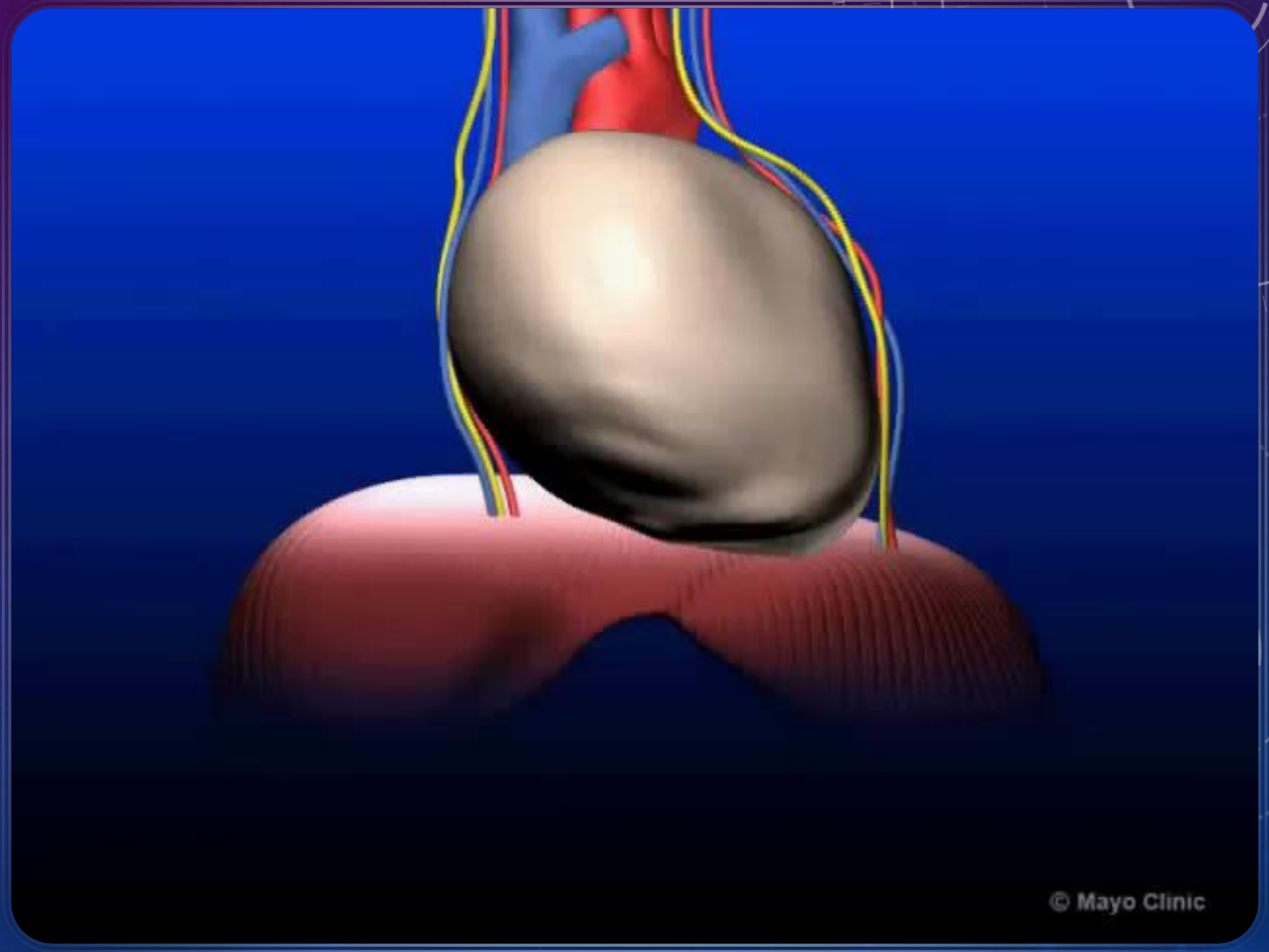


CONSTRICTIVE PERICARDITIS



CONSTRICTIVE PERICARDITIS

- **Management**
  - Diuretics
  - Pericardiectomy



SUMMARY

- Acute Pericarditis
- Recurrent/Relapsing/Chronic Pericarditis
- Tamponade
- Constriction

QUESTIONS?