PERICARDIAL DISEASE

INTERNAL MEDICINE RESIDENCY ACADEMIC DAY

AUG 10TH 2021

BUMC-P

F MOOKADAM MD FRCPC FACC MSC

PROFESSOR OF MEDICINE

- **CONSULTANT CARDIOVASCULAR DISEASES**
- **IMAGING**
- **CARDIO-ONCOLOGY**

THE COMMON CONUNDRUM

CHEST PAIN

43 F presents with Chest Pain. 3 weeks ago Thru airport.

Sharp, associate shortness of breath.

- **What Questions would you ask her?**
- **What Physical Exam would you do?**
- **Lab tests and Ancillary tests?**
- **Imaging tests?**
- **Management?**

PERICARDIAL DISEASE

- Describe the presentation of Acute Pericarditis
- ECG findings of Acute Pericarditis
- Differential Diagnosis of Acute Pericarditis
- Describe First line Therapy of Acute Pericarditis
- Diagnosing cardiac Tamponade and the Pathophysiology
- Pericardial Constriction Basics and Diagnosis

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**

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

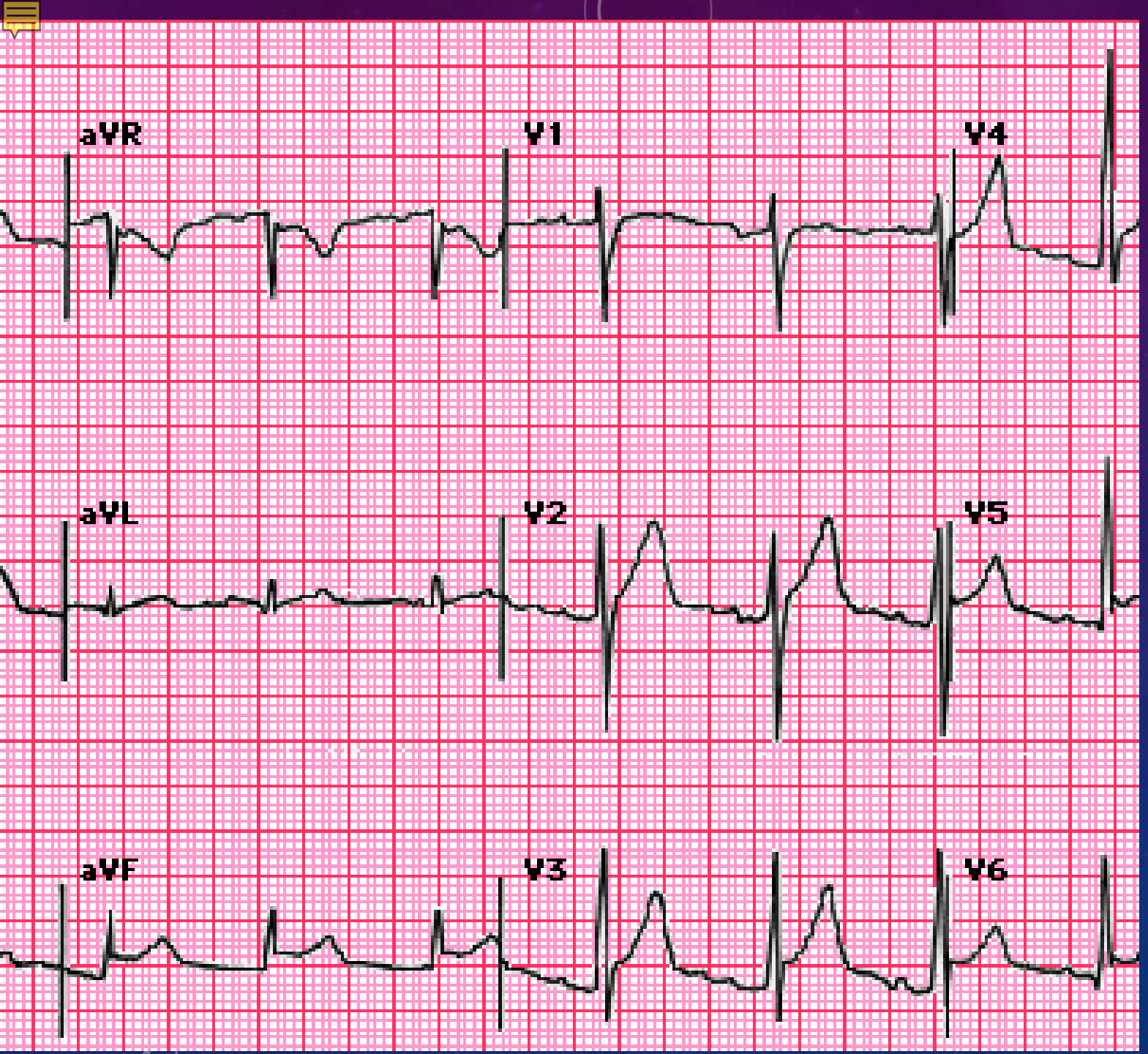
DIAGNOSTIC CRITERIA FOR ACUTE PERICARDITIS

- **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.

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 Z
F. All of the above



THE ECG

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

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**

ACUTE MI
EVOLVING ECG CHANGES

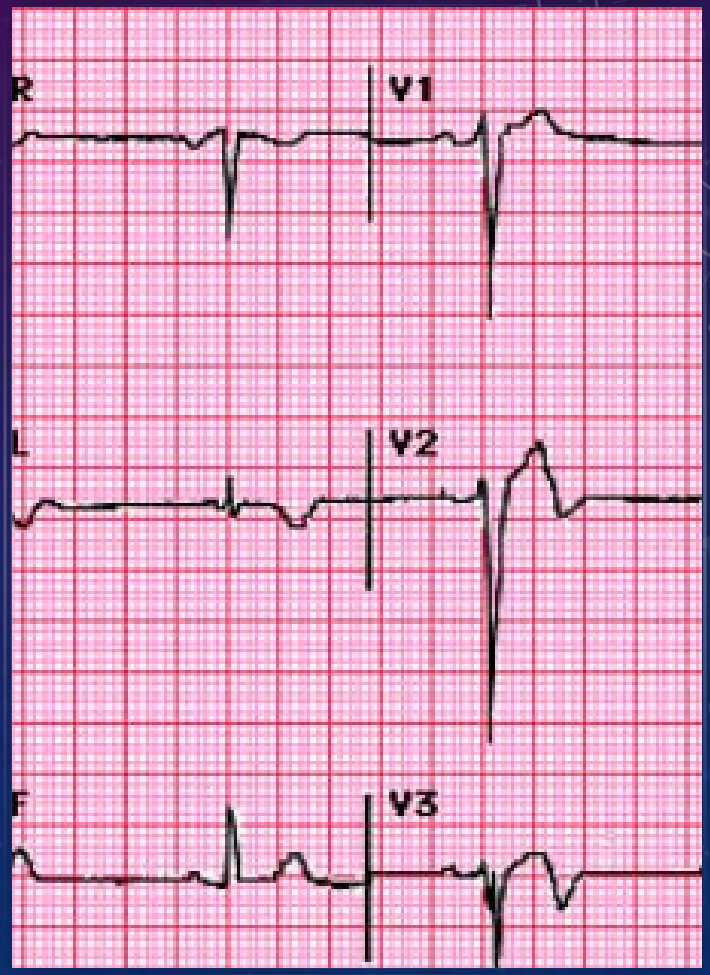
Morphology: Dome shaped. >5mm height

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

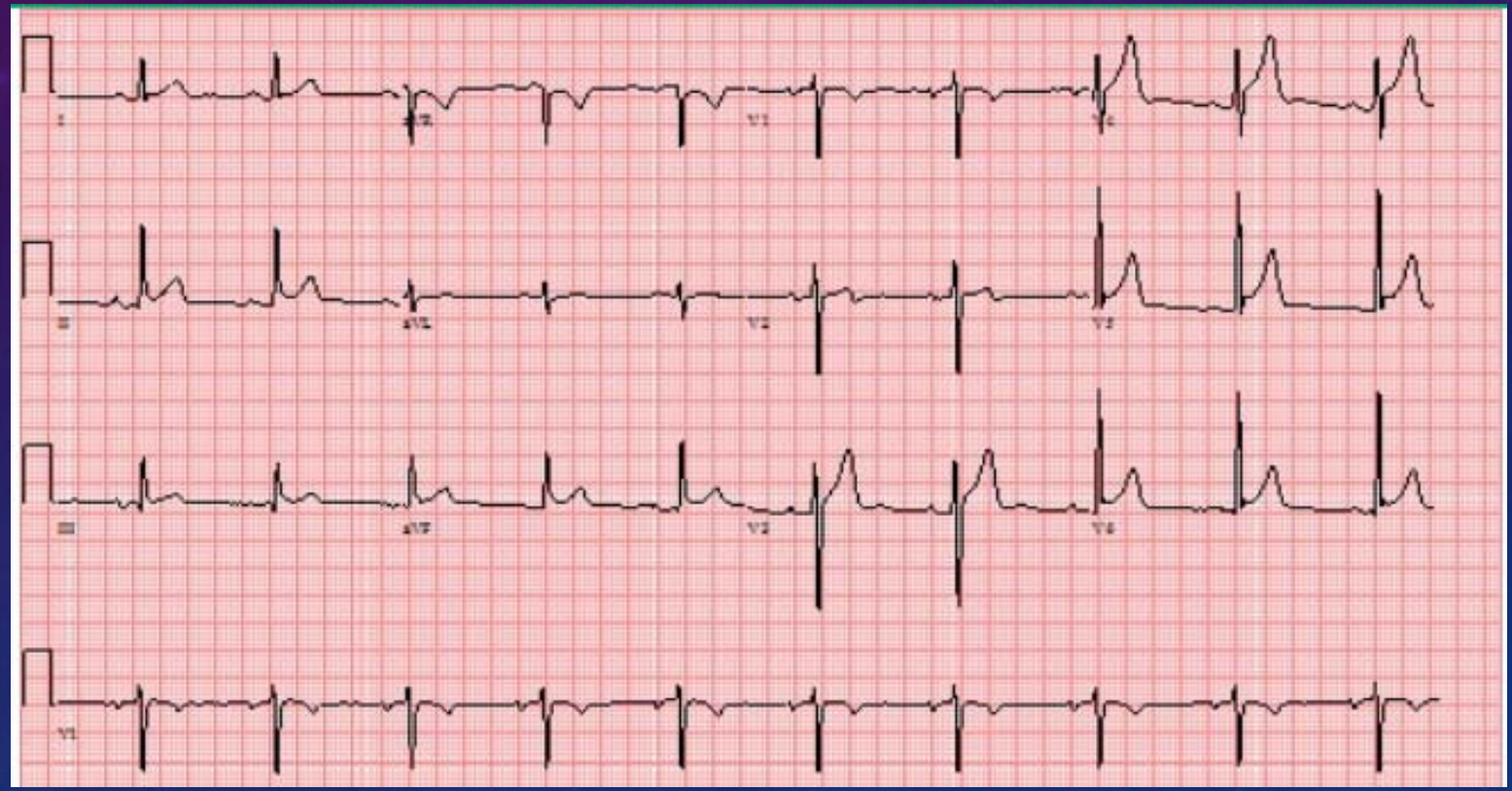
Reciprocal changes – Acute STEMI is often associated with reciprocal ST-segment changes, which are not seen with pericarditis, except in leads aVR and V1.

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



EARLY REPOLARISATION OR J POINT ELEVATION



COMPARATIVE TABLE

ECG features	Findings in acute pericarditis	Findings in acute MI
ST segment elevation morphology	▪ ST segment elevation begins at J point, rarely exceeds 5 mm, normal concavity	▪ ST segment elevation begins at J point, often exceeds 5 mm in height, abnormal concavity (convex or "dome-shaped")
ST segment elevation distribution	▪ Widespread ST segment elevation in most/all leads ▪ Typically most prominent in inferolateral leads	▪ Anatomical groupings of leads show ST segment elevation, which corresponds to vascular territory of infarction
Reciprocal ST segment changes	▪ Usually not seen	▪ ST segment depressions usually seen in reciprocal leads
Concurrent ST elevation and T wave inversion	▪ Unusual unless concomitant myocarditis	▪ Common
PR segment changes	▪ PR elevation in aVR ▪ PR depression in most/all other leads	▪ Rare
Other ECG findings ▪ Hyperacute T waves ▪ Q waves ▪ QT prolongation	▪ Rare; if seen, due to fusion of elevated ST segment and T wave ▪ Not usually new from acute pericarditis ▪ Unusual	▪ Commonly seen at onset of acute infarction/ischemia ▪ Seen late in course of MI due to transmural injury ▪ Can be seen

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

DIFFERENTIAL DIAGNOSIS

COMMON

- ACS
- Esophagitis
- Gastritis
- GE REFLUX
- Pleuritis
- Costochondritis
- Pneumonia

LESS COMMON

- Esophageal Spasm
- Pulmonary Embolism
- Tension pneumothorax

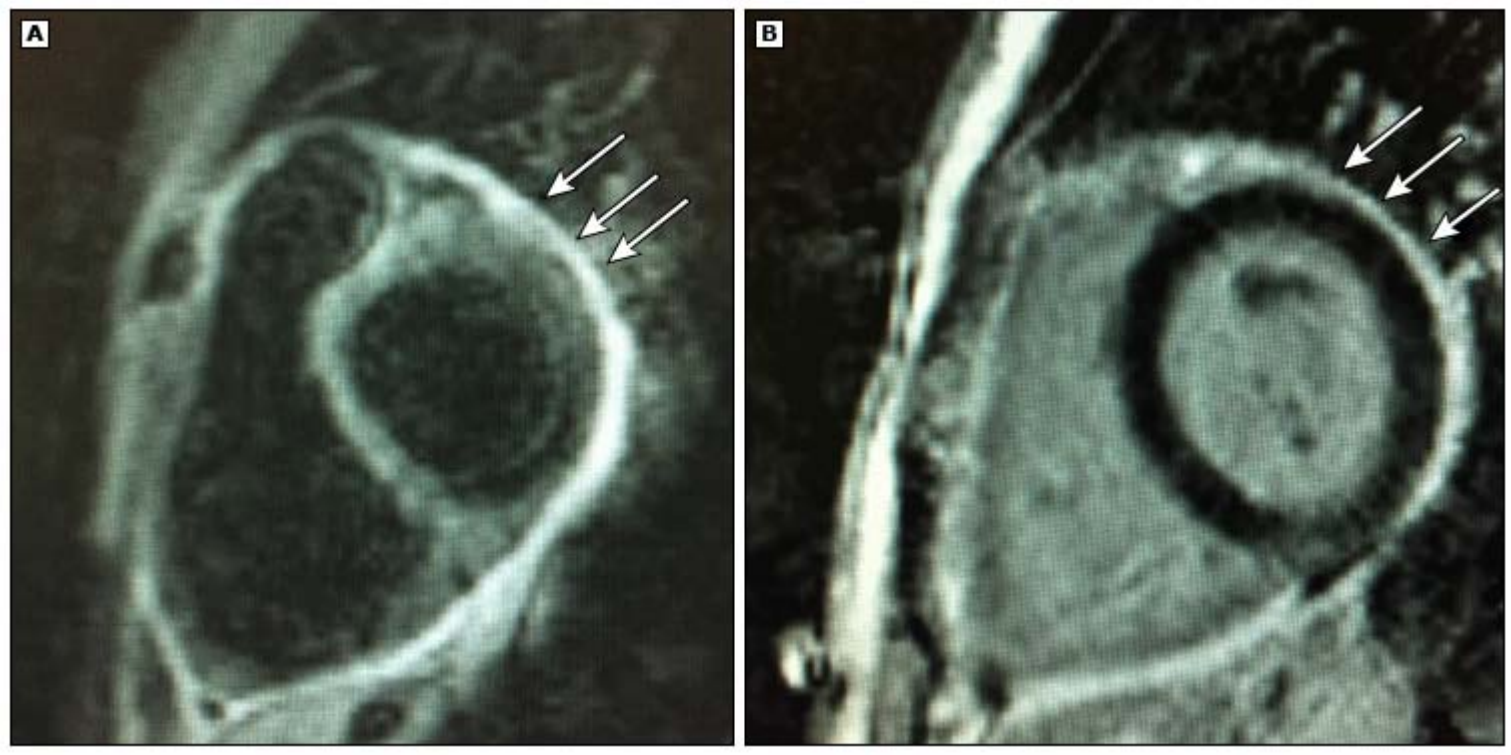
- Rare
- Aortic Dissection
- Esophageal tear

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)**
- **Noncalcified pericardial thickening with pericardial effusion is suggestive of acute pericarditis.**
- **Contrast, enhancement of the thickened visceral and parietal surfaces of the pericardial sac confirms the presence of active inflammation.**
- **CT allows differentiation of exudative fluid (20 to 60 Hounsfield units), as found with purulent pericarditis, and simple transudative fluid (<10 Hounsfield units).**

C MRI WITH GADOLINIUM ENHANCEMENT

EDEMA *LGE*



TREATMENT OF ACUTE PERICARDITIS IN ADULTS

- **NSAID**
- **Colchicine**
- **Rx Underlying Condition**

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

If Present Admit to Hospital

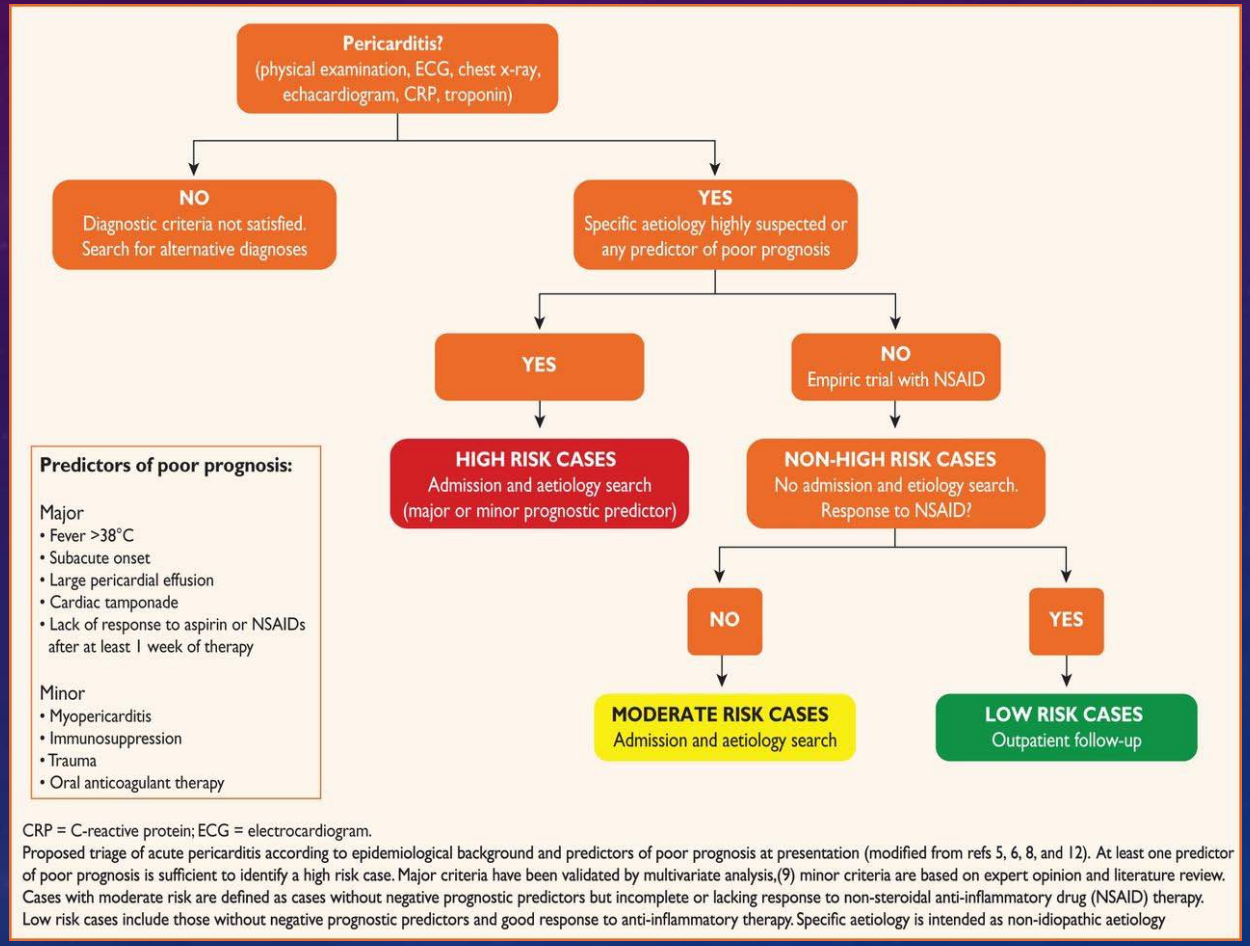
THE 2 "D"'S

Drug	Usual dosing*	Tx duration*	Tapering*
Aspirin	750–1000 mg every 8h	1–2 weeks	Decrease doses by 250–500 mg every 1–2 weeks
Ibuprofen	600 mg every 8h	1–2 weeks	Decrease doses by 200–400 mg every 1–2 weeks
Colchicine	0.5 mg once (<70 kg) or 0.5 mg b.i.d. (≥70 kg)	3 months	Not mandatory, alternatively 0.5 mg every other day (< 70 kg) or 0.5 mg once (≥70 kg) in the last weeks

OTHER VARIANTS

Pericarditis	Definition and diagnostic criteria
Acute	Inflammatory pericardial syndrome to be diagnosed with at least 2 of the 4 following criteria: (1) pericarditic chest pain (2) pericardial rubs (3) new widespread ST-elevation or PR depression on ECG (4) pericardial effusion (new or worsening) Additional supporting findings: - Elevation of markers of inflammation (i.e. C-reactive protein, erythrocyte sedimentation rate, and white blood cell count); - Evidence of pericardial inflammation by an imaging technique (CT, CMR).
Incessant	Pericarditis lasting for >4–6 weeks but <3 months without remission.
Recurrent	Recurrence of pericarditis after a documented first episode of acute pericarditis and a symptom-free interval of 4–6 weeks or longer[a].
Chronic	Pericarditis lasting for >3 months.

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

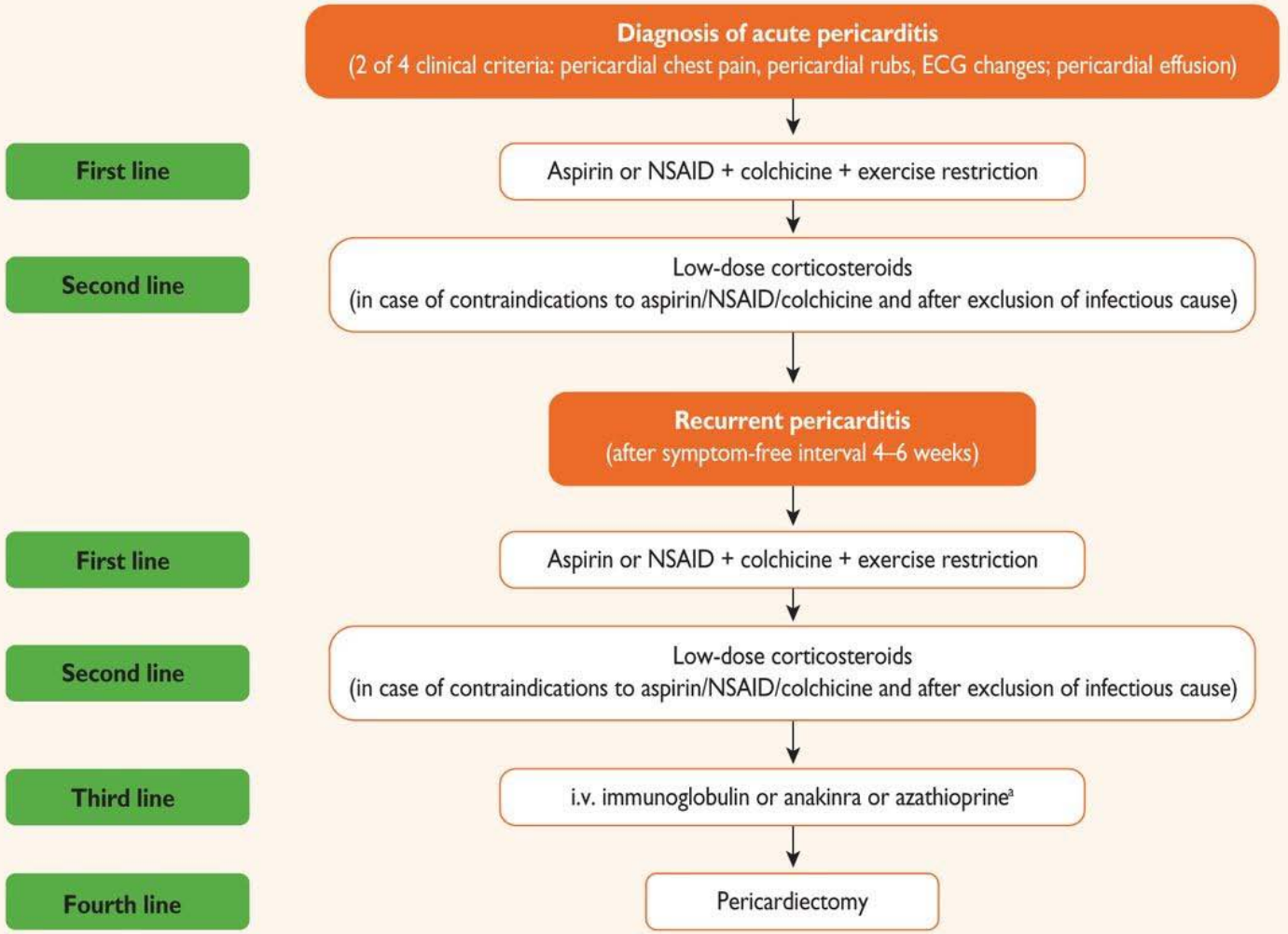
Eur Heart J, Volume 36, Issue 42, 7 November 2015, Pages 2921–2964, https://doi.org/10.1093/eurheartj/ehv318

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**

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. Cochicine .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.

EHLENMEYER FLASK

- **This patient is likely to present with:**

A. Lung or Breast Cancer

B. Recent Cardiac Surgery

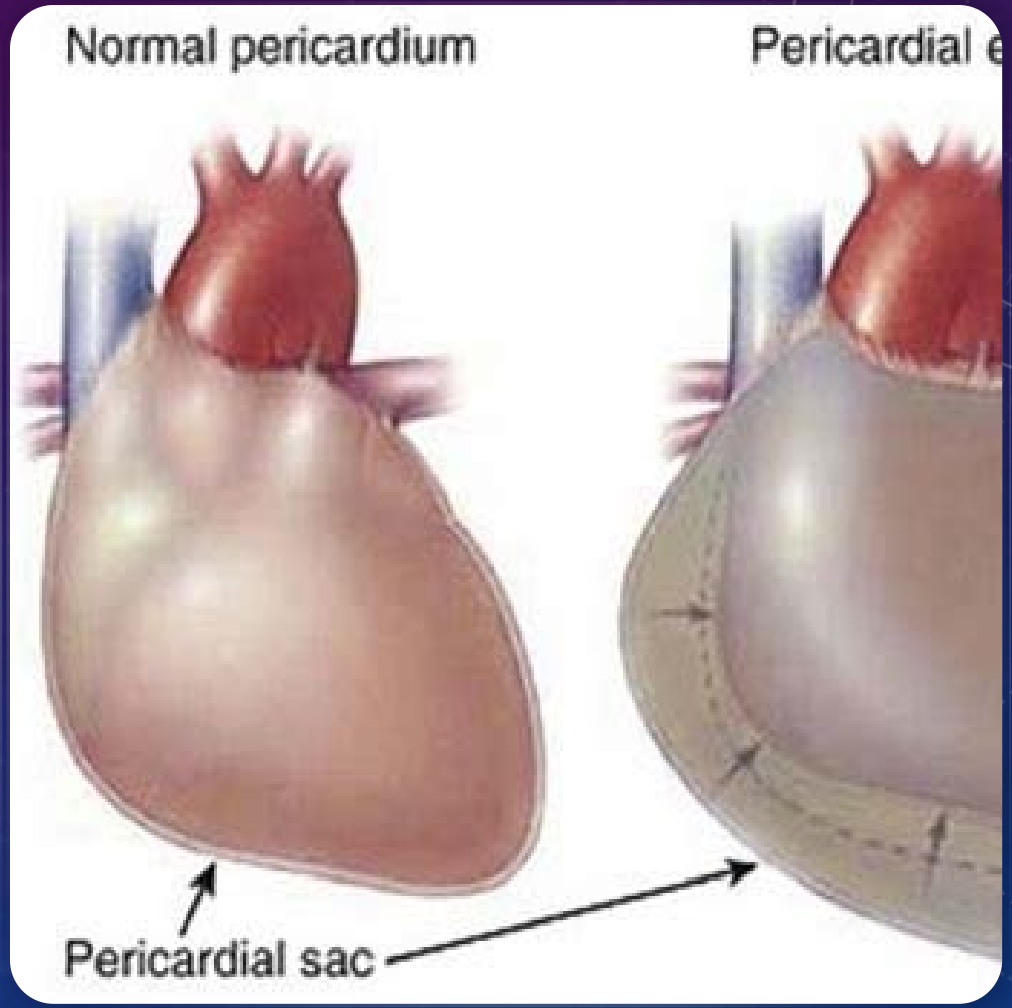
C. Recent Viral or Bacterial pericarditis

D. Systemic Rheumatologic Illness

E. All of the above

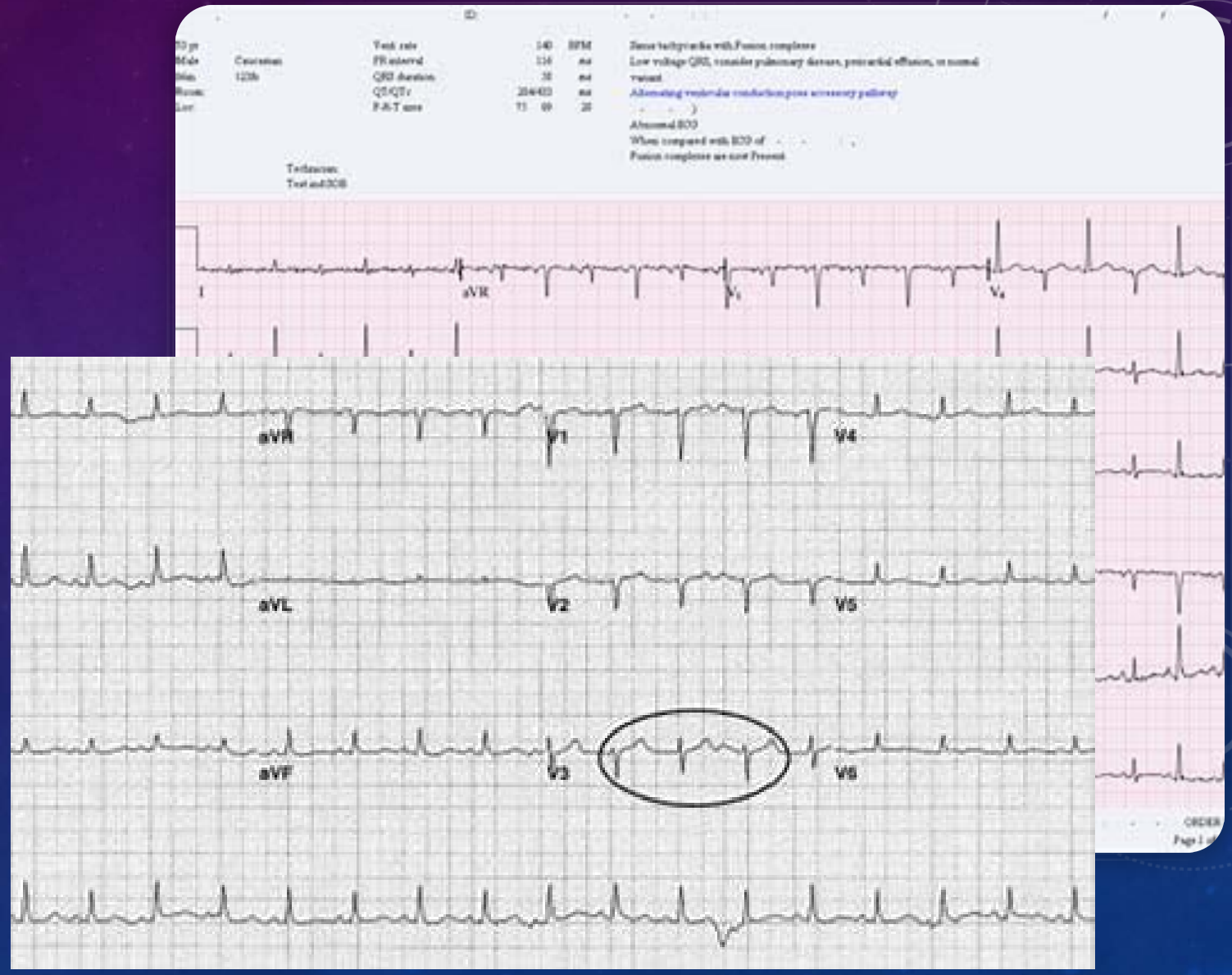
PATHOPHYSIOLOGY

- 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



DIAGNOSIS

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



LARGE PERICARDIAL EFFUSION

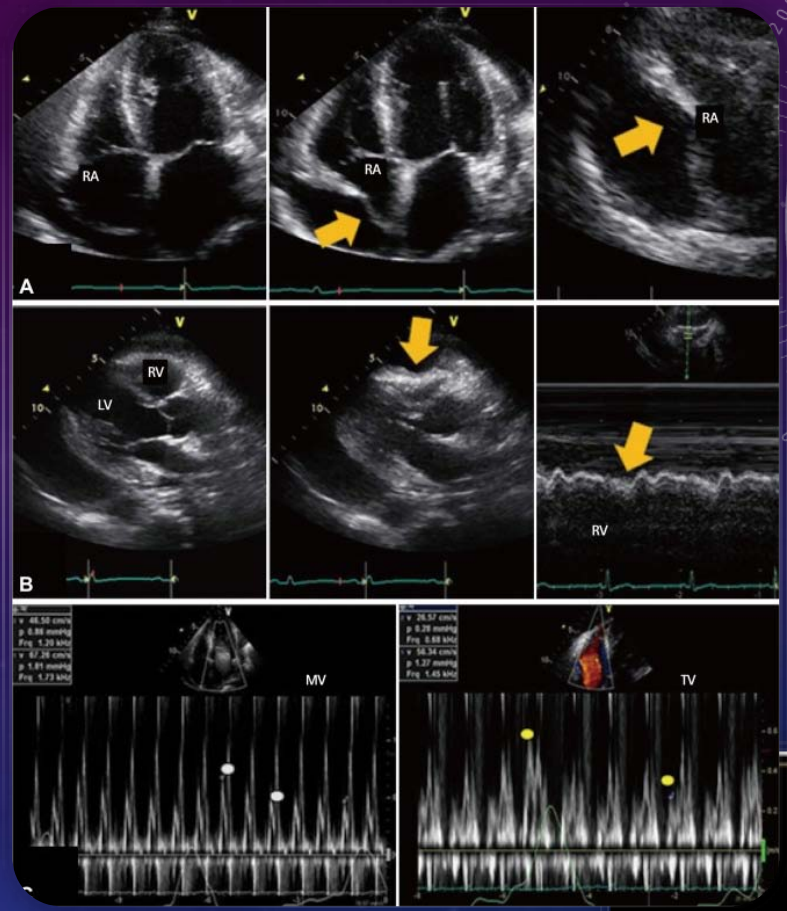
Swinging Heart

Late Diastolic RA Collapse

Early Diastolic RV collapse

Septal Bounce

Ventricular interdependence



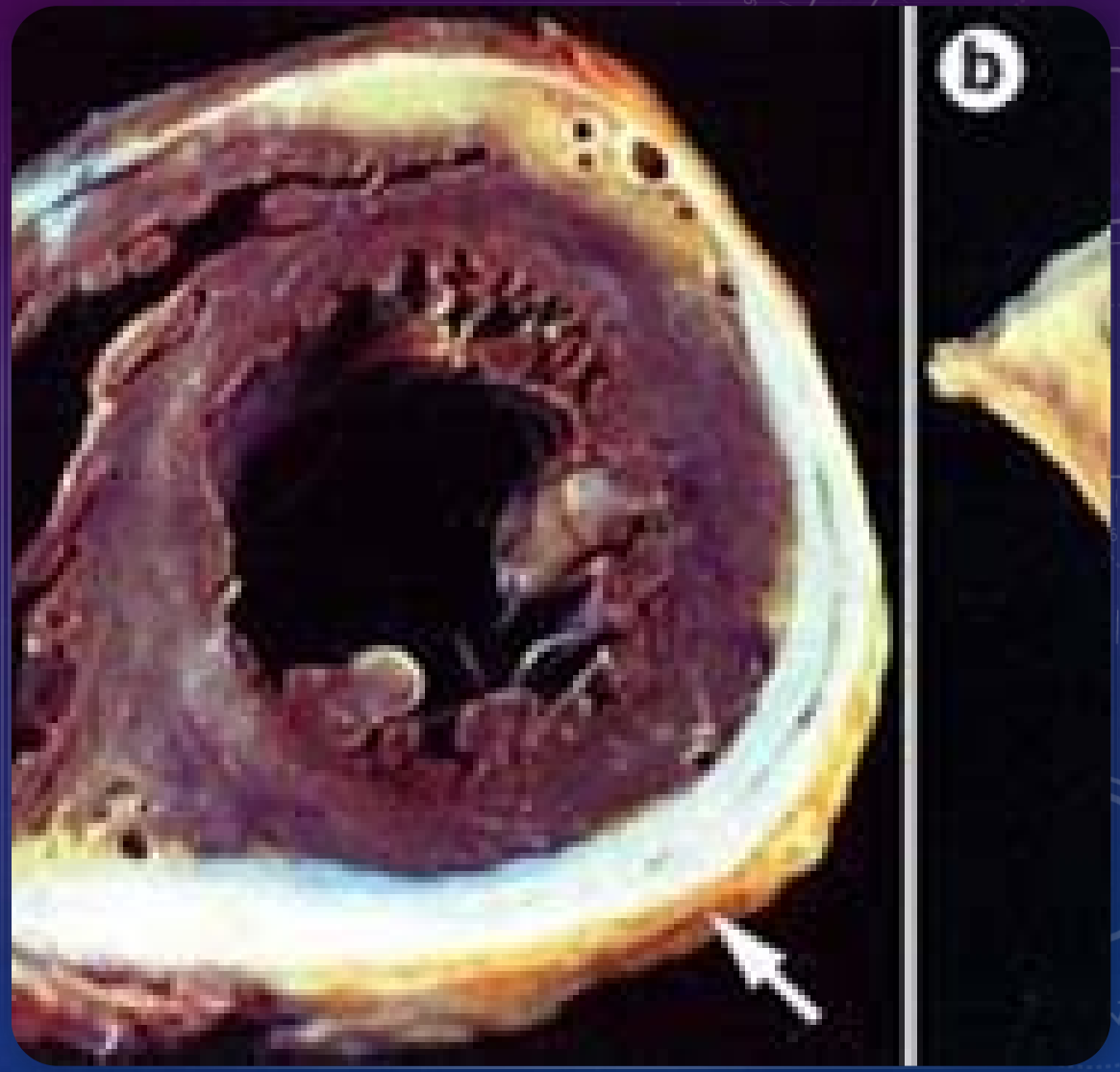
TAMPONADE TREATMENT DRAINAGE

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

57 M PRESENTS WITH DOE, FATIGUE, PERIPHERAL EDEMA, HEPATOMEGALY, HEPATIC DYSFUNCTION, ASCITES,

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 LV size and Function"**
E. **All of the above**
F. **Ask Dr Z**



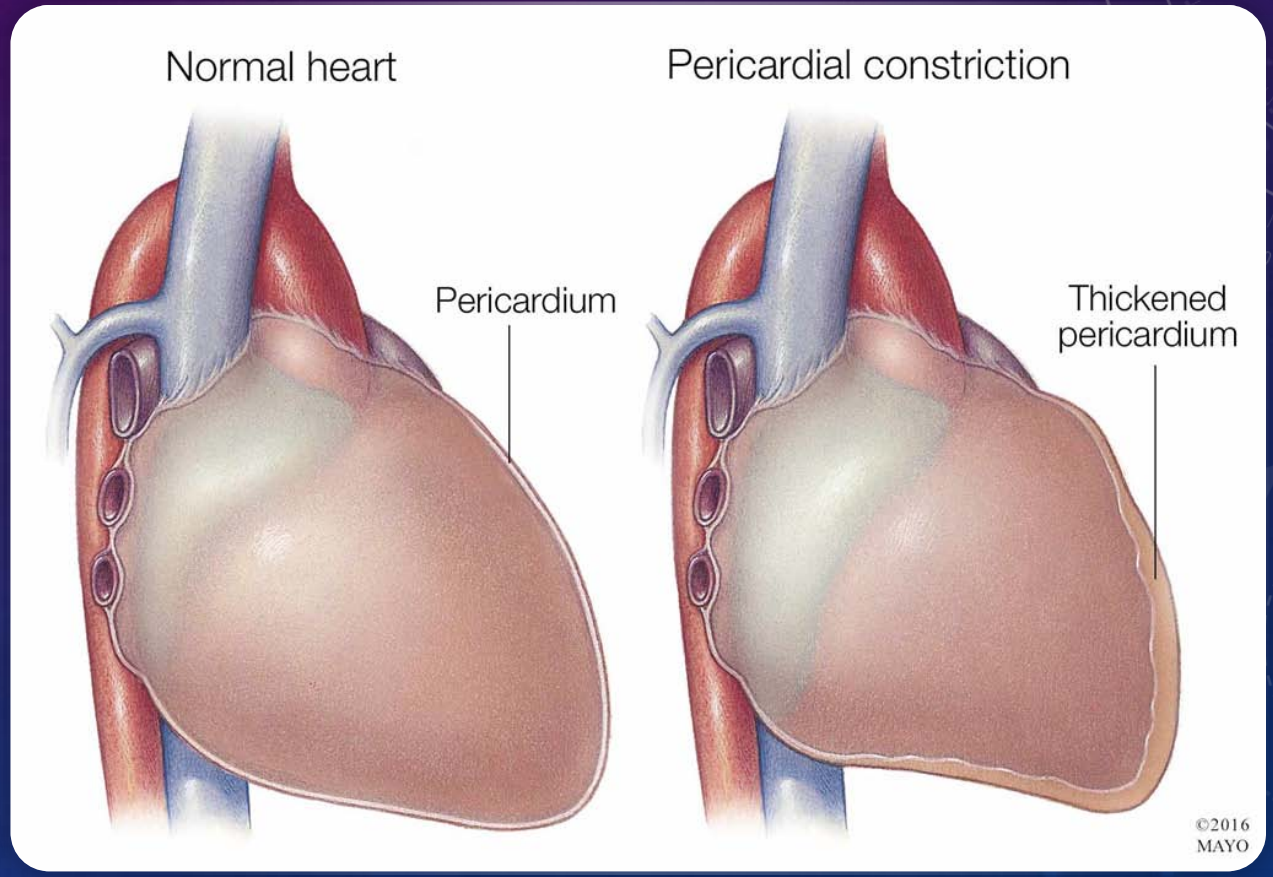
IMPAIRED DIASTOLIC FILLING BECAUSE OF “CAGED HEART” IN A THICK, FIBROUS, SCARRED PERICARDIUM

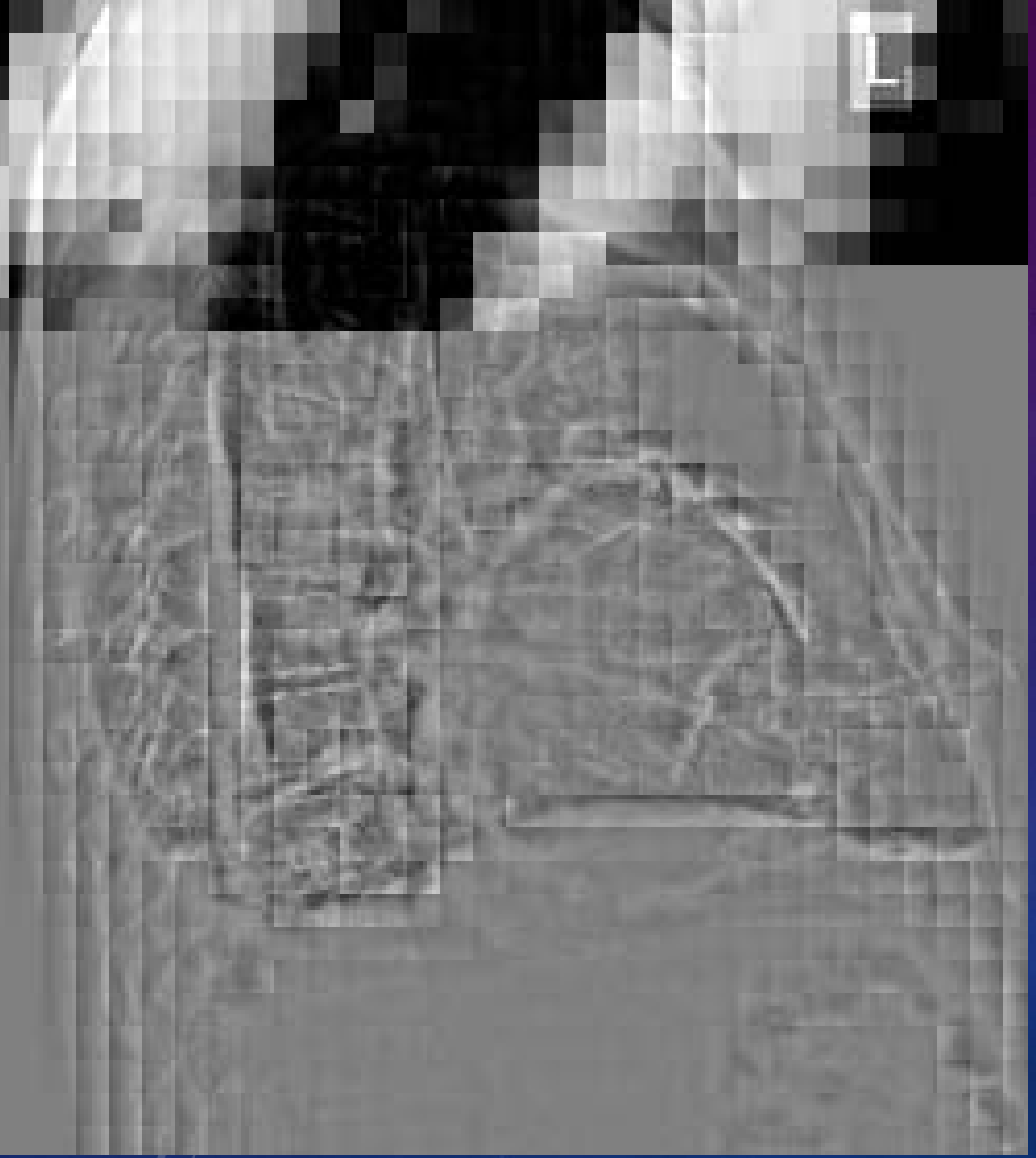
Chronic Constriction

- **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 and intracardiac pressure change and enhanced ventricular interaction in constrictive pericarditis**





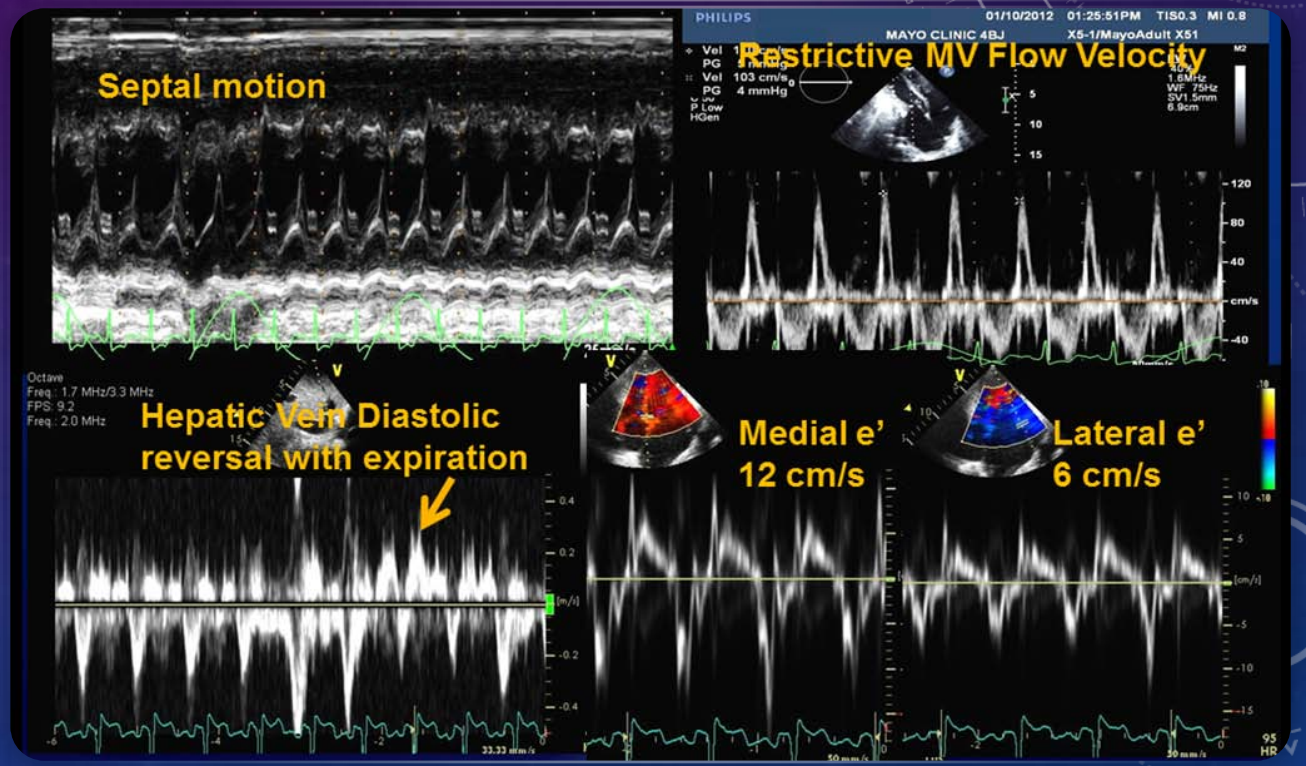
CHRONIC CONSTRICTION

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



THE COMMON CONUNDRUM

CHEST PAIN

43 F presents with Chest Pain. 3 weeks ago Thru airport.

Sharp, associate shortness of breath.

- **What Questions would you ask her?**
- **What Physical Exam would you do?**
- **Lab tests and Ancillary tests?**
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- **Management?**

SUMMARY

- Described the presentation of Acute Pericarditis
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- THANK YOU
- QUESTIONS ?