Pericardial Diseases, restriction and constriction
Understanding and how to differentiate

Dr Rosita Zakeri
Cardiology SpR
Royal Brompton & Harefield NHS Trust
r.zakeri@rbht.nhs.uk
Disclosures

- Sanofi - speaker fee
Normal pericardium

Images courtesy of Dr William D. Edwards, Mayo Clinic
Pericardial syndromes

1. Acute pericarditis

2. Pericardial effusion / tamponade

3. Constrictive pericarditis (vs. restriction)

4. Miscellaneous
Acute pericarditis

Diagnosis

• Inflammation of the pericardium
• Mostly viral aetiology

• Diagnosis requires at least 2 of:
  1. Pericarditic chest pain
  2. Pericardial rub
  3. New widespread ST elevation or PR depression on ECG
  4. Pericardial effusion (new or worsening)

• Supportive findings:
  • Raised inflammatory biomarkers
  • Evidence of inflammation on CT/MRI
Acute pericarditis
### Acute pericarditis

**Management strategy**

<table>
<thead>
<tr>
<th>Recommendations</th>
<th>Class&lt;sup&gt;a&lt;/sup&gt;</th>
<th>Level&lt;sup&gt;b&lt;/sup&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hospital admission is recommended for high-risk patients with acute pericarditis (at least one risk factor&lt;sup&gt;d&lt;/sup&gt;)</td>
<td>I</td>
<td>B</td>
</tr>
<tr>
<td>Outpatient management is recommended for low-risk patients with acute pericarditis</td>
<td>I</td>
<td>B</td>
</tr>
<tr>
<td>Evaluation of response to anti-inflammatory therapy is recommended after 1 week</td>
<td>I</td>
<td>B</td>
</tr>
</tbody>
</table>

Adler et al. ESC guidelines, *Eur Heart J*, 2015
Acute pericarditis

Who to admit

• Pericardial effusion >2cm
• Fever >38°C
• Chest trauma
• Concurrent malignancy
• Immunosuppressed
• Elevated troponin or WCC
• Hx anticoagulant use
Acute pericarditis

Treatment

- Specific therapy appropriate to underlying cause (if not viral aetiology)
- Restrict physical activity
- Aspirin / NSAIDs
- Colchicine
- Avoid steroids
Recurrent pericarditis

• Aspirin/NSAIDs + Colchicine

• Corticosteroids may be used (triple therapy)

• IVIg, anakinra, azathioprine

• Pericardiectomy (last resort)
Pericardial effusion

- Malignancy
- Infection
- Iatrogenic
- Connective tissue dx
- TB
- Hypothyroidism
Pericardial effusion and this ECG....
Cardiac tamponade

Clinical diagnosis

Clinical syndrome of low cardiac output

**Tachycardia**

**Beck’s triad:** Hypotension, raised JVP, quiet heart sounds

**Pulsus paradoxus:** Decrease in systolic BP > 10 mmHg on inspiration
Cardiac tamponade

Physiology

RA and RV collapse

Ventricular interdependence
Cardiac tamponade

Echocardiographic findings

A

B

Liver

Hep Vei

IVC

RA

A 2.37cm
B 2.54cm 0.01s
Tamponade
Management

- Needle pericardiocentesis with echo/fluoro guidance
- Surgical drainage +/- pericardial window
Constrictive pericarditis

Epidemiology

- Prevalence unknown

- Low incidence:
  - 9/500 patients with acute pericarditis went on to develop constrictive physiology (cases of bacterial infection, connective tissue disease, malignancy).

Constrictive pericarditis

Causes

- Idiopathic/viral 42-49%
- Post cardiac surgery 11-37%
- Radiation therapy 9-31%
- Connective tissue disease 3-7%
- Infectious (TB/purulent) 3-6%
- Other (malignancy, trauma, drug-induced, asbestosis, sarcoid, uraemia pericarditis) 1-10%

Ling et al. Circulation, 1999
Constrictive pericarditis
Clinical presentation

Heart failure (Rt >> Lt) - 66%

Chest pain, fatigue, abdominal symptoms, tamponade, atrial arrhythmia, frank liver disease.

Examination:

- Elevated JVP (prominent X and Y descent)
- JVP does not fall with inspiration (described in 1873)
- Pleural effusion
- Pericardial knock
- Pulsatile hepatomegaly and ascites
- Cachexia (advanced cases)

Ling et al. Circulation, 1999
Constrictive pericarditis: Pathology

a. Typically fibrotic, calcified and thickened pericardium.

b. Up to 18% of patients may not have pericardial thickening

Talreja et al. Circulation, 1993
Syed et al. Nature reviews, 2015
Constriction vs. restriction

Imaging

A

B
Constrictive physiology

Equalisation of diastolic pressures

<5mmHg difference between mean RA, RV diastolic, PA diastolic, PCWP and pericardial pressure
Constrictive physiology

Ventricular systolic discordance

Restriction

Inspiration - LV and RV concordance

Constriction

Inspiration - LV and RV discordance
Constrictive pericarditis

Treatment

• Diuretics +/- early trial of anti-inflammatory therapy

• Surgery is definitive
  
  Extensive decortication (diaphragmatic-ventricular contact regions)

  Potential complications:
  
  Bleeding
  Arrhythmias
  Ventricular wall rupture

Published surgical mortality rate: **5-15%**

Heart failure, renal/respiratory failure, sepsis, arrhythmia

*Risk factors*: age, advanced NYHA, organ failure, radiotherapy
Renal failure

- Uraemic pericarditis
- Dialysis pericarditis
- Constrictive pericarditis

**Carefully consider or avoid anticoagulation in patients starting dialysis with a documented pericardial effusion.**
Pericardial cyst

- Thin-walled echo-lucent fluid-filled structure
- Typically right costophrenic angle
- Incidental diagnosis
- Asymptomatic
- No treatment required
Pericardial malignancy

• Primary tumour exceptionally rare

• Metastatic disease from primary ca:
  • Lung
  • Breast
  • Oesophagus
  • Haematological
  • Melanoma

Consider recurrent/metastatic disease in any patient with a prior hx of cancer who presents with a pericardial effusion
2015 ESC Guidelines for the diagnosis and management of pericardial diseases

The Task Force for the Diagnosis and Management of Pericardial Diseases of the European Society of Cardiology (ESC)

Endorsed by: The European Association for Cardio-Thoracic Surgery (EACTS)

Authors/Task Force Members: Yehuda Adler* (Chairperson) (Israel), Philippe Charron* (Chairperson) (France), Massimo Imazio† (Italy), Luigi Badano (Italy), Gonzalo Barón-Esquivias (Spain), Jan Bogaert (Belgium), Antonio Brucato (Italy), Pascal Gueret (France), Karin Klingel (Germany), Christos Lionis (Greece), Bernhard Maisch (Germany), Bongani Mayosi (South Africa), Alain Pavie (France), Arsen D. Ristić (Serbia), Manel Sabaté Tenas (Spain), Petar Seferovic (Serbia), Karl Swedberg (Sweden), and Witold Tomkowski (Poland)
Take home messages...

- **Acute pericarditis**: First line therapy is NSAIDs and colchicine

- **Tamponade**: Pulsus paradoxus is key to diagnosis

- **Constrictive pericarditis**:
  - Unexplained right heart failure,
  - Previous cardiac surgery or chest wall radiation,
  - LV and RV discordance on respiration.
Good Luck !!!