DIAGNOSIS AND MANAGEMENT OF CARDIAC TAMPONADE AND CONSTRUCTIVE PERICARDITIS ACCORDING TO THE ESC GUIDELINES ON PERICARDIAL DISEASE

Professor Dr. Bernhard Maisch
Philipps-University and HGZ Marburg
Disclosures

• Prof. Maisch holds several patents for pericardial access
Learning objectives

• Aims
  -The participant should be able to diagnose the major pericardial disease entities.

• Objectives
  - is aware of the pathology, etiology and pathophysiology underlying the different pericardial syndromes.
  - interprets relevant diagnostic measures such as relevant laboratory investigations and imaging methods e.g. echocardiography for the diagnosis of dry pericarditis, pericardial effusion with and without tamponade, constrictive and constrictive-effusive pericarditis by echocardiography and MRI
  - knows medical (symptomatic and etiological) and interventional treatment options (pericardiocentesis, pericardioscopy, surgery)
  - respects the limits of management in his practice and be able to refer the individual patient to specialized centers with a heart team.
PERICARDIAL DISEASES

Definition

Structure of the pericardium

European Heart Journal (2015) -
doi:10.1093/eurheartj/ehv318
What is new in the 2015 ESC guidelines since 2004?

1) Triage strategy in pericarditis and pericardial effusion.
2) Specific diagnostic criteria for acute and recurrent pericarditis.
3) Update in immunopathogenesis.
4) Multimodality imaging
5) Enlarged epidemiologic data pool
What is new in the 2015 ESC guidelines since 2004?

6. Multicenter treatment trials


8. Prospective and retrospective studies (>100 patients) on prognosis.

9. Imaging of (reversible) pericardial inflammation.

10. Age and gender specific data
Which is the most frequently mentioned cause for a pericardial effusion in internal medicine?

a) Idiopathic pericarditis  
b) Viral pericarditis  
c) Malignant pericarditis  
d) Radiation induced pericarditis

Correct is a)

But is this a satisfying response?
**Case 1:** F. M. 27.9.1980: Acute symptomatic pericarditis with small pericardial effusion and suspected viral myocardial involvement

**Symptoms:** precordial discomfort after a common cold

**Auscultation:** pericardial rubs as early and late systolic and presystolic murmurs

**EKG:** acute „idiopathic“ pericarditis

**Echo:** increased pericardial fluid (Horowitz B), segmental inferolateral wall motion abnormality.

**Laboratory:** CRP increased, leukopenia, troponins and CKMb slightly increased.

**Endomyocardial biopsy:** Parvo B19 + HHV6 positive by PCR

**Treatment:** NSAIDs for 2 weeks and Colchicine 0,5 mg dispers 1-0-1 for 2 months, iv-Ig on day 1 and 3 after PCR of EMB was available, no sports (for 6 months)

**Clinical Course:** favorable, no recurrence
EKG-findings in pericarditis

a) ST-elevations in all leads

c) Electrical alternans

b) EKG in pericarditis (Holzmann):
   a. Normal
   b. Stage I
   c. Stage II
   d. Stage III
Suspected Perimyocarditis with Small Pericardial Effusion

Echocardiography + Cardiac MRI

Small PE + myocardial inflammation + EF <45% or VT

Elective heart catheterization + endomyocardial biopsy + histology + immunohistology + PCR

Small PE without myocardial inflammation

Symptomatic management
Hospitalisation, exercise restriction, pain therapy
- Ibuprofen, 300-800 mg or Ass 1 g
- Colchicine, 0.5 mg 3-times daily

Follow-up echo and/or MRI: if symptomatic or refractory PE

Small PE without myocardial inflammation

Recurrent + symptomatic PE +/- myocardial inflammation

Elective heart catheterization, endomyocardial biopsy + histology + immunohistology + PCR

Disease specific systemic therapy

Autoreactive PM: immunosuppression

Eosinophilic or giant cell PM immunosuppression

Viral PM (EV, ADV, EBV, CMV) Iv immunoglobulins

Viral PM (HHV 6): virostatics


www.escardio.org
Case 2: H.B., *22.10.1937 Pericarditis with tamponade in 57 year old smoker

Symptoms and signs:

- Palpitations (Sinustachycardia/SVT/TAA..)
- Dyspnoea
- Physical weakness
- Hypotension
- Venous congestion
- Pulsus paradoxus in tamponade = Decrease of pulse amplitude (or blood pressure) during inspiration
Biography, H.B., *22.10.1937

- Compensated renal failure since 20 years due to obstructive uropathy.
- Kidney transplantation 7.6.1999,
- Renal failure due to transplant rejection in April 2012 (creatinin 3.98 mg/dl) with pleural and pericardial effusions (Horowitz C), Ascites, EKG low voltage and atrial fibrillation. Successful treatment with Cyclosporine

- 31.8.2012 Pericardial tamponade, pericardiocentesis
- What diagnostic measures are possible and adequate?
Water bottle heart („Bocksbeutelherz“)
Pericardial effusion: Diagnostic and therapeutic algorithms

Echocardiography (or MRI)

- Tamponade or PE >20 mm in diastole
  - Suspected purulent, TB or neoplastic effusion
    - Emergency pericardiocentesis and drainage
    - Elective pericardioscopy peri- and epicardial biopsy with histology+immunohistology+PCR
      - Follow-up Echocardiography
      - Prolonged drainage, intrapericardial sclerosing therapy with gentamycin 80 mg
        - Disease specific intrapericardial therapy
          - Malignant effusion: Prolonged drainage, ip. cisplatin
          - Purulent effusion: Drainage, saline rinsing → cardiac surgery
          - Autoreactive effusion: i.p. triamcinolone and prolonged drainage
          - Viral effusion: prolonged drainage No further ip. therapy

- No tamponade PE 10-20 mm in diastole
  - Elective pericardiocentesis, drainage, pericardioscopy, peri- and epicardial biopsy + histology+immunohistology+PCR

- No tamponade PE <10 mm in diastole
  - Symptomatic management
    - Hospitalisation, exercise restriction, pain management
      - Ibuprofen, 300-800 mg
      - Colchicine, 0.5 mg 3-times daily
  - Follow-up Echocardiography

Etiologies and precipitating factors causing tamponade

**Likely:** Neoplasm, infection, iatrogenic haemopericardium, hemopericardium in aortic dissection, myocardial infarction, renal failure

**Rarely:** Collagen disease, autoimmune or thyroid disorders, Dressler’s syndrome

**Never:** Pericardial transudates in heart failure, pulmonary hypertension and last trimester of pregnancy
Pericardiocentesis

Subxyphoidal access:
Lateral view: Halo!
X-ray control

Lateral axillary line:
Echo control
- For large or medium effusions
Pericardial effusion in Cardio-MRI

- Function
- Compression of RA, LA, RV, LV
- Late enhancement
- Morphology (Atrophy)
Echocardiography and Cardiac MRI

- Swinging heart in tamponade
Epicardial biopsy and pericardioscopy
Pericardial biopsy under radiological control
Biography, H.B., *22.10.1937
Cytology and histology

Malignant pericardial effusion: oat cell carcinoma
in Maisch et al HFR 2013
Etiology and Intrapericardial Treatment in Pericardial Effusions

n = 259 patients, 152 male, age 57±14.8 years

% positive

- Malignant: 28
- Autoreactive / lymphocytic: 35
- Viral: 12
- Bacterial: 2
- Trauma: 15
- Other: 8

G: gentamycin
G + triamcinolon
G + cisplatin
G + rinsing + surgery

Intrapericardiac Therapy with Cisplatin in neoplastic pericardial effusion

No recurrence during rest of life(%)

**1st episode of pericarditis January 10th 2001** with precordial discomfort during half-marathon. Diagnosis made by the local cardiologist: Idiopathic pericarditis.

**EKG:** SR 84/min, extrasystole, otherwise normal

**Echocardiography:** A small pericardial effusion (Horowitz C1), no contraction abnormalities.

**Treatment:** NSAIDs for 1 week and colchicine for 4 weeks.

**After 4 weeks:** no effusion, sports was started too early.

**2nd episode of pericarditis with effusion in March 2001.** Transfer to our clinic for further diagnosis and treatment.

**Clinical work-up** including peri- and epicardial biopsy: recurrent autoreactive pericarditis with effusion.

**Treatment:** intrapericardial triamcinolone
Pericardioscopy and epicardial biopsy

Safety wire

Halo

Pericardioscope
Biopsy site selection: white vs blue light
Procedural success with intrapericardial triamcinolone


3rd episode August 8th 2011 clinical presentation: Fatigue and exercise restriction
EKG: SR 96/min
Chest x-ray: pericardial calcification

Echocardiography: pericardial thickening (Horowitz F), Dip and plateau phenomenon, square root sign in TM
Heart Catherization: Dip and plateau phenomenon, enddiastolic pressure equalisation in cardiac chambers
Aetiology of constrictive pericarditis

Cleveland Clinic 1977-2000 (n=150)
Bertog et al 2001

- Idiopathic: 62 (41%)
- Postsurgical: 54 (36%)
- Radiation: 20 (13%)
- Miscellaneous: 14 (9%)

Marburg Heart Center (n=15)

- Autoreactive: 7 (46%)
- TBC: 2 (13.5%)
- Radiation: 2 (13.5%)
- Postsurgical: 3 (20%)
- Neoplastic: 1 (7%)
MRI and CT in preoperative screening before pericardiectomy

- Exclusion of patients with extensive myocardial fibrosis and/or atrophy significantly reduces the mortality rate.

Rienmüller et al. J Thorac Imaging 1993

ESC-Guidelines 2004
Cardiac surgery in constrictive pericarditis

Total pericardiectomy improves
-symptoms
-central hemodynamics
-prognosis

Its current mortality rates are ~5%

Note: In rare effusive-constrictive pericarditis
intrapericardial urokinase
and/or triamcinolone may be
a promising option.
Recommended further reading:

You see only, what you already know and understand!

Johann Wolfgang Goethe