DEPARTMENT OF INTERNAL MEDICINE

ACUTE PERICARDITIS

Speakers: Students of 4th Course
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GOAL

On example of case history to reveal clinical course and management of patient with acute pericarditis.
DEFINITION

Acute pericarditis is the inflammation of the pericardial sac (lining around the heart) caused by infectious or noninfectious agents with the possible increased production of pericardial fluid as an exudate and its duration is less than 4 weeks.

RELEVANCE

Three main considerations of David H. Spodick:

1) pericarditis occurs in every category of disease, common and exotic (the spectrum is so broad that with every new case, the clinician should devise an appropriate differential diagnosis)

2) to avoid therapeutic mishaps, pericarditis must not be mistaken for other syndromes, and

3) the etiological and clinical spectra of acute pericarditis change frequently and some classic assumptions and descriptions are outdated
Our Patient M.
46 yr. old male
PRESENTING COMPLAINTS

- Dull, aching pain in retrosternal region of the chest with radiation to the cervical spine, shoulders, interscapular area
- Pain is persistent and has three weeks duration
- Pain becomes worse on inspiration and supine position
- Occasionally patient notes palpitations
- Other symptoms include: weakness, fatigue, high grade fever (39.5°C), body weight loss up to 2 kg
HISTORY OF THE PRESENTING COMPLAINTS

- Three weeks prior to presentation, patient had been exposed to cold
- Since that moment the patient developed low grade fever (up to 37.5°C) and pain in the heart region
- Patient thought he had caught the cold, and he used NSAIDs to relief symptoms
- However, symptoms were not reduced, and fever gradation increase up to 39.5°C
- General practitioner prescribed for the patient Amoxicillin 1000 mg tid
- Five days of treatment were not effective and patient was referred to cardiologist
DRUG HISTORY

- Patient is not using any drugs currently

ALLEGIES AND REACTIONS

- Patient has no allergies and no reactions to drugs and medication

ALCOHOL AND SMOKING

- He consumes alcohol occasionally and smokes 20 (1 pack) cigarettes per day for 17 years: making 17 pack years
FAMILY HISTORY

- He has no risk factor for cardiovascular disease, his family and relatives do not have cardiovascular diseases

SOCIAL HISTORY

- Married
- Live in rural area in a house with his wife, son, and mother-in-law
- Unemployed
EXAMINATION

VITAL SIGNS:

- Temperature: 39,5\(^\circ\) C
- PS: 100 bpm
- BP: 120/80 mm Hg
- Respiratory rate: 15 pm
- Height: 186 cm
- Weight: 75 kg
- BMI: 21,7 kg/m\(^2\)

*Fever and tachycardia*
EXAMINATION

GENERAL CONDITION

• His mood, orientation in space, posture and development are normal

SKIN AND MUCOUS MEMBRANES

• Skin, subcutaneous fat tissue, nails, mucous membranes, tongue are normal, he had no edema and lymph nodes are not palpable
EXAMINATION

JOINTS, HEAD & NECK

- Joints, head and neck are normal
- Thyroid gland is palpated, size is increased insignificantly, painless and has smooth surface
- JVD 5.0 cm above the sternal angle

RESPIRATORY & CARDIOVASCULAR SYSTEMS

- The point of apex beat is diffuse (3 cm in diameter), impulse is diminished force, unchanged location (palpated in the 5th intercostal space, 1.5 cm toward the sternum from left midclavicular line)
- $S_1$ and $S_2$ are soft; diffuse holosystolic grade 3 murmur best heard at the apex

GIT AND URINARY SYSTEMS

- Both systems were unremarkable
PATIENT’S PLAN OF SURVEY

Instrumental investigations

- Thermometry
- ECG
- Echocardiography
- Abdomen ultrasound
- Thyroid ultrasound
- Chest X-Ray
- Chest CT-scan
**LABORATORY TESTS**

Complete blood count on the date of admission

ESR 34 mm/h

<table>
<thead>
<tr>
<th>Test</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>RBC (N 3.9-5.0 10^12/L)</td>
<td>4.20 *10^{12}/L</td>
</tr>
<tr>
<td>Hb  (N 120-160 g/L)</td>
<td>143 g/L</td>
</tr>
<tr>
<td>WBC (N 4.0-9.0 10^9/L)</td>
<td>13.9 *10^9/L</td>
</tr>
<tr>
<td>NE  (N 1.7-7.7 10^9/L; 47.0-72%)</td>
<td>12.5 *10^9/L 89.9%</td>
</tr>
<tr>
<td>Band neutrophils (1.06-6%)</td>
<td>14 %</td>
</tr>
<tr>
<td>Segmented neutrophils (47-72%)</td>
<td>75.9 %</td>
</tr>
<tr>
<td>LY  (N 0.4-4.4 10^9/L; 19.0-37.0%)</td>
<td>0.7 *10^9/L 5.3%</td>
</tr>
<tr>
<td>MO  (N 0.0-0.8 10^9/L; 3.0-11.0%)</td>
<td>0.5 *10^9/L 3.3%</td>
</tr>
<tr>
<td>E   (N 0.0-0.6 10^9/L; 0.5-5.0%)</td>
<td>0.1 *10^9/L 1.0%</td>
</tr>
<tr>
<td>BA  (N 0.0-0.2 10^9/L; 0.0-1.0%)</td>
<td>0.1 *10^9/L 0.5%</td>
</tr>
<tr>
<td>PLT (N 180-320 10^9/L)</td>
<td>273 *10^9/L</td>
</tr>
</tbody>
</table>

Signs of inflammation: neutrophilic leucocytosis, shift to the left, increased ESR
## LABORATORY TESTS

Urine analysis on the date of admission

<table>
<thead>
<tr>
<th>Test</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>Colour</td>
<td>Light yellow</td>
</tr>
<tr>
<td>Specific gravity (N 1,001-1,040)</td>
<td>1,015</td>
</tr>
<tr>
<td>pH (N 5.0-7.0)</td>
<td>6.0</td>
</tr>
<tr>
<td>Protein (N absent)</td>
<td>Absent</td>
</tr>
<tr>
<td>Glucose (N absent)</td>
<td>Absent</td>
</tr>
<tr>
<td>Erythrocytes (N single)</td>
<td>single</td>
</tr>
<tr>
<td>Leucocytes (N 6-8 in field)</td>
<td>1-3/HPF</td>
</tr>
<tr>
<td>Transitional epithelium (N single)</td>
<td>sometimes</td>
</tr>
<tr>
<td>Casts: hyliane, granular, etc. (N single)</td>
<td>Absent</td>
</tr>
<tr>
<td>Crystals (N absent)</td>
<td>Absent</td>
</tr>
</tbody>
</table>

*Urine analysis falls in normal ranges*
Biochemical blood profile on the date of admission

Plasma glucose (3.9 - 6.4 venous blood) – 4.1 mmol/L

<table>
<thead>
<tr>
<th>Test</th>
<th>Reference Range</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bilirubin Total</td>
<td>17 - 21 mkmol/L</td>
<td>9.3 mkmol/L</td>
</tr>
<tr>
<td>Bilirubin Direct</td>
<td>0 - 7,9 mkmol/L</td>
<td>4.33 mkmol/L</td>
</tr>
<tr>
<td>Bilirubin Indirect</td>
<td>&lt; 19 mkmol/L</td>
<td>4.97 mkmol/L</td>
</tr>
<tr>
<td>ALT</td>
<td>&lt; 41 U/L</td>
<td>22 U/L</td>
</tr>
<tr>
<td>AST</td>
<td>&lt; 35 U/L</td>
<td>16 U/L</td>
</tr>
<tr>
<td>Creatinine</td>
<td>62-115 mkmol/L</td>
<td>82 mkmol/L</td>
</tr>
</tbody>
</table>

All tests fall in reference range
Biochemical blood profile on the date of admission

| Troponin I (N < 0.01 ng/ml) | < 0.01 ng/ml |

*Troponin I falls in reference range, there is no evidence of cardiomyocyte damage*
Biochemical blood profile

<table>
<thead>
<tr>
<th>Test</th>
<th>Reference Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>C-RP (N &lt; 6 mg/L)</td>
<td>6-48 mg/L</td>
</tr>
<tr>
<td>Rheumatoid factor (N &lt; 8 IU/mL)</td>
<td>&lt; 8 IU/mL</td>
</tr>
<tr>
<td>ASL-O (N &lt; 200 IU/mL)</td>
<td>&lt; 200 IU/mL</td>
</tr>
<tr>
<td>Procalcitonin (&lt;0.46 ng/mL)</td>
<td>0.48 ng/mL</td>
</tr>
</tbody>
</table>

Signs of inflammation – raised level of C-RP, procalcitonin is slightly increased (range 0.47-0.50 indicates low risk of severe sepsis and/or septic shock, >2 high risk)
LABORATORY TESTS

Biochemical blood profile on the date of admission

<table>
<thead>
<tr>
<th>TSH</th>
<th>1.89 mkU/mL</th>
</tr>
</thead>
<tbody>
<tr>
<td>(N 0.25-5 mkU/mL)</td>
<td></td>
</tr>
</tbody>
</table>

TSH falls in reference range

To clarify thyroid dysfunction was recommended additional analysis: T4, TPO antibodies, Tg antibodies (to rule out autoimmune thyroiditis)
Blood culture findings are diverse; it likely to be due to inappropriate blood sampling.
**LABORATORY TESTS**

Serum PCR infection identification

<table>
<thead>
<tr>
<th>Infection</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>Herpes Simplex Virus type 1, 2</td>
<td>1.1</td>
</tr>
<tr>
<td>Varicella Zoster Virus</td>
<td>1.2</td>
</tr>
<tr>
<td>Epstein Barr Virus</td>
<td>0.9</td>
</tr>
<tr>
<td>Cytomegalovirus</td>
<td>1.2</td>
</tr>
<tr>
<td>Human Herpes Virus type 6</td>
<td>0.8</td>
</tr>
</tbody>
</table>

Reference Range
- 0.5 – 1.09 negative
- 1.1 – 1.3 low viral load
- 1.4 – 1.6 medium viral load
- 1.7 – 1.9 high viral load

*It occurs low viral load of herpes simplex virus type 1, 2 and cytomegalovirus, data are not sufficiently convincing for viral etiology of pericarditis*
ECG on the date of admission

Sinus rhythm, 89 bpm, normal heart axis, PR-segment depression in II, III, AVF, PR-segment elevation in AVR, T waves flattened
INSTRUMENTAL INVESTIGATIONS

Echocardiography on the date of admission
- Heart chambers are not enlarged
- Pericardial effusion
  - posterior echo-free pericardial space 10 mm
  - anterior echo-free pericardial space 8 mm
  - apical echo-free pericardial space 8 mm
- Presence of floating fibrin threads
- Myocardial contractility is preserved, EF 76%

*Signs of mixed serous-fibrinous pericardial effusion, mild severity*
INSTRUMENTAL INVESTIGATIONS

Thyroid ultrasound on the date of admission

Thyroid hyperplasia II-III degree
Diffuse changes of thyroid parenchyma and its hyperemia

Goiter II-III degree with hyperemia and diffuse changes of parenchyma
Abdomen ultrasound on the date of admission

- Liver
- Pancreas unremarkable
- Gallbladder
- Spleen is increased in size (135*63mm), diffuse changes of its parenchyma
- Kidneys: microlithiasis (D 4.5-5.0mm)

Splenomegaly with diffuse changes of parenchyma
Chest X-Ray on the date of admission

- Focal and infiltrative changes is not observed
- Roots are structural, normal sized
- Pleural sinuses are not changed
- Diaphragm clearly defined
- Heart is enlarged, left border is displaced to the left
- Aorta is not changed

_Lungs are not changed; heart is enlarged_
Chest CT-scan

- Lungs are not changed
- Trachea and main bronchi are without any abnormalities
- Pulmonary trunk diameter 20 mm
- Left pulmonary artery diameter 19 mm
- Right pulmonary artery diameter 21 mm
- Mediastinal lymph nodes are up to 10 mm
- In pericardial sac occurs fluid with max thickness up to 20 mm
- Destructive changes of bones are not observed

**Pericardial effusion occurs**
High grade fever occurs in initial stages, but resolved by the treatment.
CLINICAL SYNDROMES

- Pericarditis
- Pericardial effusion
- Inflammation
- Splenomegaly
- Goiter
Clinical Syndromes Classification

Etiology of Pericarditis

Most cases are labeled as “Idiopathic” because the traditional diagnostic approach often fails to identify the etiology.

http://ddxof.com/pericardial-effusion/
## Clinical Syndromes Classification

### Pericarditis

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

### Pericardial effusion

<table>
<thead>
<tr>
<th>Onset</th>
<th>Acute</th>
<th>Subacute</th>
<th>Chronic (&gt;3 months)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Size</td>
<td>Mild &lt;10 mm</td>
<td>Moderate 10–20mm</td>
<td>Large &gt;20 mm</td>
</tr>
<tr>
<td>Distribution</td>
<td>Circumferential</td>
<td>Loculated</td>
<td></td>
</tr>
<tr>
<td>Composition</td>
<td>Transudate</td>
<td>Exudate</td>
<td></td>
</tr>
</tbody>
</table>

2015 ESC Guidelines for the diagnosis and management of pericardial diseases
Grading the size of an effusion by echocardiography measurements

- **Physiologic/trivial**
  - Echo-free pericardial space < 5 mm ≈ 50-100 ml of fluid

- **Small**
  - Echo-free pericardial space 6-9 mm ≈ 100-250 ml of fluid

- **Moderate**
  - Echo-free pericardial space 10-19 mm ≈ 250-500 ml of fluid

- **Large**
  - Echo-free pericardial space >20 mm ≈ >500 ml of fluid
Clinical Syndromes Classification

**Pericardial effusion**

According to the composition of the fluid

- Serous
- Fibrinous
- Purulent
- Caseous
- Hemorrhagic
- Mixed
**Clinical Syndromes Classification**

**INFLAMMATION**

**According to duration**
- Per-acute inflammation
- Acute inflammation
- Sub-acute inflammation
- Chronic inflammation

**According to etiology**
- Biological inflammation
- Chemical
- Physical
- Immune factors

**According to location**
- Localized
- Widespread or Systemic
### Clinical Syndromes Classification

#### SPLENOMEGALY

**Primary causes**
- Immune response work hypertrophy
- RBC destruction work hypertrophy
- Congestive
- Myeloproliferative
- Infiltrative
- Neoplastic

**Miscellaneous causes**
- Trauma
- Cysts
- Hemangiomas
- Metastasis
- Giant abscess
- Drug induced
Clinical Syndromes Classification

WHO goiter classification

Grade 0 – no goiter presence is found (the thyroid impalpable and invisible)

Grade 1 – neck thickening is present in result of enlarged thyroid, palpable, however, not visible in normal position of the neck; the thickened mass moves upwards during swallowing. Grade 1 includes also nodular goiter if thyroid enlargement remains invisible

Grade 2 – neck swelling, visible when neck is in normal position, corresponding to enlarged thyroid- found in palpation
Goiter classification according to thyroid function

- Non-toxic goiter
- Toxic goiter
- Hypothyroid goiter
Clinical Syndromes Classification

Goiter classification according to the thyroid structure

- Diffuse
- Nodular
FINAL DIAGNOSIS

Main disease
Acute idiopathic serofibrinous (seroplastic) pericarditis with small amount of effusion

Complication
Inflammatory splenomegaly

Concomitant disease
Diffuse non-toxic goiter grade I
2015 ESC RECOMMENDATIONS FOR THE TREATMENT OF ACUTE PERICARDITIS

**Diagnosis of acute pericarditis**
(2 of 4 clinical criteria: pericardial chest pain, pericardial rubs, ECG changes; pericardial effusion)

- **First line**
  - Aspirin or NSAID + colchicine + exercise restriction

- **Second line**
  - Low-dose corticosteroids
    (in case of contraindications to aspirin/NSAID/colchicine and after exclusion of infectious cause)

- **Recurrent pericarditis**
  (after symptom-free interval 4–6 weeks)

- **First line**
  - Aspirin or NSAID + colchicine + exercise restriction

- **Second line**
  - Low-dose corticosteroids
    (in case of contraindications to aspirin/NSAID/colchicine and after exclusion of infectious cause)

- **Third line**
  - i.v. immunoglobulin or anakinra or azathioprine

- **Fourth line**
  - Pericardiectomy

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.

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.
MANAGEMENT OF THE PATIENT

Inflammation

- NSAIDs
  Ibuprofen 600 mg qid
- Glucocorticoids
  Methylprednisolone 24 mg at 7.00
  8 mg at 13.00
  14 days, followed by dose tapering 4 mg every 2 weeks
- Gastroprotection
  Pantoprazole 40 mg bid
MANAGEMENT OF THE PATIENT

Emperic antibiotic therapy

- IV ceftriaxone 1000 mg bid
- IV levofloxacin 500 mg qd

Because of temperature and lab tests (neutrophilic leucocytosis: WBC 13.7*10⁹/L, band 4%, segmented 77%) were not normalized, antibiotic treatment continued by

- Azithromycin 500 qd 5 days

Protection against fungal infection

- Fluconazole 150mg qod # 5
In this case prompt investigation, appropriate diagnosis, and efficient treatment led to recovery.

- Symptoms abated
- Body temperature turned into normal: 36.6-36.9°C
- Lab tests were normalized: WBC 7.8*10⁹/L
- Second echocardiogram after treatment revealed reduction of the effusion (posterior echo-free pericardial space 2 mm, anterior and apical echo-free pericardial space were absent)
- Patient was discharged from the hospital and it was recommended observation of the cardiologist and continuing methylprednisolone tapering

OUTCOME
CONCLUSION

- Clinical case displayed particular features of the acute pericarditis: course of disease, diagnostic consideration, treatment recommendations
- In this instance take place positive trend of illness against the background of the conservative therapy

**BUT**

- 15% to 30% of patients with acute pericarditis recurrence may develop
- The risk of recurrence is higher in women and in patients who do not have a response to initial treatment with NSAIDs
Thank you!