

V.N.KARAZIN

KHARKIV NATIONAL UNIVERSITY

DEPARTMENT OF INTERNAL MEDICINE

ACUTE PERICARDITIS



Speakers : Students of 4th Course

Monu & Tandzile Dlamini

Head of the department : Prof . M.I. Iabluchanskyi

Teacher Advisor : O. Babiy &

N. Kumpan

GOAL

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

RELEVANCE

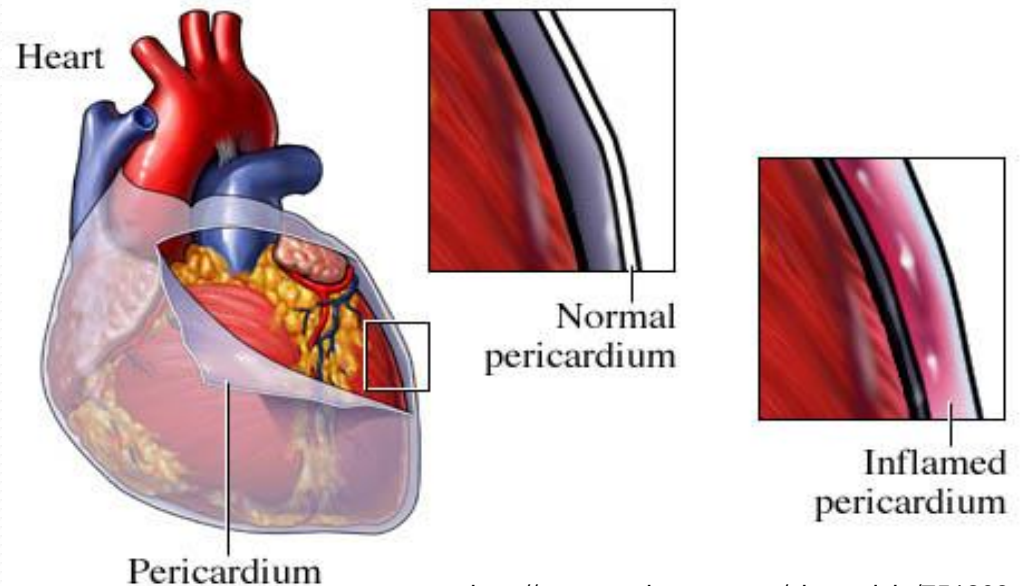
Three main considerations of David H. Spodick:

- 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and clinical spectra of acute pericarditis change frequently and some classic assumptions and descriptions are outdated



DEFINITION

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



EPIDEMIOLOGY

- Epidemiologic data are lacking, likely because this condition is frequently inapparent clinically, despite its presence in numerous disorders
- Lorell noted a diagnosis acute pericarditis in approximately 1 per 1000 hospital admissions
- Acute pericarditis comprises 1% of emergency room visits in patients with ST-segment elevation



**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 three weeks duration
- Pain becomes worse on inspiration and supine position
- Occasionally patient notes palpitations
- Other symptoms include: weakness, fatigue, high grade fever ($39,5^{\circ}\text{C}$), 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 in patient developed low grade fever (up to $37,5^{\circ}\text{C}$) and pain in the heart region
- Patient thought he had been caught the cold, and had been used NSAIDs to relief symptoms
- However, symptoms were not reduced, and fever gradation increase up to $39,5^{\circ}\text{C}$
- General practitioner had prescribed for patient Amoxicillin 1000 mg tid
- Five days of treatment were not effective and patient had been referred to cardiologist

PAST MEDICAL HISTORY

- In the 2013 year patient suffered from periodical dull pain in the heart region
- He had been investigated and had been treated by cardiologist; final diagnosis was:
“Neurocirculatory asthenia on the background of chronic tonsillitis decompensation”
- After treatment, symptoms decreased, pain in the heart region bothered patient rare

DRUG HISTORY

- Patient has not any current medications

ALLERGIES AND REACTIONS

- Patient has not any allergies
- Patient has not any reactions to drugs and medication

ALCOHOL AND SMOKING

- Patient consumes alcohol occasionally
- Patient smokes 20 cigarettes (1 pack) per day during 17 year, what equals 17 pack-years

FAMILY HISTORY

- Patient has no risk factors for cardiovascular disease, his parents and relatives do not bother cardiovascular diseases

SOCIAL HISTORY

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

EXAMINATION

VITAL SIGNS:

- Temperature 39,5° C
- PS 100 bpm
- BP 120/80 mm Hg
- Respiratory rate 15 pm
- High 186 cm
- Weight 75 kg
- BMI 21,7 kg/m²

Fever and tachycardia

EXAMINATION

GENERAL CONDITION

- Middle aged good mood man
- He has correct **orientation** in space and surroundings
- The patient's **posture** is active
- Patient is well **developed**, well **nourished** and his **appearance** is consistent with his stated age

EXAMINATION

SKIN & MUCOUS MEMBRANES

- **Skin** is pale pink and clear, rashes and hemorrhages are absent, skin turgor and elasticity are preserved
- **Subcutaneous fat tissue** is mildly underdeveloped
- **Nails** are without any abnormalities
- **Mucous membranes** are pink and wet
- **Tongue** is clear and wet
- **Edema** is absent
- **Lymph nodes** are not palpable

EXAMINATION

JOINTS, HEAD & NECK

- **Joints** have normal configuration, active and passive movements are painless
- **The head** examination is unremarkable
- The **neck** has normal shape and size, no visible enlargement of thyroid gland
- **Thyroid gland** is palpated, size is increased insignificantly, painless, has smooth surface, homogeneous structure, nodules are not detected
- **JVP** 5.0 cm above the sternal angle

EXAMINATION

RESPIRATORY & CARDIOVASCULAR SYSTEMS

- The chest has normal shape
- Vesicular breath sounds of the lungs to auscultation
- 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 medclavicular line)
- S₁ and S₂ are soft; diffuse holosystolic grade 3 murmur best heard at the apex

EXAMINATION

GIT & URINARY SYSTEMS

- **Abdomen** is soft and nontender
- **Liver** and **spleen** are not palpable
- **The kidneys** are not palpable
- **Stool** is normal
- **Urination** is normal

2015 ESC RECOMMENDATIONS: INVESTIGATIONS FOR ACUTE PERICARDITIS

1ST LEVEL (all cases)

- Markers of inflammation (i.e. ESR, CRP, white blood cell count)
- Renal function and liver tests, thyroid function
- Markers of myocardial lesion (i.e. troponins, CK)
- ECG
- Echocardiography
- Chest X-Ray

2015 ESC RECOMMENDATIONS: INVESTIGATIONS FOR ACUTE PERICARDITIS

2nd LEVEL (if 1st level is not sufficient for diagnostic purpose)

- CT and/or CMR
- Analysis of pericardial fluid from pericardiocentesis, or surgical drainage, for
 1. Cardiac tamponade or
 2. Suspected bacterial, neoplastic pericarditis or
 3. Symptomatic moderate to large effusions not responding to conventional anti-inflammatory therapy

Additional testing should be directed to specific etiologies according to clinical presentation (presence of high risk criteria)

2015 ESC RECOMMENDATIONS: INVESTIGATIONS FOR ACUTE PERICARDITIS

HIHG RISK CRITERIA

(at least 1 among the following)

Major

- High fever ($>38^{\circ}\text{C}$)
- Subacute course without a clear-cut acute onset
- Large pericardial effusion (i.e. diastolic echo-free space >20 mm)
- Cardiac tamponade
- Failure to respond to NSAID therapy at least 1 week of therapy

Minor

- Myopericarditis
- Immunodepression
- Trauma
- Oral anticoagulant therapy

PATIENT'S PLAN OF SURVEY

Laboratory tests

- Complete blood count
- Urinalysis
- Biochemical blood profile:

Bilirubin	Creatinine	Glucose
ALT	Urea	Cardiac biomarkers
AST	Potassium	(Troponin I)

Thyroid function tests: TSH, T₄

- Inflammation assessment: ESR, C-RP, RF
- Infection identification: ASL-O, PCR, blood culture

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

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

Signs of inflammation: neutrophilic leucosytosis, shift to the left, increased ESR

LABORATORY TESTS

Urine analysis on the date of admission

Colour	Light yellow
Specific gravity (N 1,001-1,040)	1,015
pH (N 5,0-7,0)	6.0
Protein (N absent)	Absent
Glucose (N absent)	Absent
Eritrocytes (N single)	single
Leucocytes (N 6-8 in field)	1-3/HPF
Transitional epithelium (N single)	sometimes
Casts: hyaline, granular, etc. (N single)	Absent
Crystals (N absent)	Absent

Urine analysis falls in normal ranges

LABORATORY TESTS

Biochemical blood profile on the date of admission

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

Bilirubin Total (N 17 - 21 mkmol/L)	9.3 mkmol/L
Bilirubin Direct (N 0 - 7,9 mkmol/L)	4.33 mkmol/L
Bilirubin Indirect (N < 19 mkmol/L)	4.97 mkmol/L

ALT (N < 41 U/L)	22 U/L
AST (N < 35 U/L)	16 U/L
Creatinine (N 62-115 mkmol/L)	82 mkmol/L

All tests fall in reference range

LABORATORY TESTS

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

LABORATORY TESTS

Biochemical blood profile

on the date of admission →	C-RP (N < 6 mg/L)	6-48 mg/L
	Rheumatoid factor (N < 8 IU/mL)	< 8 IU/mL
	ASL-O (N < 200 IU/mL)	< 200 IU/mL
after 10 days of treatment →	Procalcitonin (< 0.46 ng/mL)	0.48 ng/mL

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

TSH

(N 0.25-5 mkU/mL)

1.89 mkU/mL

TSH falls in reference range

To clarify thyroid dysfunction was recommended additional analysis: T4, TPO antibodies, Tg antibodies (to rule out ***autoimmune thyroiditis***)

LABORATORY TESTS

Blood culture

Laboratory Number	Culture	Antibiotic sensitivity
#35-36	Pseudomonas stutzeri	ceftriaxone, cefotaxime, ceftazidime, ceftazidime, cefixime, cefepime, ceftoloxime, amikacin, ofloxacin, ciprofloxacin, pefloxacin, levofloxacin, gatifloxacin
#37-38	Negative	
#39-40	Enterococcus faecium	amoxicillin, amoxiclav, rifampicin, chloramphenicol, doxycycline, vancomycin, azithromycin, levofloxacin, gatifloxacin, linezolid, netilmycin

Blood culture findings are diverse; it likely to be due to inappropriate blood sampling

LABORATORY TESTS

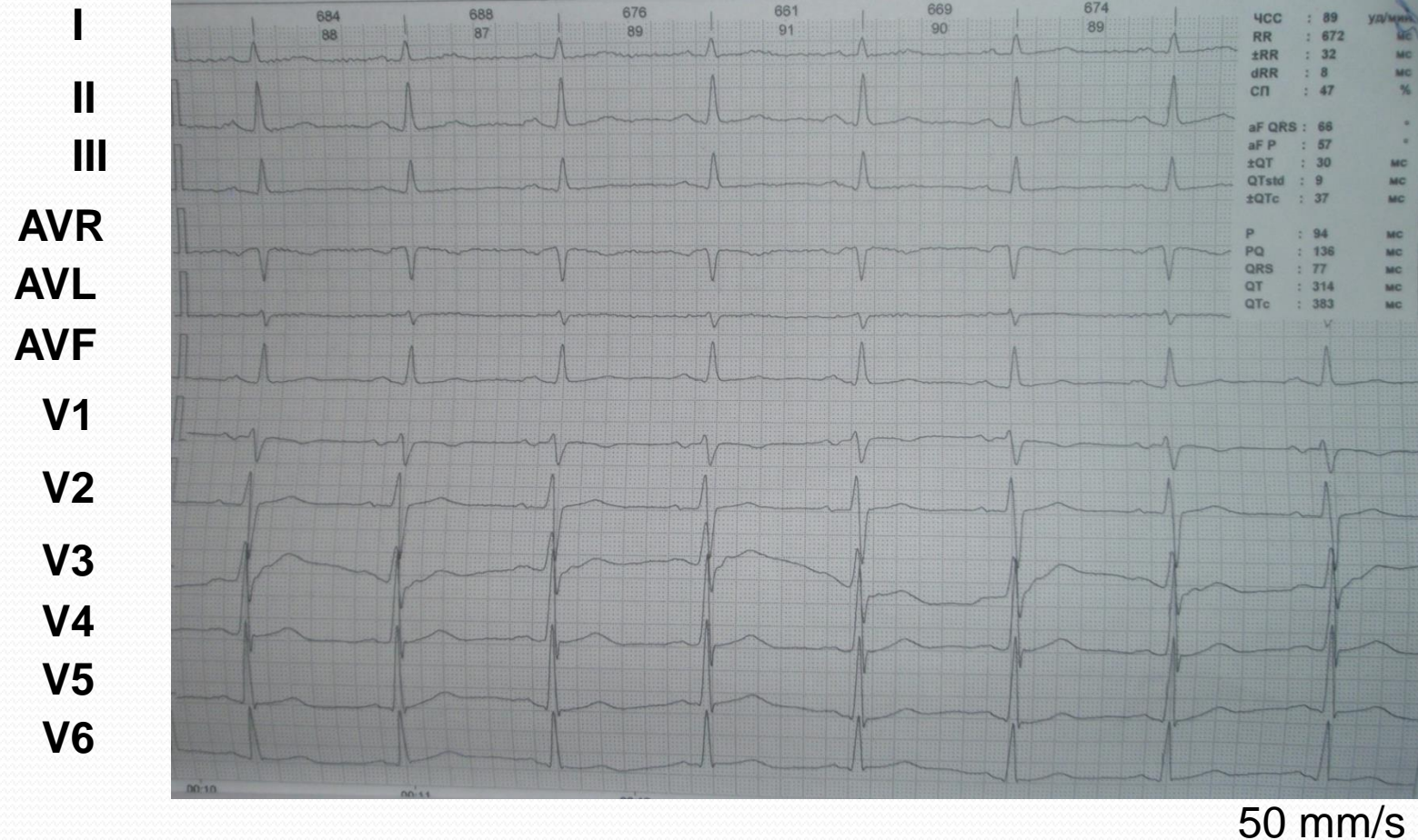
Serum PCR infection identification

Infection	Result	Reference Range
Herpes Simplex Virus type 1, 2	1.1	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
Varicella Zoster Virus	1.2	
Epstein Barr Virus	0.9	
Cytomegalovirus	1.2	
Human Herpes Virus type 6	0.8	

It occurs low viral load of herpes simplex virus type 1, 2 and cytomegalovirus, data are not sufficiently convincing for viral etiology of pericarditis

INSTRUMENTAL INVESTIGATIONS

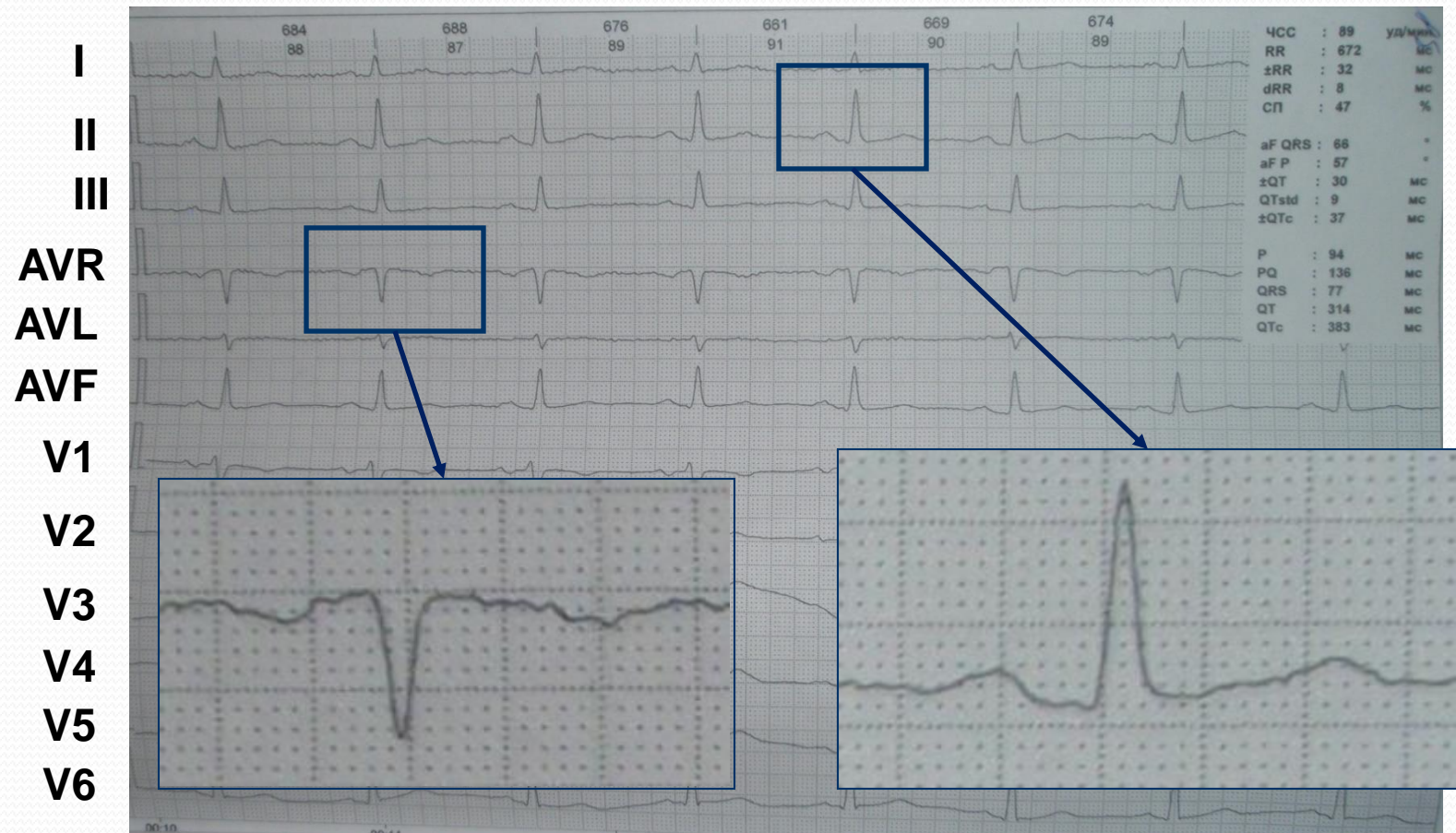
ECG on the date of admission



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

INSTRUMENTAL INVESTIGATIONS

ECG on the date of admission



50 mm/s

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

INSTRUMENTAL INVESTIGATIONS

Abdomen ultrasound on the date of admission

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

Splenomegaly with diffuse changes of parenchyma

INSTRUMENTAL INVESTIGATIONS

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

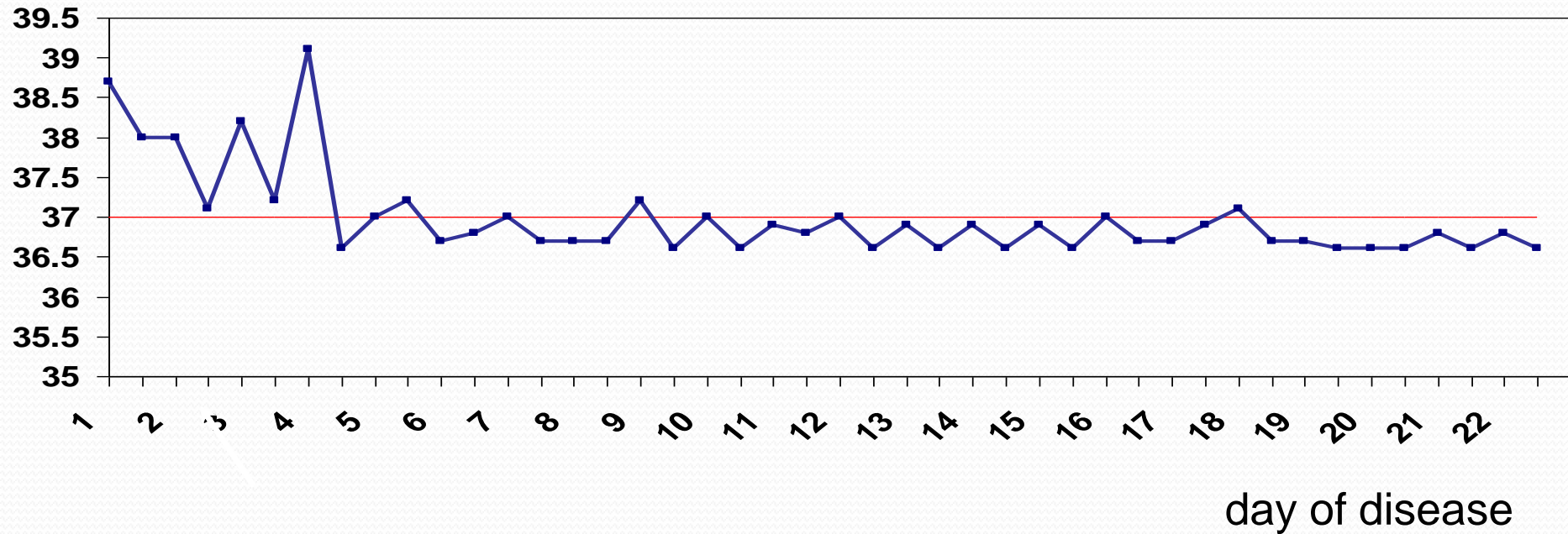
INSTRUMENTAL INVESTIGATIONS

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

DYNAMIC OF BODY TEMPERATURE



High grade fever occurs in initial stages, but resolved by the treatment

CONSULTATION

Endocrinologist

Diffuse goiter I degree, euthyroidism

Condition does not require any correction at the present time

CONSULTATION

ENT specialist consultation

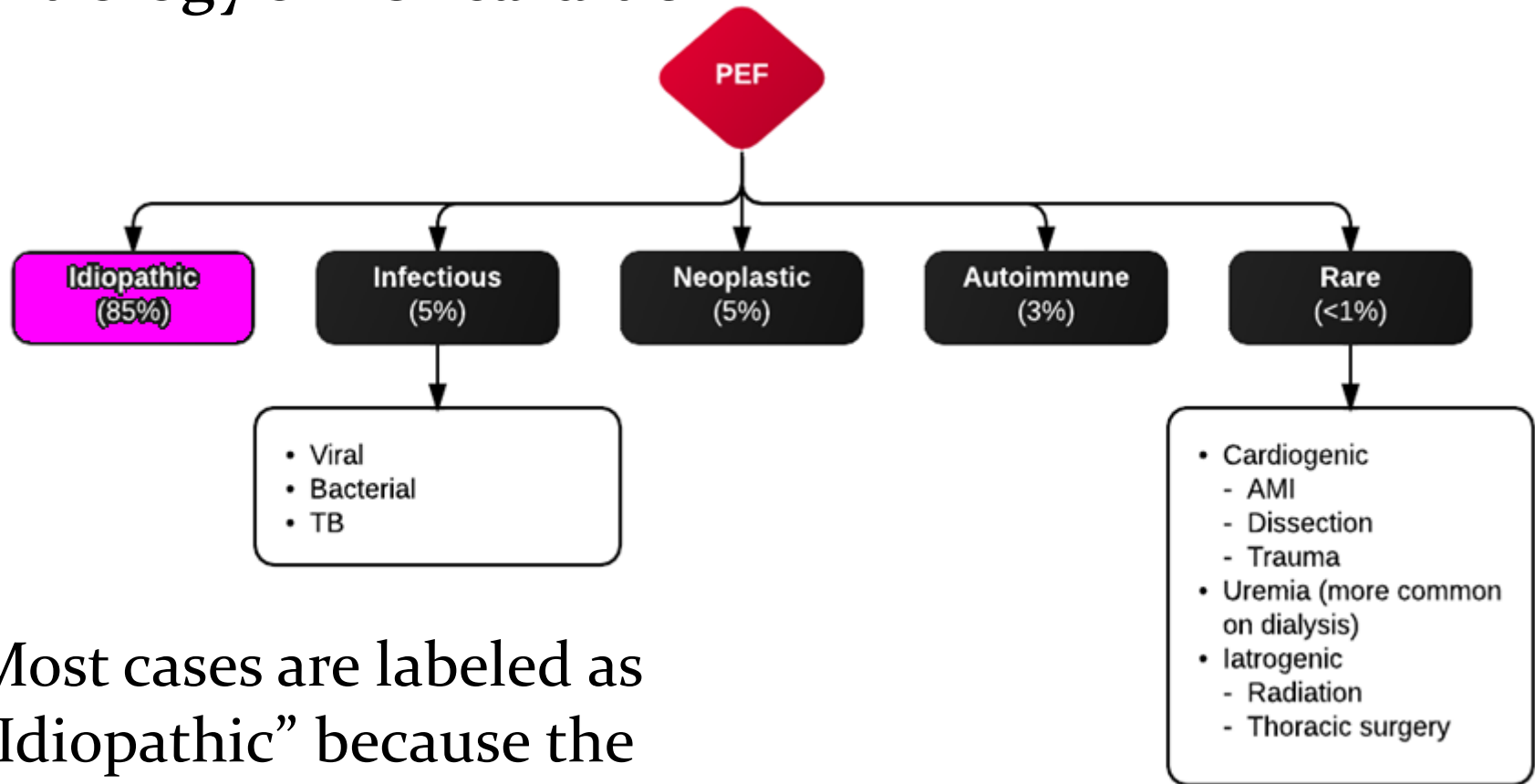
Pathology of ENT organs are not detected
Chronic tonsillitis is compensated

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

Clinical Syndromes Classification

Pericarditis

Pericarditis	Definition and diagnostic criteria
Acute	<p>Inflammatory pericardial syndrome to be diagnosed with at least 2 of the 4 following criteria:</p> <ol style="list-style-type: none">(1) pericarditic chest pain(2) pericardial rubs(3) new widespread ST-elevation or PR depression on ECG(4) pericardial effusion (new or worsening) <p>Additional supporting findings:</p> <ul style="list-style-type: none">- 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.

Clinical Syndromes Classification

Pericardial effusion

Onset	Acute
	Subacute
	Chronic (>3 months)
Size	Mild <10 mm
	Moderate 10–20mm
	Large >20 mm
Distribution	Circumferential
	Loculated
Composition	Transudate
	Exudate

Clinical Syndromes Classification

Grading the size of an effusion by echocardiography measurements

- Physiologic/trivial

echo-free pericardial space < 5 mm \approx 50-100 ml of fluid

- Small

echo-free pericardial space 6-9 mm \approx 100-250 ml of fluid

- Moderate

echo-free pericardial space 10-19 mm \approx 250-500 ml of fluid

- Large

echo-free pericardial space >20 mm \approx >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

Clinical Syndromes Classification

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

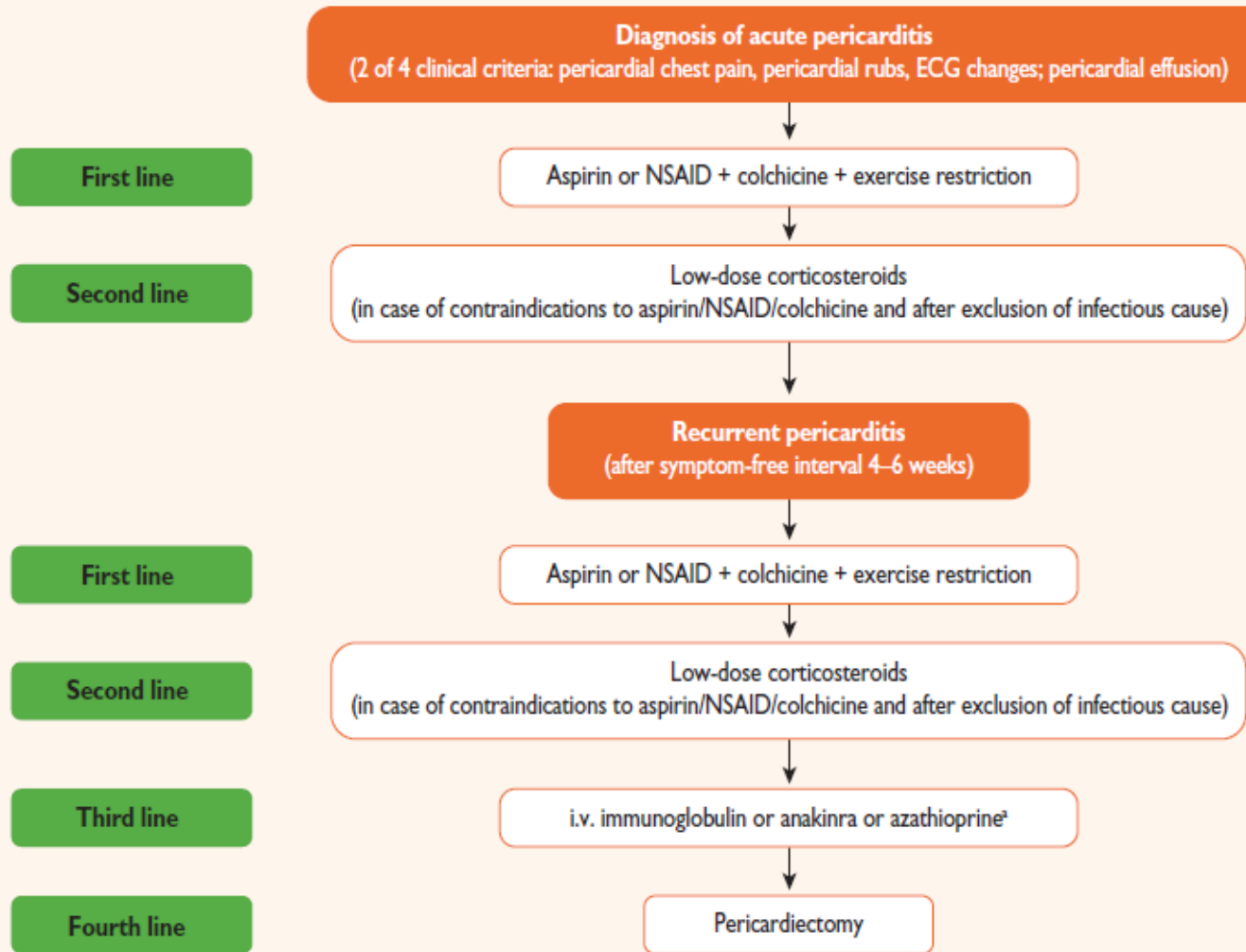
Complication

Inflammatory splenomegaly

Concomitant disease

Diffuse non-toxic goiter grade I

2015 ESC RECOMMENDATIONS FOR THE TREATMENT OF ACUTE PERICARDITIS



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.

^aAzathioprine 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.

2015 ESC RECOMMENDATIONS FOR THE TREATMENT OF ACUTE PERICARDITIS

Drug	Usual dosing	Duration	Tapering
Aspirin	750-1000 mg q8h	1-2 weeks for acute weeks –months for chronic	Decrease dose by 250-500 mg every 1-2 week
Ibuprofen	600mg q8h	1-2 weeks for acute weeks –months for chronic	Decrease dose by 200-400 mg every 1-2 week
Colchicine	0.5 mg qd (<70 kg) 0.5 mg bid (>70 kg)	3 months for acute At least 6 months for chronic	Not mandatory, alternatively 0.5 mg every other day(<70 kg) or 0.5 mg once(>70 kg) in the last weeks

Colchicine is added on the top of aspirin or ibuprofen.
Gastroprotection should be provided.

2015 ESC RECOMMENDATIONS FOR THE TREATMENT OF ACUTE PERICARDITIS

CORTICOSTEROIDS (Prednisone)

Starting dose 0.25-50 mg/kg/day	Tapering
> 50 mg	10 mg/day every 1-2 weeks
50-25 mg	5-10 mg/day every 1-2 weeks
25-15 mg	2.5 mg/day every 2-4 weeks
<15 mg	1.25-2.5 mg/day every 2-6 weeks

- ❑ Avoid higher doses except severe cases, and only for few days, with rapid tapering to 25 mg/day
- ❑ Every decrease in prednisone dose should be done only if the patient is asymptomatic and C-RP is normal
- ❑ Prevention of calcium loss: Ca supplements, vit D, biphosphonates

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

Empiric antibiotic therapy

- IV ceftriaxone 1000 mg bid
 - IV levofloxacin 500 mg qd
- } 7 days

Because of temperature and lab tests (neutrophilic leucocytosis: WBC $13.7 \times 10^9/L$, band 4%, segmented 77%) were not normalized, antibiotic treatment continued by

- Azithromycin 500 qd 5 days

Protection against fungal infection

- Fluconazole 150mg qod # 5

OUTCOME

- 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 $7.8 \times 10^9/L$
- 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)

OUTCOME

- Patient was discharged from the hospital
- It was recommended observation of the cardiologist and continuing methylprednisolone tapering

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 for women and for patients who do not have a response to initial treatment with NSAIDs

Thank you!

