



Problem statement I: cardiovascular diseases

- After several hours of driving, you finally traveled from Košice to Bratislava (cities in Slovakia). After getting out of the car, you took a couple of steps and started to feel a shortness of breath. You walked the stairs leading up to your apartment, which you almost couldn't climb due to difficulty breathing. Additionally, you started to feel pain in your chest.
 - i. Describe the pathology of the symptoms above. (1p)
 - ii. State the causes of Dyspnea (subjective feeling of lack of air), each with a short description. (1p)
 - iii. What is Angina Pectoris and what are its causes (explain what happens to the nerve endings)? (1.5p)
 - iv. Why is the most common treatment of angina pectoris a sublingual route of administration?(1p)
- They took you to a hospital, where they are trying to find the cause of your problems. You started feeling even worse and a new symptom appeared - you started coughing up blood. After multiple examinations, the doctors concluded you had a Pulmonary Embolism.
 - i. What diagnostic procedures are necessary? Explain why. (3p)
 - ii. Explain the significance of D-dimer determination. (1.5p)
 - iii. What are the consequences of Pulmonary Embolism on the body? (1.5p)
- You are still surprised that a young student with a healthy lifestyle like you got Pulmonary Embolism. During the physical examination, the doctors also found swelling and pain in your right calf, which you had not noticed before due to breathing problems.
 - i. What vascular disease does this indicate? Does it have a relation with a previous diagnosis? (2p)
 - ii. What are the risk factors for this disease? (1p)
 - iii. Explain the term Paradoxical Embolization. (1p)



Problem statement II

Patient: Robert Smith

Age: 72 years

Setting:

Mr. Smith arrives at the emergency room (ER) at 5:37 am. He was transferred to the hospital by ambulance. His wife decided to call the ambulance, because Mr. Smith was experiencing tightness in the chest along with shallow and rapid breathing for longer than ten minutes. The shortness of breath began during the night. After he woke up, he went to the window to catch his breath. His wife claims that it had happened several times in the past, but her husband had been reluctant to visit the hospital. His wife decided to step in and called 911 (United States emergency number).

Patient medical report:

After the arrival at the ER, the patient is breathing heavily and coughing. He claims his condition has already improved, he does not need help and asks to go back home. An emergency physician insists on a check-up, and the following results are recorded; Pulse is 103 beats/min, pressure 170/100 mmHg, he takes 23 breaths/min, and O₂ (Oxygen) stats of 90%. Robert is taken in as an inpatient.

After some minutes, his pulse is observed to be 110/min, blood pressure 164/98 mmHg, and a breathing rate of 24 breaths/min. The O₂ remains constant. Upon further examination, the patient reports having experienced frequent shortness of breath, ranging from mild to extreme instances, which subsided when he breathed fresh air and slept on two pillows.

Moreover, he experienced severe headaches, reduced appetite, frequent visits to the toilet, and would occasionally pass out, which were followed by blank memory (could not recall). Robert also reports having been smoking for 40 years (10 cigars a day) and not having sought medical attention for a long time.

During the examination, the doctor notices bilateral edema, which extends to his calf, crackling lung sounds above the bases of the lungs, and the breath more shallow. He has irregular heartbeats, a third heart sound, and the heart apex is displaced to the left.

The results from the laboratory were as follows:

Erythrocytes: $5.0 \times 10^{12}/l$

Lymphocytes: $4.2 \times 10^9/l$

Platelets: $200 \times 10^9/l$

Sodium: 140 mmol/l

Potassium: 3.7 mmol/l

Creatinine: 124 $\mu\text{mol/l}$

The doctor orders an X-ray and EKG.

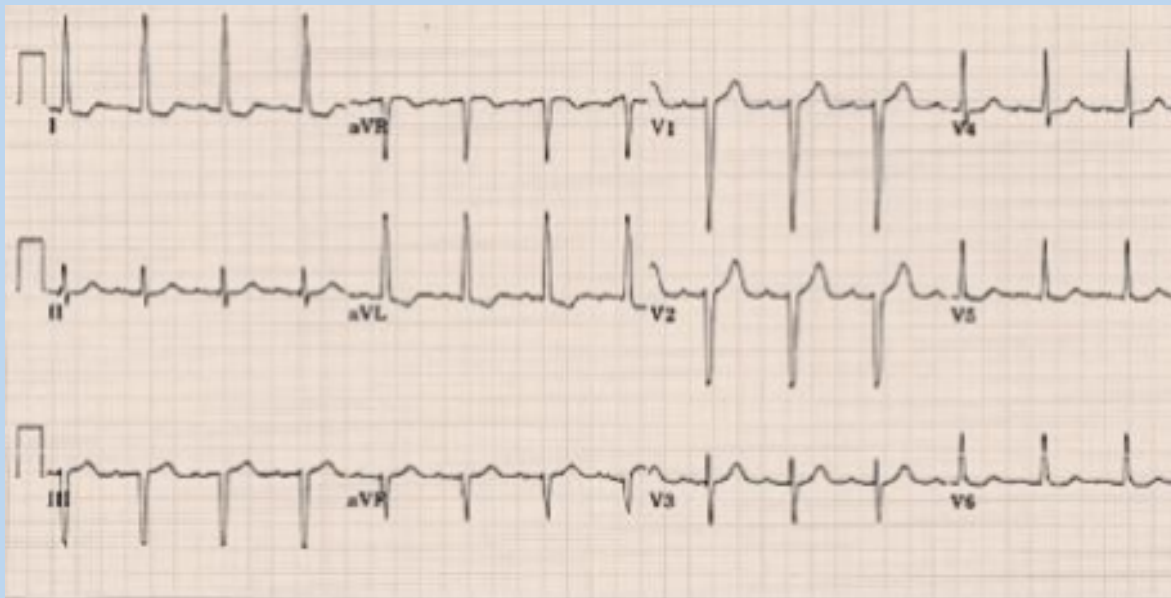


Fig. 1 The ECG of the patient



Fig. 2 Physiological EKG



Fig. 3 The RTG of the patient



Fig. 4 Physiological RTG(Normal)



Questions:

- i. State the possible diagnosis for the patient and why? (2p)
- ii. Describe the risk factors that caused the condition of the patient, based on your diagnosis above. (1p)
- iii. What is the patient's prognosis? What are the complications if the patient refuses treatment? (2p)
- iv. Which symptoms require immediate attention? (3p)
- v. Why does the patient sleep with two pillows under his head? (2p)
- vi. What tests would you order as a part of differential diagnostics?(3p)
- vii. Compare and contrast patient's EKG and RTG with a normal EKG and RTG. What differences have you noticed? (2p)

Problem statement III: Pericarditis

The following are recurring presentations of a medical condition:

- Sharp stabbing pain in the chest radiating to the left arm and neck
- Pain and pressure in the chest when coughing
- Swelling of the ankles and abdomen

Similar symptoms can present in other health conditions and are often misdiagnosed as other much 'common' conditions, such as a myocardial infarction, leading to the unprecedented death of patients.

- i. What is the pericardium (where is it located, what is its function)? (1p)
- ii. What is pericarditis? (1p)



- iii. Describe the etiology of pericarditis (2). (1p)
 - iv. What are the most common infectious agents that cause pericarditis? (1p) (Syphilis, streptococci, mycobacteria...)?
 - v. What are the most common causes of non-infectious pericarditis? (1p)
 - vi. One of the symptoms of pericarditis is a specific relief position of the patient. What is the location? (1.5p)
 - vii. What methods would you choose to diagnose this disease? (2p)
 - viii. How much fluid is in the pericardial cavity under physiological conditions? (1p)
 - ix. What types of effusions do we recognize in pericarditis (at least 3)? (1.5p)
 - x. In your opinion, what would be the main factor in choosing the type of treatment for a patient and why? (3p)
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Additional questions

- i. Which is the most common cardiac biomarker? (1p)
 - ii. Do mature/adult cardiac muscle cells multiply? (1p)
 - iii. Which fruits are known to have blood pressure lowering effects? (1p)
 - iv. What are the differences between ECG, EEG, and ECHO? Which among these tests are done to detect cardiovascular disorders? (2p)
 - v. What is stress test? (1p)
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