

Perimyocarditis versus Myocardial Infarction with ST Segment Elevation-MINOCA as a Starting Point

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ABSTRACT

Myocardial Infarction with Non-obstructive Coronary Arteries (MINOCA) represents a relatively new entity in cardiovascular medicine. According to the fourth universal definition of myocardial infarction MINOCA is characterised by typical chest pain with the appearance of ST segment elevation on the electrocardiogram (ECG) but without any significant stenotic lesions on coronary angiography. MINOCA is a working diagnose as there are several potential lethal diseases like pulmonary embolism, aortic dissection, perimyocarditis, etc., that can have similar clinical presentation. This is why MINOCA requires further investigations and the use of contemporary diagnostic methods in order to make a definite diagnosis. The most commonly used non-invasive diagnostic procedures are transthoracic and transoesophageal echocardiography, computed tomography and cardiac magnetic resonance imaging. Sometimes MINOCA is caused by prolonged coronary arteries spasm – vasospastic angina. This condition requires further investigations such administration of intracoronary acetylcholine. This case report is an example taken from everyday clinical practice. A young man had a typical chest pain with ST segment elevation on ECG and high troponin levels in the blood. After echocardiography and invasive diagnostic procedure, we came to the conclusion that patient suffered from primyocarditis.

Key words: Myocardial infarction, MINOCA, Perimyocarditis, ST segment elevation, Coronary angiography, Chest pain.

INTRODUCTION

Cardiovascular diseases are the leading cause of death in the world.¹ According to the data from 2013, one in seven deaths is caused by Coronary Heart Disease (CHD).² An adequate treatment of CHD significantly improves prognosis in these patients.³

Nonetheless, diagnosing ischemic heart disease is not always easy.^{4,5} Performing coronary angiography in everyday clinical practice has considerably made it easier to diagnose CHD.⁶ However, it is not uncommon to register subepicardial blood vessels without stenosis in patients with chest pain, ischemic changes on the electrocardiogram (ECG) and elevated troponin levels. These patients are the main reason why new entity was introduced

into cardiovascular medicine - Myocardial Infarction with Non-obstructive Coronary Arteries (MINOCA).^{7,8}

CASE REPORT

Patient M.B., born in Niš, came to the Emergency Department of the Institute for Treatment and Rehabilitation “Niška Banja” due to the severe oppressive pain in the chest, which persisted for several hours, irradiating to his left shoulder. The patient was born in 1994 and he had never been hospitalised before, nor examined whatsoever. During the medical interview, the patient revealed that he had been suffering from an inflamed tooth in the upper jaw and that he had had a high body temperature of 100.4°F (38°C)

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several days before the examination. He stated tobacco consumption and a positive family history as risk factors for CHD.

After a thorough physical examination, the electrocardiogram was done. It showed diffuse concave ST-segment-elevation of 1.5mm in all leads, except V₁ and a VR, alongside with shorter PR interval and frequent supraventricular extrasystoles (Figure 1).

Laboratory tests confirmed significantly elevated troponin levels (TnI 3.14 ng/l, normal value ≤ 0.04 ng/l) and cardiac specific enzymes (CK-MB 24.1U/L, normal value ≤ 4.3 U/L), as well as elevated inflammatory markers (sedimentation 20, CRP 41.7). The performed transthoracic echocardiogram showed hypokinesia of the basal and the middle segment of the inferior wall.

In view of the clinical picture, electropathological changes on the electrocardiogram, segmental wall-motion abnormalities on the echocardiogram and elevated levels of cardiac specific enzymes, the patient was referred to the Clinical Centre Nis for invasive diagnostic procedures. The coronary angiography did not show stenotic lesions in subepicardial blood vessels (Figures 2 and 3).

After the invasive diagnostic procedures, the patient was referred back to the Institute, where telemetry monitoring recorded a non-sustained ventricular tachycardia. Virological analysis indicated an elevated level of IgG for CMV.

With the aim of establishing a definite diagnosis, cardiac nuclear magnetic resonance imaging was to be performed

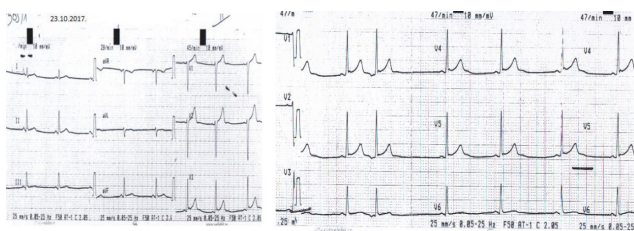
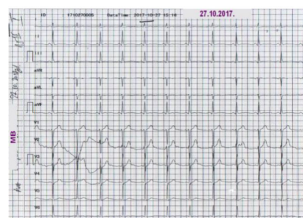


Figure 1: Electrocardiogram in the Emergency Department of the Institute.



Figures 2 and 3: Normal coronary angiography without stenotic lesions.



Figures 4 and 5: Follow-up electrocardiogram and echocardiogram.

next. However, this was not done due to technical reasons. The patient was given an antibiotic, a nonsteroidal anti-inflammatory drug and vitamin supplements. During the hospital treatment that followed, the patient felt well, he was rhythmically and thermodynamically stable, without chest pain. The electrocardiogram, which was performed before the discharge from the Institute, showed no electropathological changes, whereas a transthoracic echocardiogram showed no segmental wall-motion abnormalities (Figures 4 and 5).

The patient was discharged for home care with a recommendation to go for a check up with his chosen cardiologist after two weeks.

DISCUSSION

Middle chest pain represents the most common clinical manifestation of acute coronary syndrome (ACS).^{8,9} Nevertheless, similar symptoms can also occur in other life-threatening conditions such as pulmonary thromboembolism, myocarditis, pericarditis, or aortic dissection.¹⁰⁻¹³

For this reason, every patient with chest pain should be subjected to a 12-lead electrocardiogram.¹⁴ The finding of ST-segment-elevation in patients with middle chest pain is highly specific for transmural myocardial infarction.⁸ On the other hand, ST elevation can appear on electrocardiogram as a manifestation of other diseases or conditions such as pericarditis, early repolarisation syndrome, left ventricular aneurysm, Brugada syndrome, etc.¹⁵⁻¹⁷ The characteristics of ST elevation can help us in establishing a differential diagnosis. Therefore, diffuse concave ST elevation is more prevalent in pericarditis or early repolarisation syndrome, whereas convex ST elevation is most prevalent transmural myocardial infarction.

If there are still doubts about establishing a diagnosis, it is necessary to conduct laboratory analyses. Finding elevated troponin levels is always an alarming sign. However, just like any of the aforementioned methods, it is not completely specific for ACS (Table 1).¹⁸

Table 1: Differential Diagnosis of Elevated Troponin Levels.

Acute Myocardial Infarction	Myocardial Damage that is not caused by Ischaemia
AMI with ST-segment elevation	Congestive heart failure
AMI without ST-segment elevation	Myocarditis / endocarditis / pericarditis
Hypertensive crisis	Malignant diseases
Tachyarrhythmia	Trauma
Severe anaemia	Electric shock
Cocaine or amphetamine use	Infiltrative diseases
Percutaneous coronary intervention	Stress cardiomyopathy – takotsubo
Coronary artery bypass	Ablative procedures
Coronary artery spasm	Pulmonary thromboembolism
Coronary artery embolization	Sepsis
Imbalance of oxygen supply and oxygen demand – type-II AMI	Stroke / subarachnoid haemorrhage
	Renal insufficiency

Adapted from: de Lamos JA. JAMA 2013; 309:2262-9

Ultrasound, as the most economical, the safest and the most accessible imaging method, can help us in establishing the differential diagnosis of middle chest pain with or without elevated troponin. Newly emerging wall-motion abnormalities are characteristic of an acute heart attack and can also be found in other diseases such as perimyocarditis.¹⁹

Finally, it is necessary to perform coronary angiography when it is widely suspected that a myocardial infarction, with or without ST elevation, has occurred.^{8,20} Moreover, with a view to exclude the diagnosis of ACS, it is necessary to use the invasive diagnostic procedures in patients with perimyocarditis.¹⁹ Coronary angiography without significant stenotic lesions (no lesion $\geq 50\%$) in patients with pain typical of angina, ST segment elevation on the ECG and elevated troponin levels urged an introduction of a new entity in cardiology – MINOCA. MINOCA is a working diagnosis and it requires further search for a definite diagnosis.

MINOCA is not a rare condition as it happens in 5-6% of patients with ACS.²¹ Underlying mechanisms that can lead to MINOCA include microvascular dysfunction, prolonged spasm of coronary arteries, aortic dissection, pulmonary thromboembolism, perimyocarditis, etc.²² This call for some more sensitive diagnostic methods such as intravascular ultrasound, optic coherent tomography, intracoronary acetylcholine test, etc.²³ However, magnetic resonance seems to play the central role in the diagnostic algorithm of MINOCA as it identifies cause in more

than 87%.²⁴ All these diagnostic methods can help us in identifying the real cause of MINOCA. This is of great importance because it determines the therapeutic approach.

By using all above mentioned diagnostic methods we came to the conclusion that our patient suffered from primyocarditis. Beyond any doubt, magnetic resonance would have been of substantial assistance in establishing the definite diagnosis in the case of our patient. However, this imaging method was not used due to technical reasons.

CONCLUSION

Anamnestic data on high body temperature and chest pain, clinical presentation with ECG, laboratory and ECHO findings in addition to the absence of stenotic lesions on coronary angiography, support the fact that our patient suffered from perimyocarditis.

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CONFLICT OF INTEREST

Authors have no conflict of interest to declare.

ABBREVIATIONS

CHD: Coronary heart disease; **MINOCA:** Myocardial infarction with non-obstructive coronary arteries; **ACS:** Acute coronary syndrome; **CPK:** Creatin phosphokinase; **ECG:** Electrocardiogram; **ECHO:** Echocardiogram

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