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Case Report

A case study of a young patient with recurrent myocardial infarction

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ABSTRACT

Although myocardial infarction (MI) mainly occurs in patients over 50 years of age, this pathology is registered annually in younger patients. The development of MI at a young age is associated with cardiovascular complications, the risk of anxiety and depressive disorders, socio-economic consequences due to disability and the inability to continue professional activity. The most common causes of MI in patients under 50 years of age include coronary thrombosis due to coronary artery atherosclerosis, non-atheromatous coronary artery disease; congenital and acquired thrombophilic conditions and conditions associated with hypercoagulability; MI associated with the use of psychoactive substances. This article describes a clinical case of MI in a 36-years-old patient, with 30% occlusion of the circumflex artery and 70% occlusion of the first branch of obtuse marginal artery and provides a detailed review of the investigations done. And also, it discusses practical issues related to the management of this category of patients. We have further depicted the prognosis of PCI by using the SPECT investigation before and after PCI.

Keywords: Hypercholesterolemia, Myocardial infarction, Percutaneous coronary intervention, Single photon emission computed tomography, Stress test

INTRODUCTION

Among adults aged 35-70 years, cardiovascular disease is the leading cause of death worldwide.[1,2] The relevance of the problem of MI is undeniable and is determined by the tendency towards an increase in morbidity and mortality of individuals with acute and chronic forms of coronary heart disease in most countries of the world, which is associated with an increase in the main risk factors for atherosclerosis.[3,4] It is estimated that from 6% to 10% cases of MI occur in patients under the age of 45.[5] In the structure of mortality from cardiovascular diseases (CVD), the mortality rate from CAD in people aged 15 to 49 years is 2.0%.[6] The main cause of MI at a young age is atherosclerosis, often affecting one vessel. The presence of major risk factors affects the progression of CAD one of the main risk factors is smoking, regardless of gender.[7] When discussing about the peculiarities of the course of MI at a young age, ischemia is developed with the disturbances and changes of blood flow in the coronary arteries, the obstruction of the coronary arteries occurs in the background of an insufficient number of collaterals at this age, which could at least somehow compensate for the impaired blood circulation.[8] The clinical picture of acute MI in young people differs from that in older people. Patients under 45 years of age often present with newly diagnosed angina, which rapidly progresses to MI. The incidence of stable angina in young patients with documented coronary heart disease was only 24%.[9] The protection provided by young age has gradually disappeared due to the increasing prevalence of risk factors for coronary heart disease in young people, such as smoking, obesity and lack of physical activity. Thus, the study of risk factors, as well as the clinical features of MI in people of working age, is relevant for the search for possible areas of MI prevention.

CASE REPORT

Patient S. born in 1983, was admitted to the Grodno Regional Clinical Cardiology Center on October 2, 2019

at 00.02 with complaints of burning pain in the chest radiating to the left arm. The patient had a history of high blood pressure for 2-3 years. Maximum blood pressure readings were up to 170/90 mmHg. The patient did not receive antihypertensive therapy. The chest pain first appeared a week ago and went away on its own within a few minutes. A repeated attack of pain occurred on October 1, 2019 in the evening. The following risk factors were identified smoking, excess weight and a sedentary lifestyle.

General condition of moderate severity. Consciousness is clear. No edema, weight is 80 kg, height is 171 cm. Pulse 91 beats per minute, rhythmic. Blood pressure: 150/80 mm Hg. The borders of the heart are not dilated. The heart sounds are muffled and rhythmic. There are no murmurs. Vesicular breathing. No wheezing. The number of breaths is 17 per minute.

The ECG showed a downward sloping depression of the ST segment and T wave inversion in the leads from the inferior wall of the left ventricle (III, aVF). A preliminary diagnosis was made: Acute coronary syndrome without ST segment elevation.

Taking into account the level of highly sensitive troponin I (2420 ng/l), coronary angiography with possible angioplasty and stenting of the coronary arteries (early invasive strategy) were determined.

Coronary angiography revealed that the circumflex artery (CA) had 30% stenosis in the first segment. The first obtuse marginal artery (OM-1) had stenosis up to 70% in the middle third. The distal sections of the right coronary artery (RCA) were contrasted retrogradely collaterally from the left coronary artery system (network of pronounced septal collaterals). Angiography of the RCA revealed occlusion in the second segment with delayed, sharply weakened collateral contrast enhancement of the distal sections through a network of intrasystemic collaterals (Figure 1).

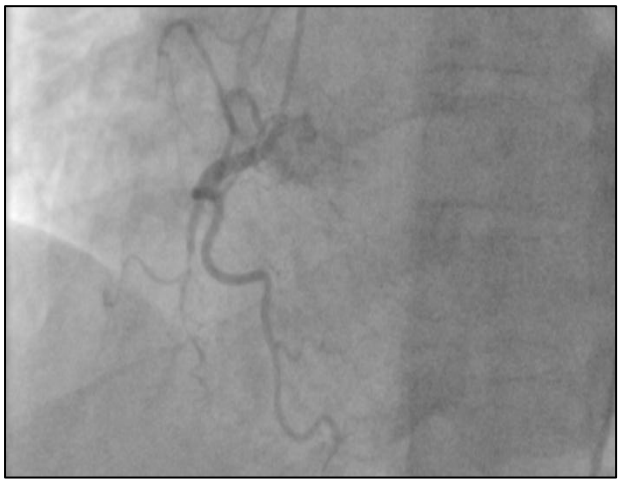

Figure 1: Patient's coronary angiography (RCA).

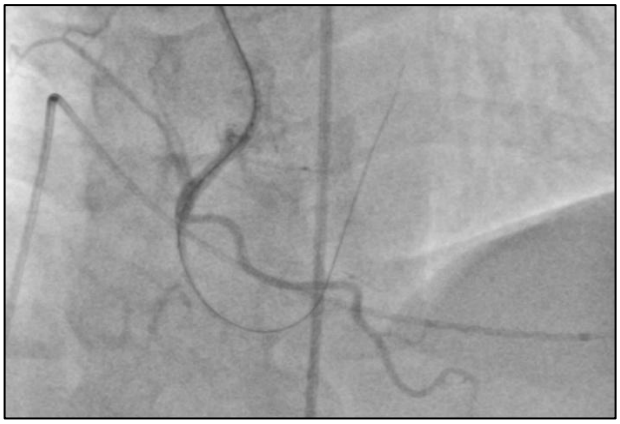

Figure 2: Patient's coronary angiography (RCA) showing insignificant paravasal spread of the contrast.

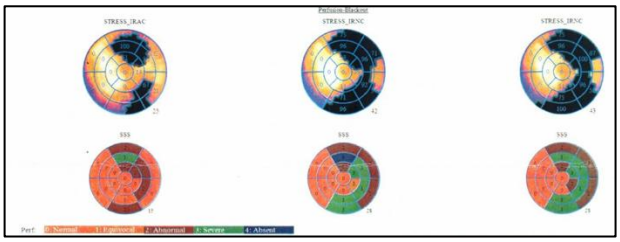

Figure 3: Patient's SPECT before PCI.

Figure 4: Patient's coronary angiography after PCI.

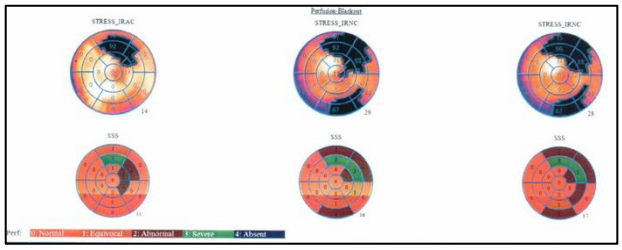

Figure 5: Patient's SPECT after PCI.

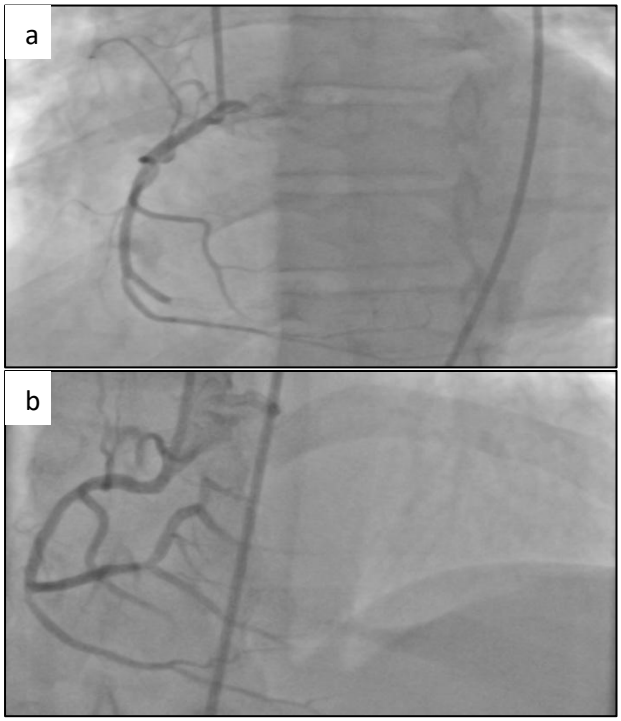

Figure 6 (a-b): Patient's coronary angiography after PCI (Stent in the RCA).

An attempt was made to perform antegrade recanalization of the right coronary artery. Due to the subintimal course of the coronary conductor and insignificant paravasal spread of the contrast without a tendency to increase in volume, the patient's stable condition and the absence of pain syndrome, it was decided to stop the procedure (Figure 2) and perform a planned repeated attempt to recanalize the RCA.

Echocardiogram from October 2, 2019 showed local hypokinesis of the middle and basal inferoseptal segments (lower wall) of the LV were found. Laboratory test results as of 02/10/2019 total cholesterol 9.62 mmol/l; aspartate aminotransferase 69.4 U/l (0-40 U/l), troponin I (highly sensitive) 2420 ng/l (0-19 ng/l), creatine kinase 2056 U/l (38-174 U/l), creatine kinase MB fraction 77 U/ (0-25 U/l) lactate dehydrogenase 541 U/l (207-414 U/l).

Results of general blood and urine tests, coagulogram were without deviations from normal values. The final diagnosis: Coronary heart disease: acute Q-myocardial infarction of the posterior-inferior wall of the LV. Atherosclerosis of the aorta, coronary arteries. Arterial hypertension II risk 4.

Inpatient treatment, including intensive care included enoxararine 0.8 ml subcutaneously, acetylsalicylic acid (ASA) 75 mg od, clopidogrel 75 mg od, atorvastatin 40 mg od, metoprolol 25 mg bid, ramipril 2.5 mg od, lansazole 30 mg od. The patient was discharged in satisfactory condition. Recommendations lansoprazole 30 mg, nebivolol 5 mg, ramipril 2.5 mg, ASA 75 mg, clopidogrel 75 mg and rosuvastatin 10 mg. On 18.02.2020, the patient was re-admitted with complaints of shortness of breath during physical exertion. A treadmill test was performed according to the modified Bruce protocol, stopped at the 3rd minute of stage 3 of the due to an increase in blood pressure to 180/100 mm Hg.

The ECG did not reveal any abnormalities. Recovery of the heart rate and blood pressure was adequate and slow. Chronotropic reserve was 53 per minute. Inotropic reserve was 60 mm Hg. Tolerance to physical activity was high. At the achieved stage, ischemic reactions were not registered.

Laboratory test results from 18/02/2020 showed: total cholesterol 5.7 mmol/l, triglycerides 1.92 mmol/l. Given the absence of ischemic changes when recording an ECG with dosed physical activity, the need to assess the viability of the myocardium before revascularization was raised, single-photon emission computed tomography (SPECT) was recommended.

26/02/2020 SPECT (stress mode) was performed. Semi-quantitative calculation of local perfusion disorders under load was carried out using a series of programs: zones of perfusion disorders are recorded in periapical, middle and basal segments of the anterior/anterolateral and inferior/inferior-lateral walls with a total stress score (TSS) of up to 28 points with a prevalence of up to 43% and involvement of up to 10 segments out of 17 with attenuation correction, similar indicators were 15 points and 25% in the same regions (Figure 3).

Assessment of thickening and contractility under load: impaired local contractility in the segments of the septal zone, local motor impairment of systolic thickening up to 3 points (hypokinesis) of the anterior and inferior walls, no changes in global contractility were noted: EDV 130 ml, ESV 45 ml, LVEF 65%. 18/03/2020 patient was re-admitted for planned PCI. Angioplasty and stenting of the proximal sections of the OM-1 and the second and third segments of the RCA were performed. Cobalt-chromium stents with drug eluting sirolimus were implanted (Figure 4a, b).

Patient was discharged in satisfactory condition. Recommendations: bisoprolol 2.5 mg, ramipril 5 mg, ASA 100 mg, clopidogrel 75 mg, rosuvastatin 10 mg, pantoprazole 20 mg in courses. 18/06/2020 the SPECT was performed. Semi-quantitative calculation of local

perfusion disorders under load was performed using a series of programs: zones of pronounced perfusion reduction are recorded in periapical, middle and basal segments of the anterior/anterolateral and basal inferior lateral walls with a total stress score (TSS) of up to 16 points with a prevalence of up to 29% and involvement of up to 6-7 segments out of 17, when correcting attenuation, similar indicators were 11 points and 14% in the same regions (Figure 5). Assessment of thickening and contractility under load local contractility disorders were expressed in segments of the septal and inferior walls local motor systolic thickening was heterogeneously impaired with an akinesis in the area of the anterior and inferior walls to akinesis. Laboratory test results from 21/06/2020: Cholesterol 8.8 mmol/l (0-5.2 mmol/l). Echocardiogram from 22/06/2020 showed signs of LV myocardial hypertrophy and local hypokinesis of the middle lower septal segment of the LV.

Rosuvastatin 10 mg replaced with atorvastatin 40 mg. In control blood test in 6 weeks' total cholesterol level reduced to 4.0 mmol/l. On 23/11/2020 the patient was admitted with signs and symptoms of acute coronary syndrome. Diagnosis: IHD: recurrent acute myocardial infarction of the inferior wall of the LV (from 11/22/2020. CAG, manual thrombectomy from RCA, stenting of RCA on 11/23/2020). Post-infarction (2019, June 2020) cardiosclerosis. Atherosclerosis of the aorta, stenotic coronary arteries. CAG and stenting of RCA, PBC, PMF on 03/19/2020. CAG and Stenting of DV 1 on 06/26/2020. Arterial hypertension 2 risk 4. H1. Hypercholesterolemia. The angiogram done revealed occlusion in the right coronary artery (Figure 6a). The echocardiogram revealed hypokinesia in the mid inferoseptal and basal inferior segments and akinesia in the basal inferoseptal segment along with signs of atherosclerotic aortic lesion. The coronary angiogram after stenting of the right coronary artery is shown (Figure 6b). Drug therapy on discharge: ASA 75 mg, Clopidogrel 75 mg, Atorvastatin 20 mg, Ramipril 5 mg, Molsidomine 2 mg taken "on demand"

Follow up

On 29 January 2025 the patient visited the Grodno Regional Clinical Cardiology Center for a health check-up. Echocardiogram was done which revealed signs of scarring of the septal region of the LV, posterior and inferior walls of the LV. Left ventricular myocardial hypertrophy. LVEF–63% in M-mode and 57% in B-mode. Patient was recommended to continue same treatment regimen. The patient is being followed up under observation by a therapist and cardiologist of the outpatient department of the State Regional Cardiology Center.

DISCUSSION

The rising incidence of non-communicable diseases in developing nations has notably affected the overall disease landscape.[10] MI is a critical coronary-related condition marked by the risk of sudden cardiac death.[11] Thanks to recent advancements in early reperfusion strategies, drug treatments, standardized care and the identification of at-risk patient groups, the outlook for acute myocardial infarction has significantly improved.[12] We have discussed a young patient with the common risk factors such as obesity, hyperlipidemia and sedentary life style.

AMI in young individuals commonly affects males, with ST elevation MI being the primary presentation. Anterior wall MI is the most frequent type and the LAD is involved in approximately two-thirds of cases. However, in the patient discussed above the inferior and anterior lateral walls were affected. Conventional SPECT myocardial perfusion imaging (MPI) assesses the presence, extent and severity of myocardial ischemia or infarction, specifically identifying flow-limiting defects.[13] Results of the SPECT images before and after PCI is discussed above.

CONCLUSION

This case describes the occurrence of recurrent MI in a 36-years-old male patient with a detailed review on the treatment and diagnostic methods used. Especially the role of SPECT imaging in monitoring the prognosis and effectiveness of PCI was discussed. The case clearly demonstrates the importance of a thorough examination of young patients with complaints of chest pain, which are often erroneously interpreted as pathology of other organs and systems, except for the cardiovascular system. The tactics of managing young patients with MI do not differ from those in older patients. Based on the assessment of the risk of an unfavourable outcome, it is necessary to select and implement a treatment strategy in the hospital: performing coronary angiography with the intention of performing myocardial revascularization (primary percutaneous intervention or coronary artery bypass grafting) or prescribing non-invasive treatment – optimal drug therapy.

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