Rare cause of acute myocardial infarction with dramatic presentation
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Abstract: Myocardial infarction with normal coronary arteries is a syndrome resulting from numerous conditions but the exact cause in a majority of the patients remains unknown. Cigarette smokers and cocaine users are more prone to develop this condition. The possible mechanisms causing myocardial infarction with normal coronary arteries are hypercoagulable states, coronary embolism, an imbalance between oxygen demand and supply, intense sympathetic stimulation, non-atherosclerotic coronary diseases, coronary trauma, coronary vasospasm and endothelial dysfunction. It primarily affects younger individuals and the clinical presentation is similar to that of myocardial infarction with coronary atherosclerosis. Coronary vasospasm can be a cause of life-threatening arrhythmias and cardiac arrest in patients with acute coronary syndrome and no hemodynamically significant coronary artery disease.

Keywords: myocardial infarction, vasospasm, normal coronary arteries, cardiac arrest

We present a case of a 59-year-old man, smoker, without any relevant medical history, who described intermittent chest pain at rest for 2 hours. The ambulance found the patient at home in cardiac arrest with ventricular fibrillation on ECG and he was resuscitated after 20 minutes. Post resuscitation ECG showed sinus rhythm, AV=90 bpm, 2 mm ST elevation in aVR, DIII and right precordial leads and 1 mm ST segment depression in DI, AVL, V5, V6 (Figure 1). At hospital the patient was mechanically ventilated, blood pressure was 90/60 mmHg with inotropic support. The ECG was repeated at the emergency room and the ST segment modifications disappeared (Figure 2). Echocardiography showed a mild left ventricular dysfunction – LVEF=50%, inferior wall hypokinesia, type I diastolic dysfunction, mild mitral regurgitation, normal right ventricular function. Cardiac troponin was elevated 1.3 ng/ml.

The patient had very-high-risk criteria like hemodynamic instability with life-threatening arrhythmias and resuscitated cardiac arrest with intermittent ST-elevation. He received dual antiplatelet therapy and was transferred in the cath lab for emergency coronaryography.

Figure 1. Ambulance ECG - sinus rhythm, AV=90 bpm, 2 mm ST elevation in aVR, DIII and right precordial leads and 1 mm ST segment depression in DI, AVL, V5, V6.

Figure 2. Echocardiography showing a mild left ventricular dysfunction – LVEF=50%, inferior wall hypokinesia, type I diastolic dysfunction, mild mitral regurgitation, normal right ventricular function.
The first injection in left main showed diffuse severe coronary spasm with occlusion at distal left anterior descending artery and left circumflex artery (Figure 3A,B). After intracoronary nitroglycerine injection, the spasm disappeared and the left coronary artery opened, with normal flow (TIMI-3) distally (Figure 4A,B). We didn’t saw hemodynamically significant coronary artery lesions, except a myocardial bridge in the second LAD segment with 40% systolic compression. Before injection in the right coronary artery the ECG showed severe bradycardia with third degree AV block and temporary cardiac stimulation was done. The injection in the right coronary artery showed acute occlusion in the first segment, distal flow TIMI 0 (Figure 5A,B). At that moment we had a problem to decide if that was a thrombotic occlusion or a severe spasm similar to the left coronary artery. The first step was to inject intracoronary nitroglycerine. After that, the right coronary artery opened and after few minutes the distal flow was normal (TIMI-3) wiyhout any hemodynamically significant coronary artery lesions (Figure 6A,B). We considered the severe coronary spasm responsible for the right coronary artery occlusion and we finished our job in the cath lab.

The patient was transferred in the critical care unit. The clinical evolution was good, he was discharged after 1 month, hemodynamically stable with normal left ventricular function, but with neurological sequelae postresuscitation and was transferred in a neurological rehabilitation center. The medical treatment at discharge was double antiplatelet therapy with aspirin and clopidogrelum, calcium channel blocker – diltiazem and statin.
DISCUSSIONS

Although plaque rupture is the major cause of acute myocardial infarction, vasospasm is also known as a potential cause of that pathology. However, it is very rare and is sometimes difficult to diagnose correctly. Coronary artery vasospasm, or smooth muscle constriction of the coronary artery, is an important cause of chest pain syndromes that can lead to myocardial infarction, ventricular arrhythmias and sudden death. Cigarette smokers and cocaine users are more prone to develop this condition. Our patient was a smoker but we didn’t have laboratory tests to confirm cocaine use as a potentially cause of vasospasm. We initially thought plaque rupture with thrombus formation might be the cause of acute myocardial infarction judging from the angiogram of the right coronary artery. This patient had been diagnosed as having vasospasm using the nitroglycerine intracoronary injection response. It is not easy to judge from the angiogram that the cause of coronary occlusion in patients with acute myocardial infarction is vasospasm and sometime you have to use special invasive techniques. We didn’t use intravascular ultrasound or OCT to check the coronary wall structure because the final angiographic result was a good one after nitroglycerine injection and we consider the patient hemodynamic instability in that moment needed urgent transfer to intensive care unit.

Arrhythmias may occur with severe vasospastic angina. Both atrioventricular conduction abnormalities and ventricular arrhythmias can cause life-threatening hemodynamic deterioration and syncope. Coronary vasospasm has been identified as an important cause of out-of-hospital cardiac arrest. The risk of sudden death is approximately 2% and is most common in patients with multi vessel spasm as it happened in our patient.

Conflict of interest: none declared.

References