# ST-segment elevation myocardial infarction and sudden cardiac arrest due to vasospastic angina: An underappreciated challenge

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**Early publication date:** September 14, 2023 About 5% of patients with myocardial infarction (MI) have no significant lesions in the epicardial arteries [1]. MI with non-obstructive coronary arteries (MINOCA) might be induced by multiple conditions, including coronary vasospasm [2]. Here, we describe a patient with vasospastic angina (VA) resulting in ST-segment elevation MI and sudden cardiac arrest (SCA).

A 49-year-old woman with hypertension and nicotine use was admitted after resuscitation following SCA accompanied by ST-segment elevation (Figure 1A). On emergency coronary angiography, no significant lesions were visible (Figure 1B, 1C; Supplementary material, *Videos S1, S2*). Further diagnostic workup showed a dynamic increase in the cardiac troponin concentration (from 2.328 ng/l to 12.543 ng/l), but no left ventricular wall motion abnormalities and no alternative causes for the clinical presentation.

Optical coherence tomography (Abbott, Chicago, IL, US) showed a stable athero-sclerotic plaque in the left anterior descending artery (Figure 1D; Supplementary material, Video S3). Fractional flow reserve (FFR), coronary flow reserve (CFR), and index of microcirculatory resistance (IMR) were within the normal range (FFR, 0.94; CFR, 3.7; IMR, 18, respectively). During the intracoronary acetylcholine provocation test, the patient reported anginal chest pain, accompanied by ST-segment elevation and >90% vasospasm of the left anterior descending artery, which resolved after intracoronary nitroglycerin administration (Figure 1E, 1F; Supplementary material, Videos S4, S5). Hence, a diagnosis of VA was made. Pharmacotherapy with diltiazem was initiated leading to the alleviation of anginal symptoms during 3-month follow-up. Considering the reversible cause of SCA and the patient's decision, an implantable cardioverter-defibrillator (ICD) was not introduced.

A working diagnosis of MINOCA arises when no significant lesions are found on coronary angiography in MI patients. MINOCA is confirmed after exclusion of alternative conditions, including sepsis, pulmonary embolism, cardiac contusion, and non-cardiac troponin rise. Furthermore, myocarditis, takotsubo syndrome, and cardiomyopathies should be excluded using echocardiography or cardiac magnetic resonance [1]. Along with magnetic resonance, invasive diagnostics are crucial to detect MINOCA cause [3]. Intravascular imaging enables the identification of atherosclerotic plaque disruption, coronary thrombus or embolus, and spontaneous coronary artery dissection. Microvascular dysfunction is diagnosed by CFR < 2.0 or IMR ≥25. Finally, vasospastic pathogenesis of MINOCA is confirmed when intracoronary acetylcholine administration induces anginal chest pain, ischemic electrocardiographic changes, and epicardial artery vasospasm. In the absence of this last sign, microvascular spasm is diagnosed [1].

Up-to-date diagnostics enable the detection of MINOCA causes in over 80% of female patients, who present with MINOCA more often than males, and tailoring the treatment [4]. In VA, non-dihydropyridine calcium channel blockers are the drugs of choice [1]. Additionally, patients could benefit from long-acting nitrates and statins. Conversely, beta-blockers should be avoided as they might exacerbate



**Figure. 1. A.** Electrocardiogram on admission showing ST-segment elevation in leads II, III, aVF, V5–V6 (black arrows), accompanied by high R waves (red arrows) and high, positive T waves (green arrows). **B.** Angiogram demonstrating about 25% stenosis in the middle segment of the right coronary artery. **C.** Angiogram showing non-significant lesions in the left anterior descending artery and in the distal segment of the circumflex branch. **D.** Optical coherence tomography of the left anterior descending artery. **E.** Angiogram demonstrating vasospasm of the distal segment of the left anterior descending artery (red arrows) after intracoronary administration of 100 µg of acetylcholine. **F.** Angiogram showing the left anterior descending artery after vasospasm resolved (red arrows) following intracoronary nitroglycerine administration

vasospasms [2]. There are no guidelines on ICD therapy in VA patients after SCA. Recently, similar outcomes in VA and non-VA patients after ICD implantation were reported [5]. Therefore, until further studies are performed, therapeutic decisions should be based on individual patient characteristics.

Although VA is frequently considered a mild clinical entity, it may lead to reinfarction, re-hospitalization, and death [2]. Hence, it is crucial to follow strictly the MINOCA diagnostic algorithm to ensure evidence-based treatment.

# Supplementary material

Supplementary material is available at https://journals. viamedica.pl/kardiologia\_polska.

# Article information

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