A "NaSTy" spasm responsible for repetitive myocardial infarction with no obstructive coronary arteries and severe left ventricular dysfunction

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A 58-year-old woman, a past smoker, with dyslipidemia was admitted for non-ST segment elevation acute coronary syndrome in December 2021.

In 2011, she experienced myocardial infarction with Q waves in inferolateral leads on an electrocardiogram (ECG). While no evidence of coronary stenosis was found on coronary angiography (CAG), cardiac magnetic resonance (CMR) revealed an ischemic scar in the akinetic inferior and inferolateral walls (Figure 1A). Left ventricular ejection fraction (LVEF) had been 40%. No etiology for coronary embolism was found. Heart failure treatment (including ramipril, bisoprolol, and spironolactone) was prescribed in addition to aspirin and atorvastatin. At follow-up, the patient continued to report atypical angina generally in the early morning or during exertion.

In 2016, she had a positive treadmill test. A second CAG was then performed showing no significant coronary stenosis.

During the index hospitalization, new negative T waves in anterior leads were observed on ECG (Figure 1C). Transthoracic echocardiography revealed new hypokinesia in the anteroseptal wall. A third CAG found no significant coronary artery disease (Supplementary material, *Video S1*). CMR revealed the presence of a new subendocardial enhancement in the septo-apical wall (Figure 1B). LVEF decreased to 30%.

We diagnosed myocardial infarction with no obstructive coronary arteries (MINOCA), and coronary spasm was suggested as a possible etiology. Therefore, an invasive acetylcholine (ACh) provocation test was performed. Selective right coronary artery injection of 50 µg of ACh resulted in chest pain, ST-segment elevation, and hemodynamic instability with important RCA epicardial spasm and subocclusion of postero-descending and postero-lateral branches (Figure 1D, E, Supplementary material, *Video S2*). Hemodynamic instability, ST elevation, and epicardial spasm were resolved following intravenous catecholamines and an intracoronary injection of 3 mg of dinitrate isosorbide. We decided not to perform an ACh injection to the left coronary artery.

Bisoprolol was then withdrawn and replaced by transdermal nitrates and amlodipine since non-dihydropyridine calcium channel blockers were contraindicated due to impaired LVEF. Dapagliflozin was added to the treatment and Life-vest® was initially proposed. After 3 months of uneventful follow-up, LVEF improved to 41%.

Compared with patients with obstructive coronary artery disease, those diagnosed with MINOCA are more likely to be young, female, and with fewer comorbidities, which suggests a predominant role of non-atherosclerotic related etiologies [1]. In addition to CMR, invasive intracoronary imaging modalities, not performed in our case, could be useful in elucidating the underlying mechanism.

Although coronary artery spasm used to be the most common cause of MINOCA irrespective of racial, genetic, and geographic variations [2], its prevalence has tended to decrease nowadays, partly due to a reduction in smoking but, mostly, due to a decreased functional coronary reactivity assessment in

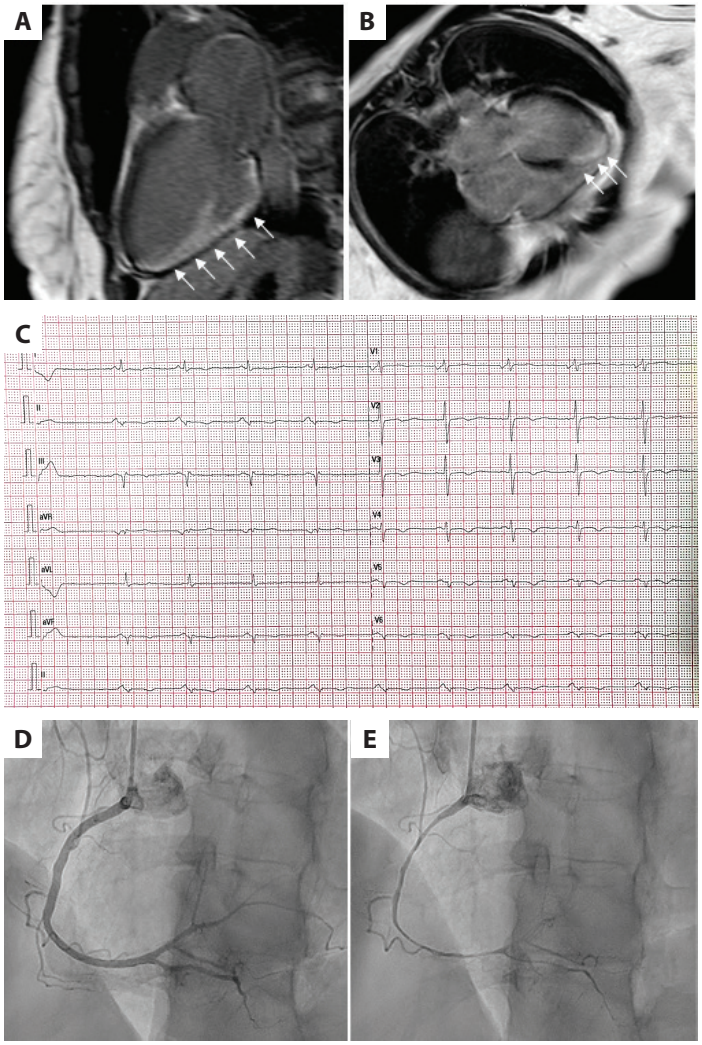

Figure 1. A. Transmural LGE of inferior wall on CMR (the arrows). **B.** Subendocardial LGE on CMR (the arrows). **C.** ECG showing pathological Q wave in inferior leads and negative T wave in anterior leads. **D.** RCA at baseline. **E.** RCA post selective ACh injection

Abbreviations: ACh, acetylcholine; CMR, cardiac magnetic resonance; LGE, late gadolinium enhancement; ECG, electrocardiogram; RCA, right coronary artery

busy cardiac catheterization centers. Overall, the prognosis is good once the diagnosis is made, and appropriate treatment is prescribed [3].

A wide spectrum of clinical manifestations from silent disease to sudden cardiac death is attributed to this complex entity with unclear pathophysiology. Severe ischemic left ventricular dysfunction due to coronary spasm, as in the case of our patient, remains an unusual presentation. Its diagnosis led to an important therapeutic change from an indication for β-blockers to their contraindication.

This case should raise the awareness of such possibility in cases of repetitive presentation of MINOCA.

Supplementary material

Supplementary material is available at https://journals.viamedica.pl/kardiologia_polska.

Article information

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