

Early recurrence of attack after myocardial infarction with non-obstructive coronary arteries: a case report

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Background

Diagnostic strategies depend on non-standardized workup, and the causes of myocardial infarction with non-obstructive coronary arteries remain unclear for some patients. Intracoronary imaging is recommended for detecting the missed causes by coronary angiography. Myocardial infarction with non-obstructive coronary arteries is a heterogeneous entity; a meta-analysis of myocardial infarction with non-obstructive coronary artery studies demonstrated that all-cause mortality rate at 1 year is 4.7%, and its prognosis is not so favourable.

Case summary

A 62-year-old man without remarkable medical history complained of acute chest pain at rest, which resolved at his arrival. Although echocardiography and electrocardiogram exhibited normal findings, the concentration of high-sensitive cardiac troponin T increased up to 0.384 from 0.04 ng/mL. Coronary angiography was performed, and mild stenosis of the proximal right coronary artery was detected. He was discharged without catheter intervention and medications as he reported no symptoms. He returned 8 days later because of inferoposterior ST-segment elevation myocardial infarction with ventricular fibrillation. Emergent coronary angiography showed that the mild stenosis of the proximal right coronary artery had progressed to total occlusion. Optical coherence tomography after thrombectomy revealed rupture of the thin-cap fibroatheroma and protruding thrombus.

Discussion

Patients presenting with myocardial infarction with non-obstructive coronary arteries and plaque disruption and/or thrombus detected by optical coherence tomography do not show normal coronaries on coronary angiography. Aggressive investigation into plaque disruption using intracoronary imaging is recommended even if coronary angiography demonstrates mild stenosis to prevent a fatal attack for suspicious cases of myocardial infarction with non-obstructive coronary arteries.

Keywords

Case report • Myocardial infarction with non-obstructive coronary arteries • Plaque disruption • Optical coherence tomography

ESC Curriculum 3.1 Coronary artery disease • 3.2 Acute coronary syndrome

Learning points

- Aggressive examination of the plaque disruption using optical coherence tomography is recommended even if the coronary angiography demonstrates mild stenosis.
- Aggressive diagnostic and therapeutic strategies are required to prevent fatal attacks when myocardial infarction with non-obstructive coronary arteries is suspected.

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Introduction

Myocardial infarction with non-obstructive coronary arteries (MINOCA) is defined as myocardial infarction without angiographic moderate to severe stenosis (>50%) and any other related diagnosis on clinical presentation.¹ Diagnostic strategies often depend on non-standardized workup and vary widely. The causes of MINOCA in some patients remain unclear. Although therapeutic strategies also often depend on non-standardized practices and evidence is scarce, pharmacological therapy with aspirin, statins, angiotensin-converting enzyme inhibitors, and calcium channel blockers have shown significant long-term beneficial effects based on data in a national registry.² Few reports have compared the outcomes of MINOCA and obstructive coronary artery disease populations; however, patients with MINOCA have a lower survival rate than healthy individuals matched for age and sex.^{3,4} A meta-analysis of MINOCA studies demonstrated an all-cause mortality rate of 4.7% at 1 year; the prognosis of MINOCA is, therefore, not as favourable.^{5–7} This is a report of a case of a patient with MINOCA who returned to the hospital because of inferoposterior ST-segment elevation myocardial infarction (STEMI) with ventricular fibrillation (VF) 8 days after his discharge. Aggressive investigation into the cause of MINOCA and pharmacological intervention are required to prevent fatal attacks for suspicious cases of MINOCA.

Timeline

First admission	Because of acute chest pain at rest, he was admitted to the hospital. High-sensitivity troponin T concentration was 0.04 ng/mL. Echocardiography showed normal findings.
Day 0	Electrocardiogram showed no significant ST-T segment changes. High-sensitivity troponin T concentration increased up to 0.384 ng/mL. Coronary angiography (CAG) showed mild stenosis (<50%) of the proximal right coronary artery (RCA).
Day 1	Discharge without any medications.
Day 8 after discharge	He complained of acute chest pain again and was brought to our hospital by ambulance. In the ambulance, he was defibrillated thrice because of VF.
Second admission	Electrocardiogram showed a sinus rhythm with ST-segment elevations in Leads II, III, aVF, and V1–4.
Day 0	CAG showed total occlusion of the proximal RCA. Optical coherence tomography (OCT) after thrombectomy revealed rupture of the thin-cap fibroatheroma and protruding thrombus. Percutaneous coronary intervention was performed, and drug-eluting stent was deployed to the proximal RCA.
Day 11	Discharge.
Outpatient service	The patient's clinical course has been good without any complaints.

Case presentation

A 62-year-old man without any remarkable previous history and medication complained of acute chest pain at rest. The symptom resolved on his arrival at our hospital, and physical examinations were normal. Echocardiography showed normal findings, and the concentration of high-sensitive cardiac troponin T (hs-cTnT) was slightly high at 0.04 ng/mL. Afterward, despite the normal findings on an electrocardiogram (*Figure 1*), the hs-cTnT level increased to 0.384 ng/mL on the same day. Coronary angiography was performed, and only mild stenosis (<50%) of the proximal RCA was found (*Figure 2*) (*Supplementary material online, Video S1*). He was discharged without catheter intervention and any medication for the prevention of coronary events (antiplatelet and/or statin) since he reported no symptoms and his low-density lipoprotein cholesterol level was 93 mg/dL. He returned 8 days after his discharge because of inferoposterior STEMI with VF. He complained of acute chest pain again and was brought to our hospital by ambulance. In the ambulance, he was defibrillated thrice because of VF, and the electrocardiogram showed a sinus rhythm with ST-segment elevations in Leads II, III, aVF, and V1–4 on his arrival (*Figure 3*). Emergent CAG showed that the mild stenosis in the proximal RCA progressed to total occlusion. (*Figure 4*) (*Supplementary material online, Video S2*). Optical coherence tomography after thrombectomy revealed rupture of the thin-cap fibroatheroma and protruding thrombus (*Figure 5*) (*Supplementary material online, Video S3*). A 3.0 × 18 mm drug-eluting stent (Xience Sierra™, Abbott Vascular, Santa Clara, CA, USA) was deployed to the proximal RCA, and the results of angiography showed a dilated lumen without flow limitations. After the percutaneous coronary intervention, his clinical course has been good. After discharge, he continued to receive dual antiplatelet (aspirin, 100 mg/day; clopidogrel, 75 mg/day) and statin therapy (rosuvastatin, 5 mg/day) and attend the hospital as an outpatient without any complaints.

Discussion

Our patient with MINOCA returned because of inferoposterior STEMI with VF only 8 days after discharge. Previous reports showed that MINOCA is a heterogeneous entity with a 1–13% prevalence among all patients with a clinical diagnosis of acute MI.⁵ Diagnostic strategies depend on non-standardized workup, and MINOCA may involve both coronary and non-coronary pathological conditions. The most recent scientific statement from the American Heart Association and European Society of Cardiology provides the current criteria for the MINOCA definition, which excludes alternative diagnoses (sepsis, pulmonary embolism, etc.), myocarditis, and Takotsubo syndrome from the final diagnosis of MINOCA.^{1,7} They additionally recommend performing cardiac magnetic resonance (CMR) for the differential diagnosis of Takotsubo syndrome, myocarditis, or true MI. Cardiac magnetic resonance can identify the underlying cause in as many as 87% of patients with MINOCA.^{1,8} Intracoronary imaging with intravascular ultrasound or OCT is also recommended for the detection of missed causes by CAG.^{1,7} In addition, OCT, with its high spatial resolution (10–20 μm), can be used to visualize intraluminal and coronary vessel wall microstructures in detail. Therefore, OCT has been reported to be superior to other intracoronary imaging modalities for identification at a coronary level and is an essential tool for the recognition of the underlying pathogenetic mechanism of MINOCA when epicardial pathology is suspected.⁹ Based on the OCT examination for MINOCA, plaque disruption and thrombus were found in 24% and 18% of patients, respectively. For these patients, CAG did not show normal coronaries. In addition, catheter and/or pharmacological interventions based on the OCT findings were administered for more than half of these cases.¹⁰ In our patient, initial CAG showed mild stenosis of the proximal RCA,

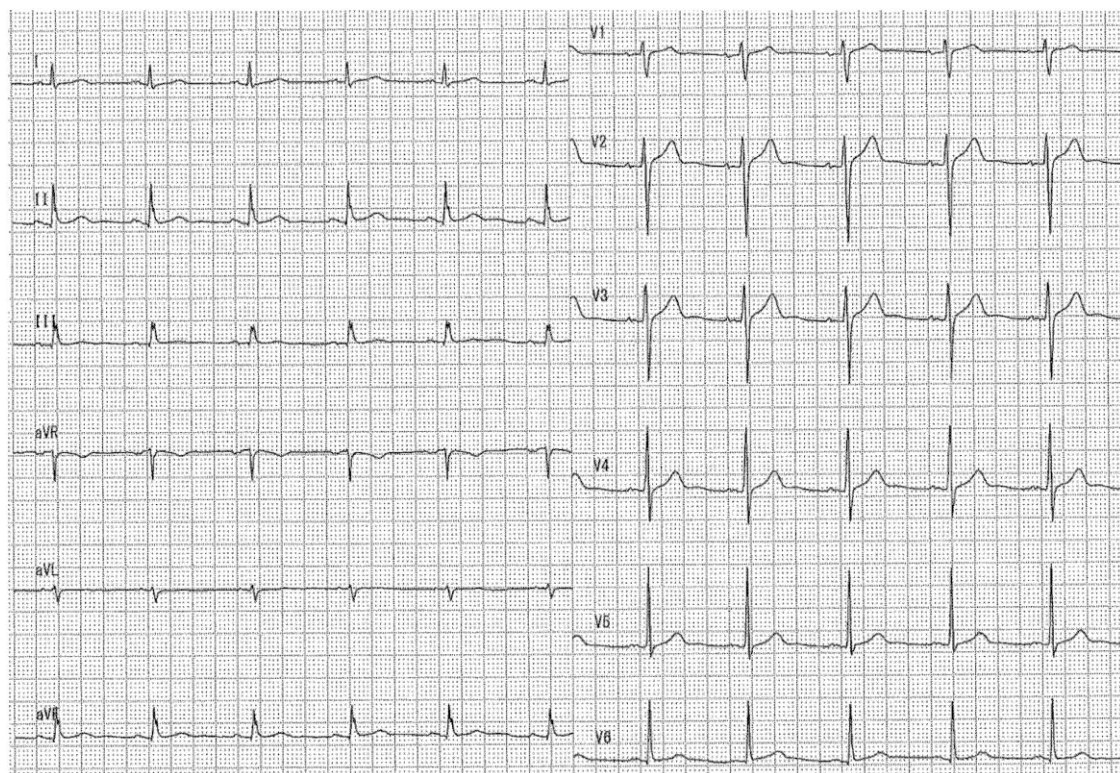


Figure 1 Electrocardiogram during the first admission. No significant ST-T segment changes.

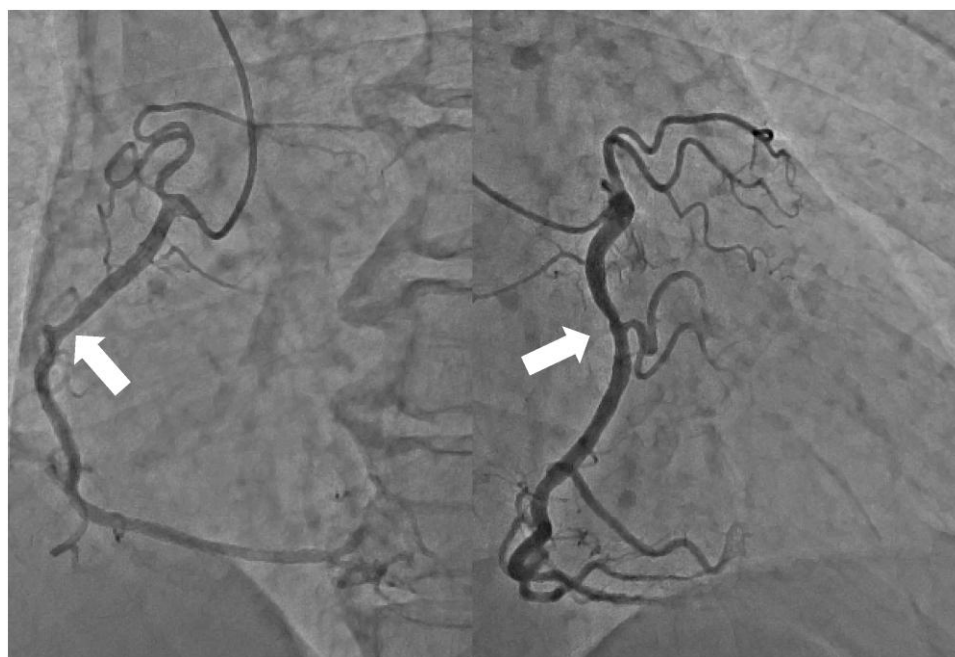


Figure 2 Coronary angiography during the first admission. Mild stenosis of the proximal right coronary artery (arrow).

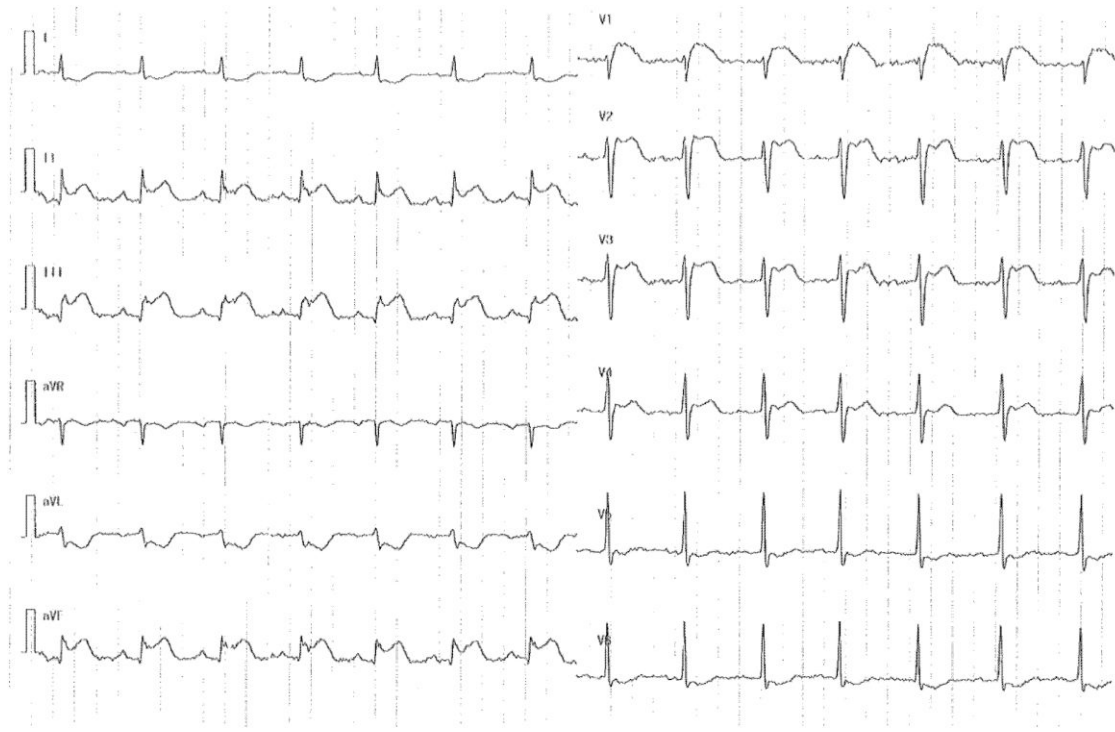


Figure 3 Electrocardiogram during the second admission. Sinus rhythm with ST-segment elevations in Leads II, III, aVF, and V1–4.

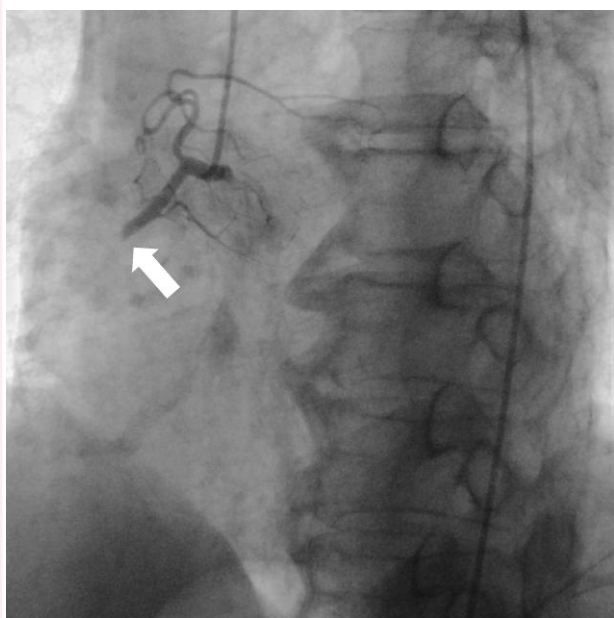


Figure 4 Coronary angiography during the second admission. Total occlusion of the proximal right coronary artery (arrow).

which had plaque disruption and/or thrombus, later progressing to STEMI 8 days after discharge. Aggressive examination of the plaque disruption using OCT is recommended even if CAG demonstrates mild stenosis. This case ascertains the need for an aggressive examination into the cause of MINOCA, along with appropriate catheter and pharmacological interventions. This report has a limitation. Since OCT images from the first admission are lacking, this case report should be considered exploratory and hypothesis generating.

Conclusion

Although the reports on the prognosis of MINOCA are not consistent, it is not considered favourable. In our case, the patient returned because of inferoposterior STEMI with VF 8 days after discharge. Aggressive diagnostic and therapeutic strategies are required to prevent fatal attacks when MINOCA is suspected.

Lead author biography



Dr. Masaki Morooka graduated in medicine from the Saitama Medical University, Japan. Through basic clinical training, he trained in cardiology at Nippon Medical Hospital for 3 years. His subspecialty interests are catheter intervention and heart failure. Currently, he is training at Nippon Medical School Chiba Hokusoh Hospital.

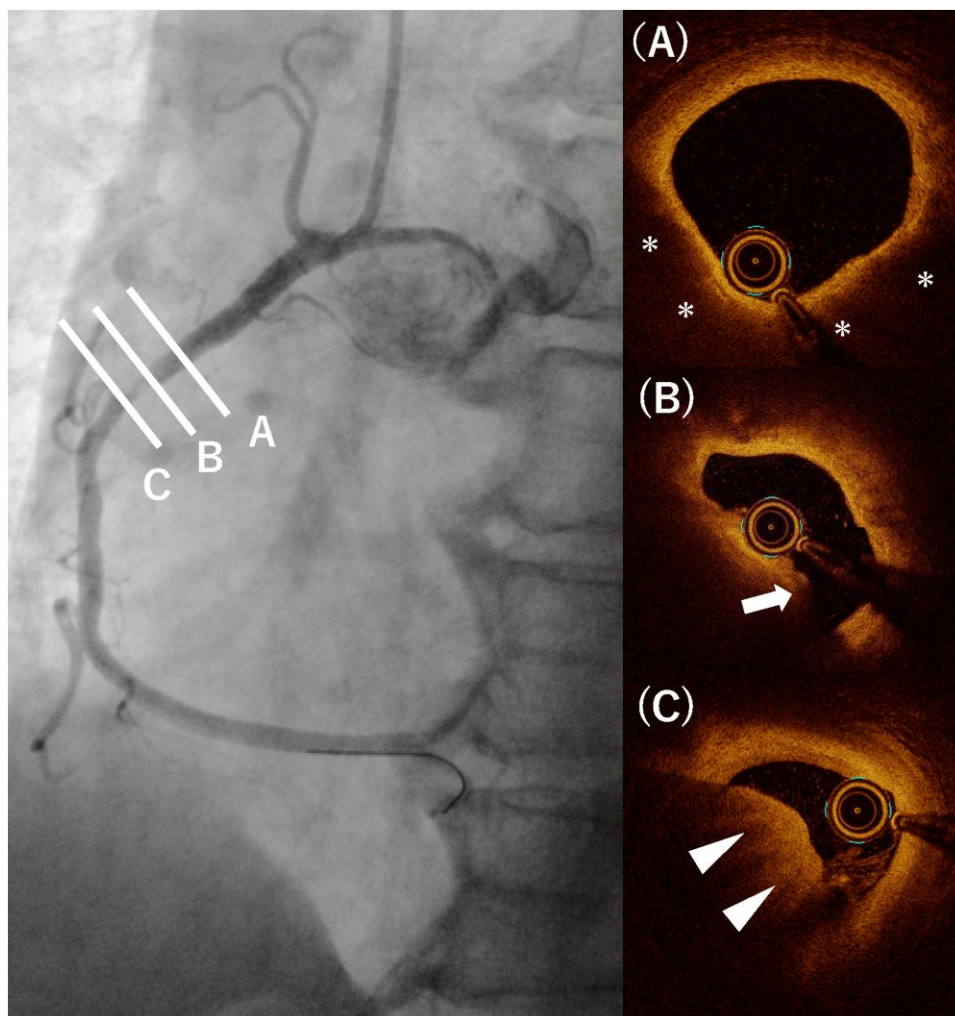


Figure 5 Coronary angiography and optical coherence tomography findings after thrombectomy during the second admission. (A–C) Thin-cap fibroatheroma (asterisks), rupture (arrow), and protruding thrombus (arrowheads) are present.

Supplementary material

Supplementary material is available at *European Heart Journal – Case Reports*.

Acknowledgements

None.

Slide sets: A fully edited slide set detailing this case and suitable for local presentation is available online as [Supplementary data](#).

Consent: The authors confirm that written consent for the submission and publication of this case report, including images and associated text, has been obtained from the patient in line with COPE guidance.

Conflict of interest: None declared.

Funding: None declared.

Data availability

The data underlying this article are available in the article and in its online [supplementary material](#).

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