

Myocardial Infarction with Non-obstructive Coronary Arteries - MINOCA in Young Patients

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ABSTRACT

Myocardial infarction with non-obstructive coronary arteries or MINOCA, is not associated with severe coronary artery stenosis. According to statistics, MINOCA occurs more frequently in women and younger patients. Symptoms and signs are similar to acute myocardial infarction. Coronary artery stenosis was excluded by coronary angiography.

Keywords: Coronary artery spasm, myocardial infarction, atherosclerosis, stenosis, thrombosis, non-obstructive coronary artery disease

INTRODUCTION

MINOCA is a syndrome with features of myocardial infarction but no significant stenosis (i.e., less than 50%) on coronary angiography [1,2]. Rupture of atheroma in the coronary artery due to sudden stress and other reasons, along with platelet adhesion and aggregation, causes thrombus formation. Because it is rich in platelets, it is unstable, and even if it blocks a vessel suddenly, it dissolves within minutes and restores blood flow. Troponin levels can also be elevated because of myocardial damage that occurs when a vessel is completely occluded. Patients with MINOCA tend to be younger and are more common in women. Evidence to date has established that coronary arterial function and disease are not limited to obstructive coronary artery disease (CAD) in women [3].

CASE PRESENTATIONS

CASE 1

A 35-year-old female patient was admitted to the department of cardiology with a complaint of chest pain. On admission, her blood pressure was 210/120 mmHg, heart rate was 75 bpm, and oxygen saturation was 90%. Her past medical history is significant for hyperthyroidism and she has been taking a 10 mg tablet of thirozol regularly for a year. There are no risk factors for CAD.

Blood tests: Hemoglobin: 13.1 mg/dL, white blood count: 6.11 μ L, low-density lipoprotein: 242 mg/dL, triglyceride: 164.6 mg/dL, thyroid-stimulating hormone: 4.75 μ U/mL, anti-thyroid peroxidase: 587.2 IU/mL, troponin I: >3.89 ng/mL (Figure 1).

Echocardiography: Left ventricular ejection fraction (LVEF), 35%; lateral and anterior segments are hypokinetic; diastolic dysfunction, grade 1; mild mitral and tricuspid valve regurgitation.

Coronary angiography showed no significant lesions (Figure 2). Cardiac magnetic resonance imaging (MRI) showed no myocardial damage (Figure 3).

CASE 2

A 28-year-old male patient presented to the emergency department with a 20-minute episode of chest pain. The chest pain was central and radiating to the left arm. Blood pressure was 130/95 mmHg, heart rate was 75 bpm, and oxygen saturation was 97%.

He smoked 20 cigarettes daily but was not aware of any other cardiovascular risk factors.

Complete blood count, normal; troponin I, normal.

Echocardiography: LVEF, 45%, with severe hypokinesis in the mid and basal sections of the anterior segment (Figure 4).



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Figure 1. Electrocardiography

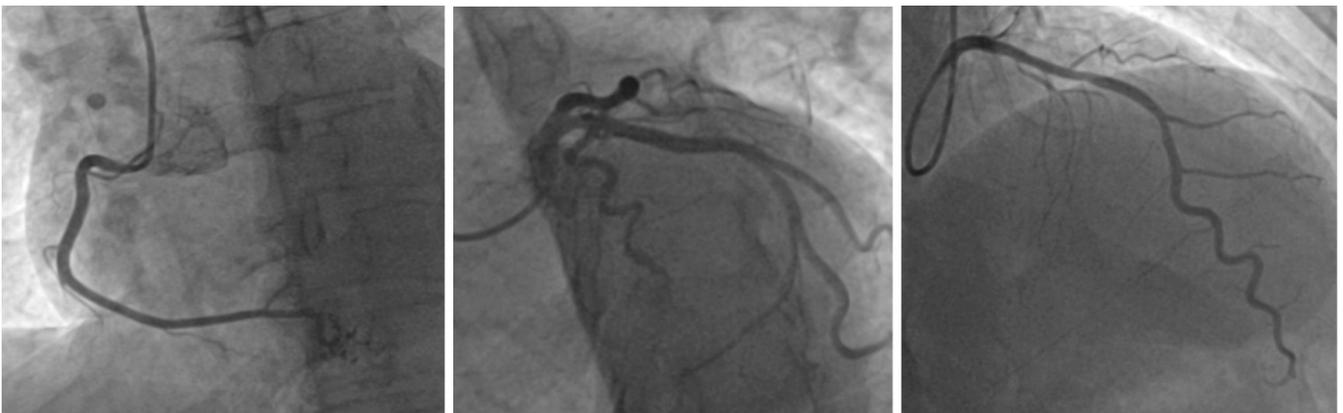


Figure 2. Coronary angiography

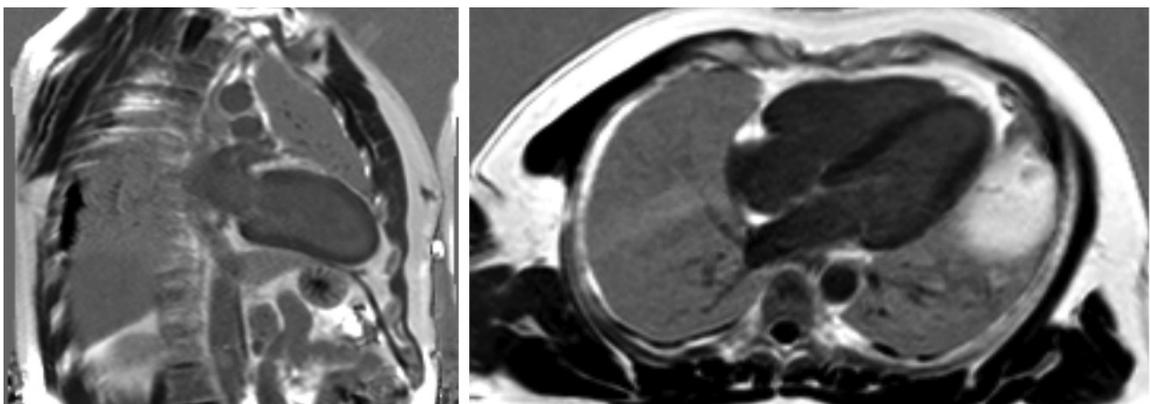


Figure 3. Cardiac MRI
MRI: Magnetic resonance imaging

Cardiac MRI: Observation of ischemic pattern injury, contrast agent retention, and a microvascular obstruction area is noted in the right coronary artery (RCA) region. Considering

the angiography results, it was thought that this patient had MINOCA due to transmural damage in the RCA vascular region, despite not having a 100% blocked vessel (Figures 5, 6).

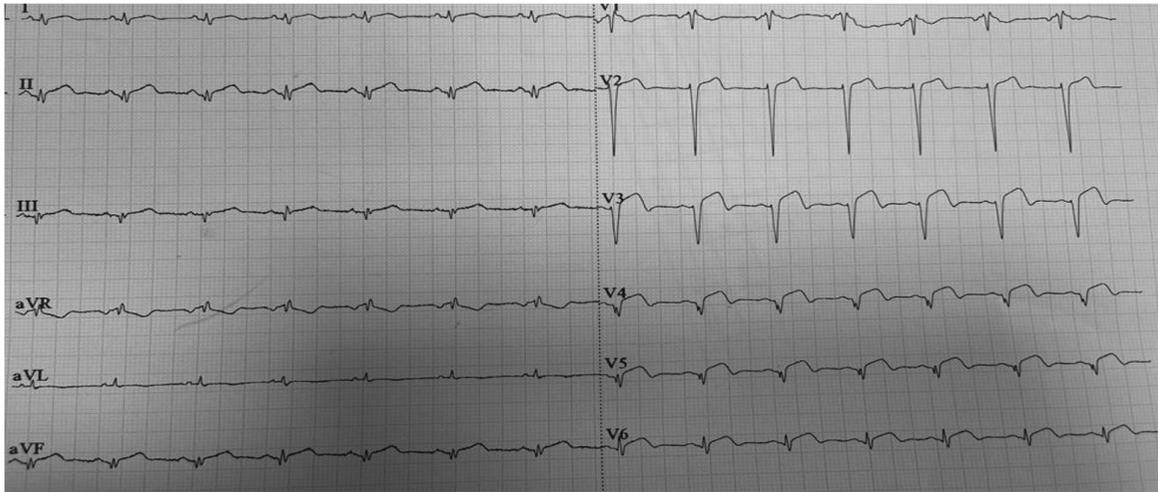


Figure 4. Electrocardiography



Figure 5. Coronary angiography

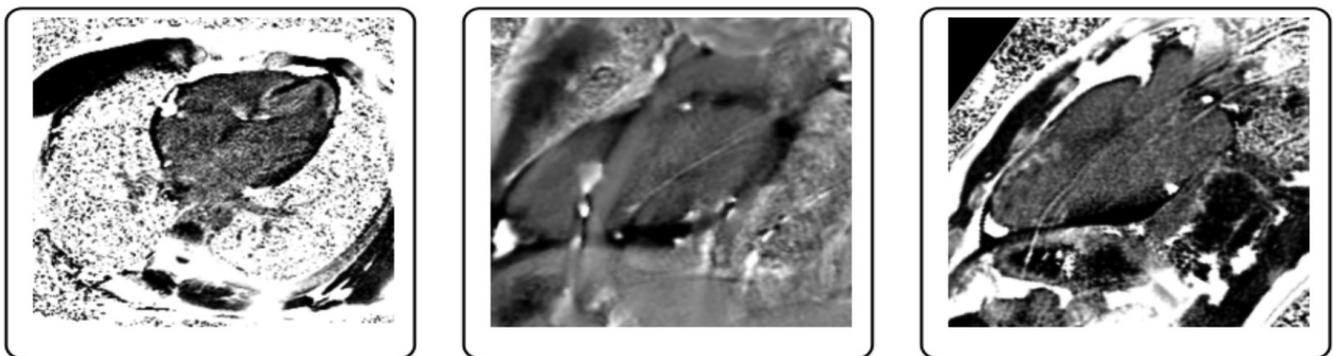


Figure 6. Cardiac MRI

MRI: Magnetic resonance imaging

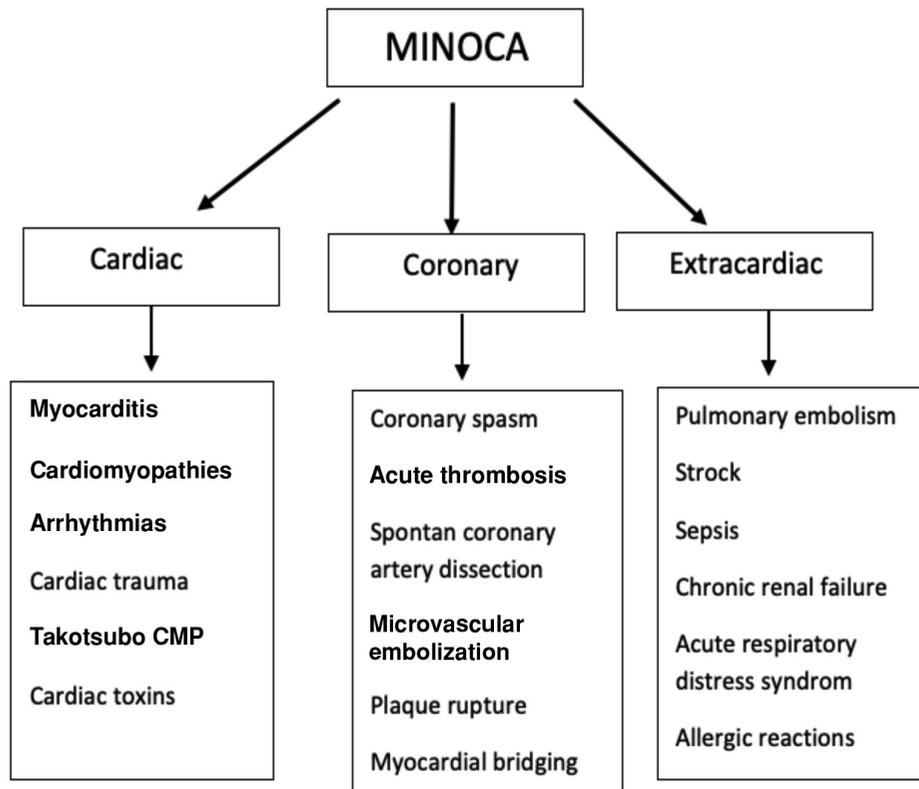


Figure 7. MINOCA

DISCUSSION

MINOCA is a syndrome with features of myocardial infarction but no significant stenosis (i.e., less than 50%) on coronary angiography [2]. Rupture of atheroma in the coronary artery due to sudden stress and other reasons, along with platelet adhesion and aggregation, causes thrombus formation. Troponin levels can also be elevated because of myocardial damage that occurs when a vessel is completely occluded. Patients with MINOCA tend to be younger and are more common in women. Evidence to date has established that coronary arterial function and disease are not limited to obstructive CAD in women [3]. Coronary angiography is essential to establish the diagnosis, and the underlying cause should be investigated. These causes are divided into coronary artery-related, cardiac, and extracardiac. 5-10% of common myocardial infarctions are MINOCA (Figure 7) [4].

The signs and symptoms are the same as those of a heart attack in someone who has blocked arteries—chest discomfort (pain, pressure, tightness), shortness of breath, nausea, and lightheadedness. There are some shared risk factors: high blood pressure, high cholesterol, diabetes, and smoking—but they are less frequent in MINOCA patients than in patients who have had heart attacks with obstructive coronary disease.

MINOCA has a lower mortality rate than myocardial infarction with CAD. If the cause of MINOCA cannot be determined by coronary angiography, left ventriculography or non-invasive methods are recommended. Cardiac MR tomography is one of the main tools used to rule out the underlying cause of MINOCA. The pathophysiology of the disease has been better understood using intracoronary imaging (intravascular ultrasound and optical coherence tomography) studies [5].

Spontaneous coronary artery dissection: Spontaneous CAD is more common in women between the ages of 45 and 55 years. It can be observed in women who use oral contraceptives and have a history of infertility during or before menstruation or during infertility treatment [6]. If there is no hemodynamic disorder, conservative treatment is preferred. Treatment for pregnant women is the same as that for non-pregnant women.

Takotsubo cardiomyopathy: Takotsubo cardiomyopathy is more common in postmenopausal women. Clinically, it resembles acute coronary syndrome. The word “Takotsubo” is a container used by the Japanese to catch octopus, which has a circular bottom and narrow neck, which resembles the heart’s condition in TC to a certain degree [7]. Therefore, response to fluctuations in the levels of adrenaline and noradrenaline secreted in moments of stress, microvascular disorder, and

underlying left ventricular outflow tract obstruction can be indicated.

Micro-macrovascular dysfunction: Microvascular dysfunction and coronary vasospasm are the underlying causes in 80% of patients without major stenoses on coronary angiography, and most cases are women. Studies have shown that statins, ACE inhibitors, ARBs, and beta blockers are beneficial, but dual anticoagulation therapy has been identified [8].

It is important to raise awareness of MINOCA. Educating individuals about symptoms, risk factors, and available treatments may facilitate an earlier diagnosis. Even after long-term treatment, patients with MINOCA are still at risk of future cardiovascular events. Lifestyle changes, medications, and regular follow-up are important components of treatment.

Ethics

Informed Consent: The patients written informed consent was obtained.

Authorship Contributions

Surgical and Medical Practices: G.A., N.I., A.S., Concept: G.A., N.I., A.S., Design: G.A., N.I., A.S., Data Collection or Processing: G.A., N.I., A.S., Analysis or Interpretation: G.A., N.I., A.S., Literature Search: G.A., N.I., A.S., Writing: G.A., N.I., A.S.

Conflict of Interest: No conflict of interest was declared by the authors.

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