

Acute Myocardial Infarction Involving Left Main Artery in a Patient with Antiphospholipid Syndrome

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INTRODUCTION

Antiphospholipid syndrome (APS) is an autoimmune disease characterized by vascular thromboses (arterial, venous, or small vessels) and elevated serum levels of antiphospholipid antibodies (anticardiolipin, lupus anticoagulant, or anti- β 2 glycoprotein I).¹ The most common manifestation of APS is deep vein thrombosis (31.7%). Acute myocardial infarction (AMI) is a rare manifestation of APS with an overall prevalence of 5.5%, but has a relative good in-hospital prognosis (92.5% survival rate).^{2,3} However, this rare manifestation can lead to a lethal outcome. Here, we presented a young female with AMI and cardiogenic shock due to APS.

CASE

A 39-year-old woman, a non-smoker, presented to our emergency department with severe retrosternal chest pain and cold sweating for two hours. She had no previous history of hypertension, diabetes mellitus, hyperlipidemia, or pregnancy, but her mother was diagnosed with systemic lupus erythematosus. At our emergency department, her 12-lead electrocardiogram revealed accelerated junctional or ventricular rhythm, new onset right bundle branch block, ST elevation at lead I and aVL, as well as ST depression at lead II, III, and

aVF (Figure 1).⁴ Computed tomography excluded the likelihood of aortic dissection, pneumothorax, or pulmonary embolism. Before coronary angiography for highly suspicious AMI, she experienced hemodynamic shock with pulseless electrical activity. She received cardiopulmonary-cerebral-resuscitation and returned spontaneous circulation in seven minutes. Because of persistent hemodynamic shock, cardiac surgeon set up extracorporeal membrane oxygenation (ECMO). Meanwhile, her laboratory examination showed elevated troponin I of 0.46 ng/ml, elevated total creatine kinase of 467 U/l, and elevated creatine kinase-MB (CK-MB) isoenzyme of 38.3 U/l. Besides, she received a loading dose of aspirin 300 mg and ticagrelor 180 mg, along with intravenous heparinization.

After stabilized, she received coronary angiography, showing a large thrombus in the left main artery with patent right coronary artery (Figure 2). She received percutaneous coronary intervention (PCI) with a drug eluting stent replacement, supported by intra-aortic balloon pumping and ECMO. Then she was admitted to our intensive care unit and received therapeutic hypothermia. She received standard AMI management with aspirin 100 mg per day, ticagrelor 90 mg twice per day, intravenous heparinization, and inotropic agents of dobutamine and norepinephrine.

During her hospitalization, we confirmed that she had no conventional cardiovascular risk factors, including diabetes mellitus and hyperlipidemia. Because her mother had a known autoimmune disease, we checked her profiles of autoimmune disease. Her autoimmune profiles revealed borderline positive speckled and homogeneous antinuclear antibody of 40 times, along with low level of C3 and C4, positive antiphospholipid immunoglobulin G, anticardiolipin immunoglobulin G of more than 160 U/ml, anti- β 2 glycoprotein immunoglobulin G of more than 160 U/ml, and positive lupus anticoagulant (LA) (LA 1 is higher than 100 seconds, LA 2 is 41.6

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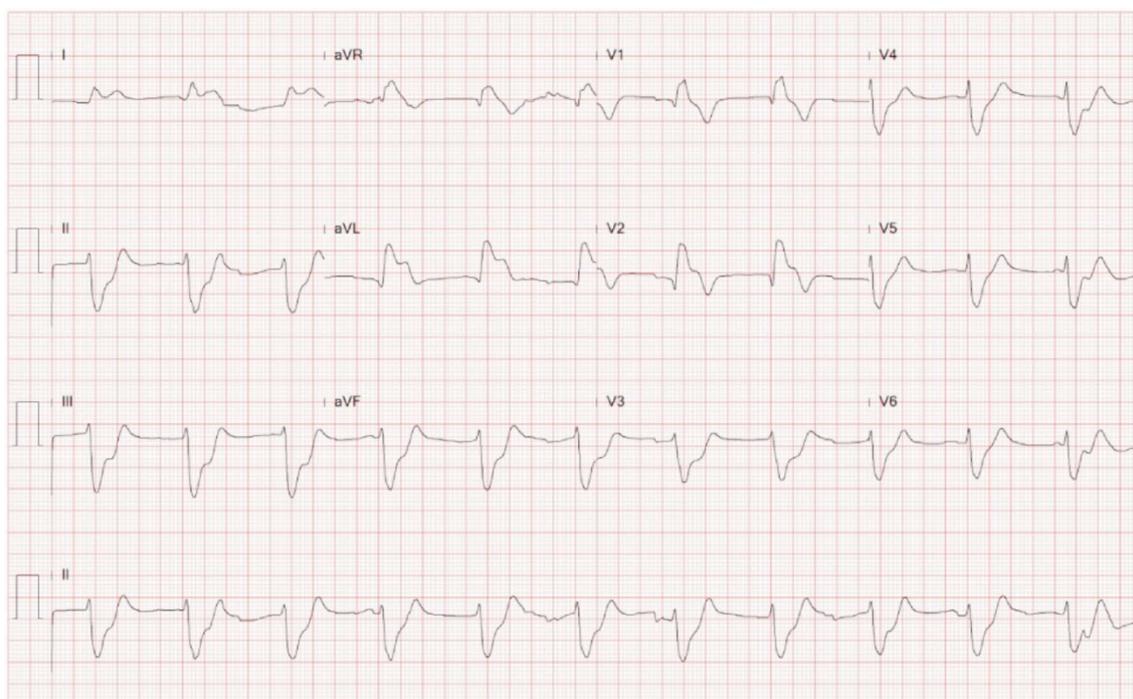


Figure 1. The 12-lead electrocardiogram shows accelerated junctional or ventricular rhythm, new onset right bundle branch block, ST elevation at lead I, aVL and ST depression at lead II, III, aVF.

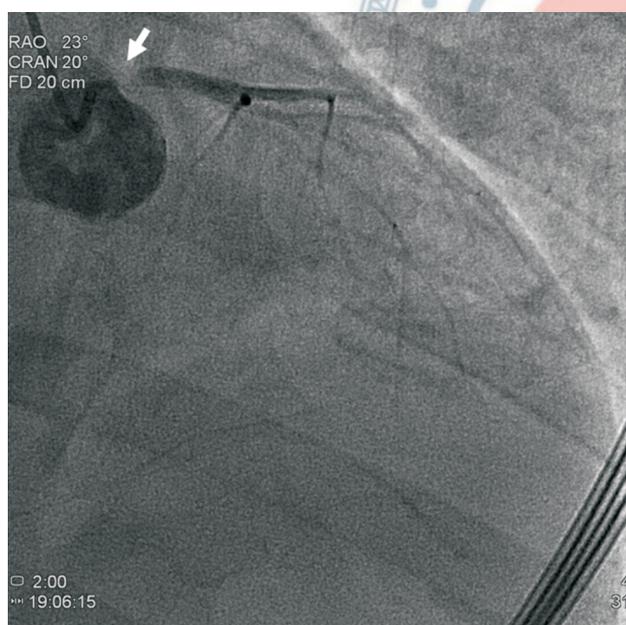


Figure 2. The coronary angiogram right anterior oblique (RAO) view shows proximal occlusion of left main artery with a large thrombus (arrow).

seconds, and ratio of LA1/LA2 is 2.48). Besides, she had negative results of anti-DNA antibody, anti-ENA antibody, anti-SmD antibody, anti-RNP antibody, rheuma-

toid factor, perinuclear neutrophil antibodies, anti-Ro antibody, and anti-La antibody. Therefore, primary APS was highly suspected based on the revised Sapporo APS Classification Criteria, though we couldn't repeat antibody profile after 12 weeks.

Despite aggressive medical treatment, she developed refractory cardiogenic shock with multiple organ failure. Transthoracic echocardiography revealed severe global hypokinesia with an ejection fraction of 11%. Although we planned to arrange heart transplantation for the patient, she expired on the sixth day after her hospitalization.

DISCUSSION

APS is a systemic autoimmune disease, defined by thrombotic or obstetrical events occurring in patients with persistent antiphospholipid antibodies. While stroke and transient ischemic attack are the most common arterial events, lower-extremity deep-vein thrombosis and pulmonary embolism are the most common venous events.⁵ A definite diagnosis of APS requires a presence of at least one clinical and one laboratory criterion. Clin-

ical criteria include objectively confirmed venous, arterial, or small-vessel thrombosis, or pregnancy morbidity. Laboratory criteria encompass persistently positive tests from at least one of three antiphospholipid antibodies (anticardiolipin, anti- β 2-glycoprotein I, lupus anticoagulant test), measured on two or more times within 12-week interval.¹ In our case, primary APS was highly suspected based on AMI and strongly positive tests of antiphospholipid antibodies, though we could not repeat the test after 12 weeks to meet the diagnosis criteria.

AMI due to APS is rare with an overall prevalence of 5.5% and is even rarer as an initial manifestation with a prevalence of 2.8%.² The average age of AMI associated with APS is 41.1 years,³ significantly lower than patients with typical AMI (64.7 years).⁶ While women constitute 29.9% of AMI cases in general population,⁶ women occupy 45% of AMI associated with APS.³ APS is more common in women than men,² so it is reasonable to consider APS in a young woman without conventional cardiovascular risk factors. One systematic review of 40 AMI cases due to APS reported that, in its supplementary file, ST-elevation myocardial infarction (STEMI) was the most common presentation of 45%, non-STEMI occupied 27.5%, and 27.5% were not specified with AMI types. Among these 28 cases of STEMI and NSTEMI, 75% were either thrombotic or patent coronary artery, while 25% had obstructive atherosclerotic stenosis, including six cases of left anterior descending artery, three cases of right coronary artery, and two cases of left circumflex artery.³ No cases involved left main artery. The overall in-hospital prognosis is good, with a 92.5% survival rate.³ Thus, our case had a large thrombus in left main artery with a catastrophic outcome, a rare presentation of AMI related to APS.

The treatment of AMI due to coronary artery disease focuses on coronary reperfusion, dual-antiplatelet agents, and anti-thrombotic therapy.^{7,8} After PCI, life-long anticoagulation is usually not recommended. However, mechanism of coronary stenosis or occlusion in APS is mostly thrombotic. Because treatment of APS with thrombotic events is life-long anticoagulation from initial presentation, AMI associated with APS should consider life-long anticoagulation.⁵ Besides, intensity of anticoagulation is under debate. Some experts recommend conventional intensity of anticoagulation with warfarin at an international normalized ratio (INR) of 2.0

to 3.0 for APS with the first venous event, whereas APS with arterial thrombosis or recurrent venous events should be treated with warfarin at an INR 3.0 or greater. A systematic review of observational studies concluded that the rate of recurrent arterial thrombosis was significantly lower with INR more than 3.0.⁹ Published data on direct oral anticoagulants (DOACs) for APS are limited. One randomized controlled trial comparing rivaroxaban with warfarin (target INR of 2.0 to 3.0) for secondary prevention of venous thromboembolism associated with APS showed that no patient in either group had bleeding or thrombosis during a six-month period.¹⁰ Further trials are needed to confirm efficacy and safety of DOACs for APS. In our case, dual anti-platelets therapy (DAPT) and intravenous heparinization were given before and after PCI, and when the patient was supported by ECMO. There is insufficient evidence to determine whether patients with APS after PCI should give triple anti-thrombotic therapy (DAPT, plus anti-coagulation) or dual therapy (clopidogrel plus anti-coagulation). Further APS trials for dual or triple anti-thrombotic therapy are needed.

LEARNING POINTS

Our case implicates that AMI involving left main artery can be a lethal initial presentation for patients with APS. Moreover, screening of antiphospholipid antibodies should be considered for young patients with AMI and without conventional cardiovascular risk factors.

CONFLICT OF INTEREST

All the authors declare no conflict of interest.

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