

Acute myocardial infarction due to coronary artery embolism in a patient with atrial fibrillation

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A 66-year-old female was referred for primary coronary intervention because of acute inferior ST-elevation myocardial infarction. Electrocardiography also showed atrial fibrillation. Coronary angiography showed a distal occlusion of the right coronary artery. Two different wires did not pass the occlusion, but dislodged the apparent thrombus more distally. No abnormalities were seen in the course of the recanalised part of the vessel. The sequential angiographic images together with the presence of atrial fibrillation are highly suggestive of coronary embolism as the cause of the myocardial infarction. Anticoagulation and rate control strategy was initiated. The patient was discharged in good condition. (*Neth Heart J* 2009;17:297-9.)

Keywords: coronary artery embolism, atrial fibrillation, myocardial infarction, percutaneous coronary intervention

A 66-year-old female with a history of cigarette smoking experienced acute pain in the left arm and shoulder with nausea and transpiration. She had not complained of cardiac symptoms before. She was recently treated by her general practitioner with ciprofloxacin because of urinary tract infection. The ambulance electrocardiogram (ECG) showed atrial fibrillation with ST-segment elevation in the inferior leads and reciprocal ST-segment depression in leads I and aVL (figure 1). The diagnosis of ST-segment

elevation myocardial infarction (STEMI) was made and treatment with 600 mg clopidogrel, 5000 units of heparin and 250 mg aspirin was initiated in the ambulance. Subsequently she was transported directly to our catheterisation laboratory for primary coronary intervention (PCI). At presentation to the catheterisation laboratory she had less pain, but the nausea was still present. A quick physical examination revealed a height of 172 cm and a weight of 120 kg. The blood pressure was 135/90 mmHg and the pulse irregular at 90 beats/min. Auscultation of the heart and lungs revealed no abnormalities. Coronary angiography (CAG) was performed via the right radial artery, because of extreme obesity. This revealed a normal left coronary artery. The right coronary artery (RCA) was dominant with an abrupt occlusion in the distal RCA after two posterolateral branches (figure 2). After an attempt to pass the occlusion with a rather floppy wire (Wizdom wire, Cordis) the occlusion moved slowly a few centimetres more distally; a new stiffer wire (PT2 light support, Medtronic) could not successfully pass the thrombus but pushed it gradually more distally, revealing several small side branches. Because of the very distal location it was not possible to try to remove the thrombus with a suction device. At the location of occlusion and further on in the course of the recanalised part of the vessel no coronary abnormalities were seen (figure 3). At this point the clinical suspicion of coronary artery embolism as the cause of the STEMI was high. This angiographic appearance together with the atrial fibrillation was highly suggestive. No further intervention was or could be performed because of the distal location of the occlusion with a relatively small area of myocardium at jeopardy with, in the meanwhile, resolution of the anginal complaints. An abciximab bolus was given during the procedure. Heparin IV was given intravenously until the acenocoumarol was in the therapeutic range of the international normalised ratio (INR) and aspirin was continued in a dose of 80 mg. Rate-control strategy was initiated for the atrial fibrillation because it was unclear how long the abnormal rhythm had been present. During further observation, no complications occurred and the day after presentation the patient

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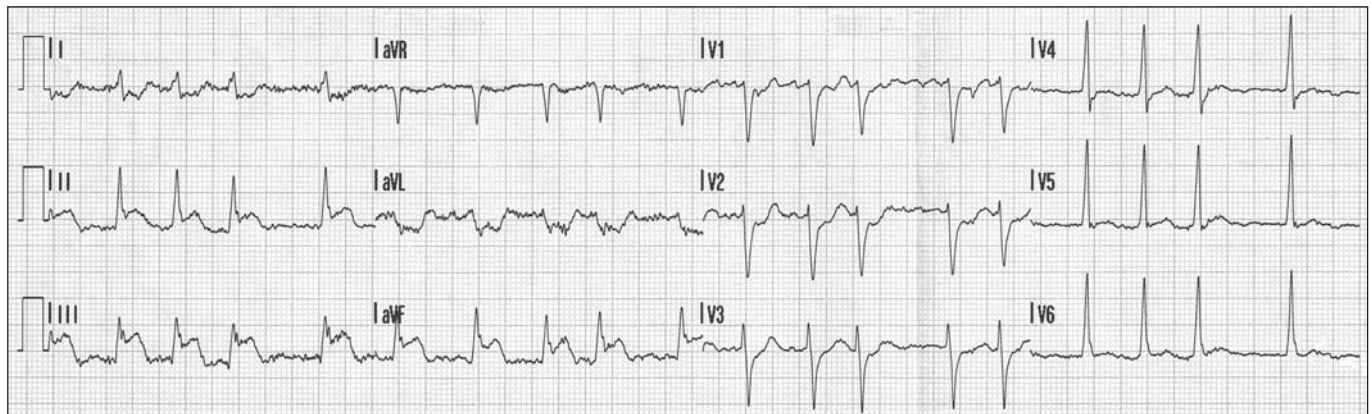


Figure 1. Ambulance electrocardiogram (25 mm/s, 10 mm/mV).



Figure 2. Coronary angiography of the right coronary artery (RCA). Left anterior oblique with cranial angulation. Arrow points to sudden stop in the distal vessel.



Figure 3. Coronary angiography of the right coronary artery (RCA). Left anterior oblique with cranial angulation after the occlusion is moved by the wire into a small posterolateral branch of the RCA. Arrow 1 points to the original stop. Arrow 2 to the current stop.

was transported to a hospital near her home; a few days later she was discharged in good clinical condition.

Discussion

Coronary artery embolism is a rare cause of acute myocardial infarction (AMI) and the precise diagnosis remains challenging for the (interventional) cardiologist. The prevalence of this nonatherosclerotic entity remains unknown because of its difficult diagnosis in the acute setting. In general, 4 to 7% of all patients diagnosed with an AMI do not have atherosclerotic coronary disease at autopsy or coronary angiography.¹ Furthermore, in another autopsy study 55 out of 419 patients (13%) showed coronary artery embolic infarcts.² During primary PCI, signs of distal

embolisation can be seen by coronary angiography as small peripheral stops and are a marker for a worse prognosis.³ There are several case reports of AMI secondary to thromboembolism.⁴⁻¹⁰ In these reports (non) valvular atrial fibrillation is the most frequent thromboembolic risk factor. Although coronary embolism is infrequent, there are a number of causes of coronary artery thromboembolism which are outlined in table 1. Procoagulable states such as obesity, pregnancy, hereditary thrombophilic disorders and cancer are important additional risk factors for coronary embolism. Nowadays, it is obvious that when confronted with a patient with ST-segment elevation myocardial infarction, no time should be wasted and urgent transport for intended primary PCI is crucial.

Table 1. List of reported causes of coronary embolism.

Atrial fibrillation
Cardiac surgery
Coronary atherosclerosis
Dilated cardiomyopathy
Embolism by tumor or thrombus through a PFO or ASD
Iatrogenic embolism during interventional procedures (air bubbles, thrombi, calcium deposits)
Left ventricular aneurysm
Non-infected thrombi on prosthetic valves
Septic emboli from infective endocarditis
Tumors (atrial myxoma, papillary fibroelastoma)
Valvular heart disease

PFO=patent foramen ovale, ASD=atrial septal defect.

However, when coronary embolism is suspected, interventional techniques using thrombus aspiration devices and intravascular ultrasound become more important.⁵ In the literature, intracoronary thrombolysis and stent implantation are also described as reperfusion strategies, but there is no consensus about the optimal management. Furthermore stent implantation may not be the optimal recanalisation technique when the underlying pathophysiological mechanism of the myocardial infarction is thromboembolism.

We report a case of a patient with an AMI which, in our opinion, is due to coronary artery thromboembolism. In our case the extreme obesity of the patient in combination with smoking probably led to a hypercoagulable state with increased risk of atrial thrombi in the setting of atrial fibrillation and eventually leading to embolic AMI. No direct transoesophageal echocardiography (TEE) was performed which might be seen as a shortcoming, but even absence of thrombus in the left atrial appendage does not preclude a thromboembolism. Furthermore direct TEE does not change the treatment of this patient which consists of aggressive anticoagulation and rate control. We believe that the specific angiographic images and the response of the thrombus to the wire manipulations, together with the clinical presentation are highly specific for coronary embolism.

Conclusion

Coronary artery thromboembolism as a nonatherosclerotic cause of acute ST-segment elevation myocardial infarction is a rare finding with unknown prevalence. The cardiologist should be aware of possible coronary artery embolism when the angio-

graphic images are typical together with important thromboembolic risk factors. The urgent treatment is comparable with atherosclerotic coronary syndromes and consists of aggressive anticoagulation and interventional techniques, including thrombus aspiration devices, when possible. ■

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