

Acute Myocardial Infarction of the Left Main Coronary Artery Secondary to Embolism

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Abstract

There are few reported cases of left main artery embolism and is usually fatal, the importance of atrial fibrillation as a cause of acute myocardial infarction and the treatment these patients should be offered, this case highlights the challenges faced during the management of this rare condition due to lack of clear-cut guidelines describing an evidence-based approach [1].

We describe the case of LMCA thrombus that presented as ST-elevation myocardial infarction (STEMI) in a patient with paroxysmal atrial fibrillation who was successfully treated with thrombus aspiration is presented. We highlight the importance of intravascular imaging to determine the underlying putative mechanism.

Keywords: coronary artery embolism; acute coronary syndrome; atrial fibrillation; left main coronary

Abbreviations

LMCA : Left main coronary artery

ALM : Minimal luminal area

MI : myocardial infarction

STEMI : ST-elevation myocardial infarction

IVUS : Intravascular ultrasound

PCI : Percutaneous coronary intervention

LVEF : Left ventricular ejection fraction

Introduction

Left main coronary artery thrombosis is a clinically rare event. Plaque rupture followed by intracoronary thrombus formation is the most common underlying mechanism of myocardial infarction. However there are other causes such as the phenomenon of coronary artery thromboembolism, with an underestimated prevalence due to the difficulty in establishing embolism as a secondary cause and multiple differential diagnoses, this diagnosis should be suspected in the case of a high thrombus burden despite a relatively normal underlying vessel or recurrent coronary thrombus. Coronary embolism is the underlying cause of 2.9-4.3% of acute coronary syndromes.[1,3]

We present a case of LMCA thrombus that presented as ST-elevation myocardial infarction (STEMI) in a patient with paroxysmal atrial fibrillation.

Case Report

A 50-year-old male with a history of chronic arterial hypertension, presented severe chest pain and went to the emergency room for persistent pain, where the electrocardiogram showed ST elevation in precordial leads V2-V6, and a diagnosis of MI with anterior ST segment elevation was established. An urgent radial coronary angiography was performed with a total ischemia time of 180 minutes.

Coronary angiography showed occlusive coronary thrombus in the distal left main coronary artery and confluence polygon extending to the ostial portion of the left anterior descending and circumflex arteries, right coronary artery without angiographic stenosis. We decided to aspirate the thrombus with removal of a large thrombus, reduction of the thrombus burden and migration of the thrombus to the distal portion of the anterior descending coronary artery, presenting atrial fibrillation 200j defibrillation was applied, reverting to sinus rhythm. Glycoprotein IIb/IIIa inhibitor was administered for intracoronary artery and distal flow improved, intravascular ultrasound was used without documenting plaque burden with Minimal luminal area (ALM) 17mm² in the left main. Tirofiban was applied sequentially for 24 hours and the patient's chest pain symptoms were completely relieved. He presented paroxysmal atrial fibrillation and medical management was given.

In echocardiogram LVEF 49% with apical cap hypokinesia without left ventricular thrombus, dilated left atrium with an indexed volume 37ml/m² without valvulopathies.

An agitated saline transesophageal echocardiogram revealed no patent foramen ovale, no atrial septal defect and no evidence of an embolic source in the valves or left atrial appendage.

Coronary angiography 7 days later showed TIMI 3 distal flow in the anterior descending coronary artery, intravascular ultrasound without plaques burden, he was discharged 48 hours later. Follow-up at 3 months without paroxysms of atrial fibrillation, concluded cardiac rehabilitation with 7.2 Mets, in functional class I.

Discussion

Left main coronary artery (LMCA) thrombosis with acute myocardial infarction (MI) is a rare condition with very high mortality of 40-80%. There are few reported cases of left main artery embolism, in most cases it is usually paradoxical secondary to a septal defect or procoagulant diseases. The incidence of thrombus in the LMCA is unknown, but it is estimated to be 0.8%, being a high-risk group of patients [1,2].

Acute or chronic coronary syndrome and atrial fibrillation are common conditions with mutual interplay, patients with atrial fibrillation have a high prevalence ranging from 36% to 86% of coronary artery disease. AF is a frequent complication of acute myocardial infarction has been linked to increased rates of heart failure, stroke, and death [8].

Most AF embolisms occur in the central nervous system and peripheral arterial system and coronary embolism is rare, due to the size of the aorta compared to the coronary ostium, while the embolism occurs in systole and coronary filling is in diastole. There is a 1.5 to 7% of coronary embolism and when this occurs they are usually distal events and not transmural, in our case the event was proximal with a large thrombus which makes it a case of greater difficulty and rarer in clinical practice, we ruled out any other cause of embolism and therefore attributed the embolism to atrial fibrillation. Embolism should be suspected in the case of a high thrombus burden despite a relatively normal underlying vessel or recurrent coronary thrombus. Coronary embolism may be direct from the aortic valve or left atrial appendage, paroxysmal from venous circulation through a patent foramen ovale, atrial fibrillation, embolism from endocarditis vegetation, or iatrogenic following cardiac intervention. Investigations include transesophageal echocardiography to evaluate the left atrial appendage and atrial septum or to rule out endocarditis [5,8].

In patients with myocardial infarction, 4-7% do not have atherosclerotic vascular disease [4].

In a study by Shibata et al. of acute myocardial infarctions where 1776 cases were analyzed, a prevalence 2.9% were due to embolism and atrial fibrillation was the most frequent etiology at 73% in these cases. At 5-year follow-up, there was a recurrence of coronary thromboembolism (4.2%) and stroke 6.3%. [3].

Popovic et al. detected that out of 1232 patients with STEMI, 4.3% were due to embolism and of these 28% were secondary to atrial fibrillation, in the 45-month follow-up there was no recurrence of myocardial infarction or thromboembolism [9].

Aoun et al. suggested an algorithm for the treatment of coronary emboli. Small, distal coronary embolisms without hemodynamic instability should be treated with anticoagulation alone whereas high intracoronary thrombus burden with instability should lead to thrombus aspiration.

Primary stenting may be considered if TIMI is <2 after thrombus aspiration. IVUS or OCT may be considered if TIMI is ≥ 2 after thrombus aspiration and rule out plaque erosion, if embolism resolves or plaque burden is minimal the best option is long-term anticoagulation [11].

Meta-analysis of individual patient data has suggested that there may be a significant reduction in cardiovascular mortality in selected patients with high thrombus burden, although with a slight but significant increase in the risk of stroke [10].

The role of intravascular imaging in identifying plaque characteristics in ACS and STEMI may ultimately influence the indications for PCI and assess the mechanism of ST-segment elevation myocardial infarction. Intravascular imaging helps in the evaluation of plaque burden, plaque rupture or erosion and to rule out dissection or thrombus can be evaluated after medical treatment [6].

After conservative treatment, patients should undergo a new angiography to reevaluate the thrombus, determine its resolution and possible etiology. In addition to medical treatment with anticoagulation, glycoprotein IIb/IIIa inhibition and aspirin may be a successful option. Popovic et al. emphasize that the coronary embolism group used less glycoprotein IIb/IIIa inhibitors 73.9% vs. 37.7% compared to the non-embolism group and less use of primary angioplasty 45.3% vs. 95.5% respectively. [7,9]. Our patient presentation demonstrated an acute left main coronary artery thrombosis in the context of STEMI, the difficulty of treating LMCA thrombus without plaque burden as in this case pharmacological management is a successful option.

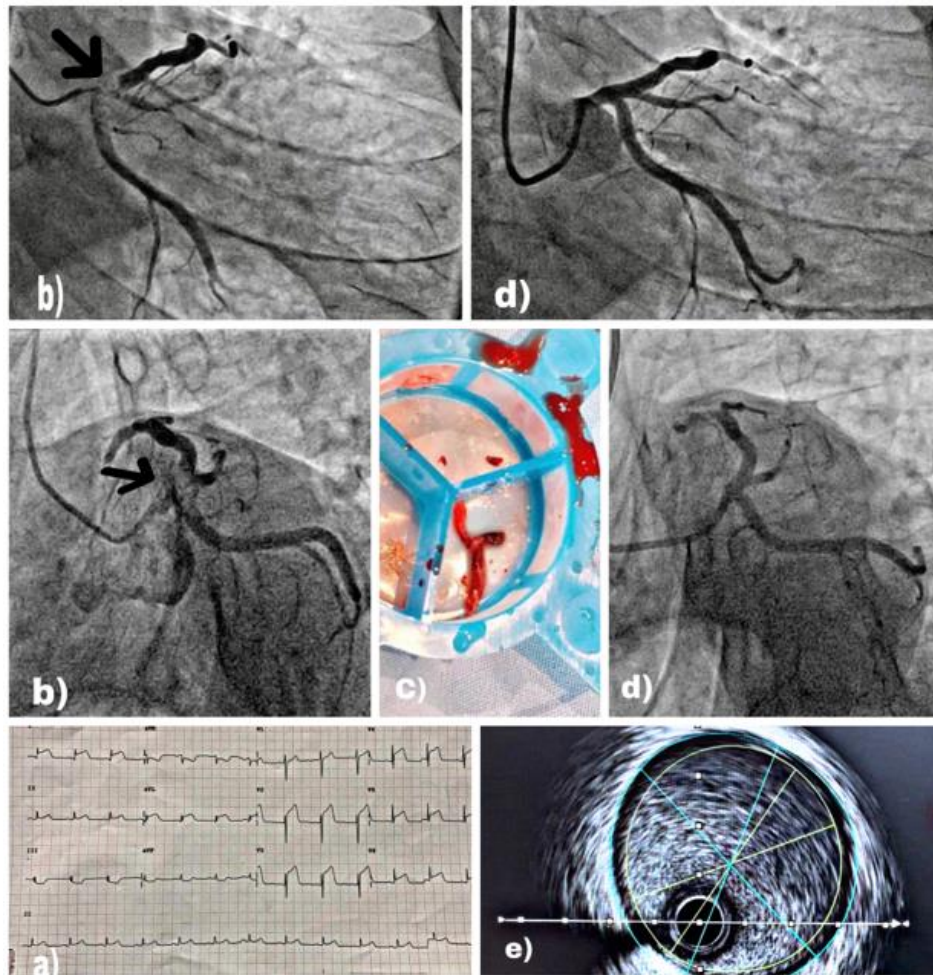


Figure 1 (a): An Electrocardiogram shows ST-segment elevation in the anterior leads **(b):** Coronary angiogram showed that the culprit lesion was located on the distal left main, left anterior descending artery (LAD) and circumflex. Coronary angiography showing intraluminal thrombosis (arrows). **(c):** macroscopic thrombus removed after thromboaspiration. **(d):** Coronary angiogram showed distal left main, left anterior descending artery (LAD) and circumflex without significant stenosis **(e):** Intravascular imaging without plaque burden.

Conclusions

The case is relevant because acute myocardial infarction secondary to embolism is a rare condition that occurs in 2.9-4.3% and of these the most frequent cause in 28-73% is atrial fibrillation, and even more infrequently occurs in the left main coronary artery where the mortality rate is very high. We also documented the successful resolution of the LMCA thrombus with thromboaspiration and medical treatment, which may be the optimal strategy in this group of patients, achieving a good vessel reperfusion rate.

Conflicts of interest

No conflict of interest.

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