

Acute myocardial infarction in an 80 year-old woman caused by left main occlusion with concomitant chronic total occlusions of right and left coronary artery: Successful treatment with percutaneous revascularization

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Abstract

Although acute left main coronary artery occlusion is rare, it carries a very high mortality rate. Following the encouraging results of trials testing the effect of primary percutaneous coronary intervention, more cases of left main stenosis are treated as culprit lesion in acute myocardial infarction. Few cases of primary percutaneous intervention on left main occlusion have been published. We present the case of an elderly patient presenting with acute myocardial infarction complicated by cardiogenic shock due to left main occlusion, with concomitant chronic total occlusion of right and left anterior descending coronary arteries. Successful percutaneous intervention as a bridge to coronary artery bypass grafting was performed with stent implantation, which resulted in the relief of obstruction, the restoration of blood flow and the immediate clinical improvement of the patient. The patient left the hospital in good condition after 11 days, although she had refused the proposed coronary artery bypass grafting. (Cardiol J 2009; 16, 6: 568–572)

Key words: left main coronary artery occlusion, percutaneous coronary intervention, myocardial infarction

Introduction

Acute left main coronary artery (LM) occlusion is a rare angiographic finding [1, 2]. When it takes place, the prognosis is usually poor, unless there are substantial pre-existing collaterals and reperfusion is rapidly established [2, 3]. Cardiogenic shock or pulmonary edema due to pump failure or refractory ventricular arrhythmias are the leading causes of death in patients with this clinical condition.

Primary percutaneous coronary intervention (PCI) is now well established and of proven benefit

in patients with acute myocardial infarction (AMI). The major trials on AMI however have excluded patients with LM occlusion. Whereas elective LM, especially in high risk patients, has been shown to be a feasible option [4], emergent LM stenting has been associated with much worse outcomes, with high mortality [5–9].

We present the case of an elderly patient with AMI caused by LM occlusion with concomitant chronic total occlusion of right and left anterior descending coronary arteries successfully treated with percutaneous revascularization.

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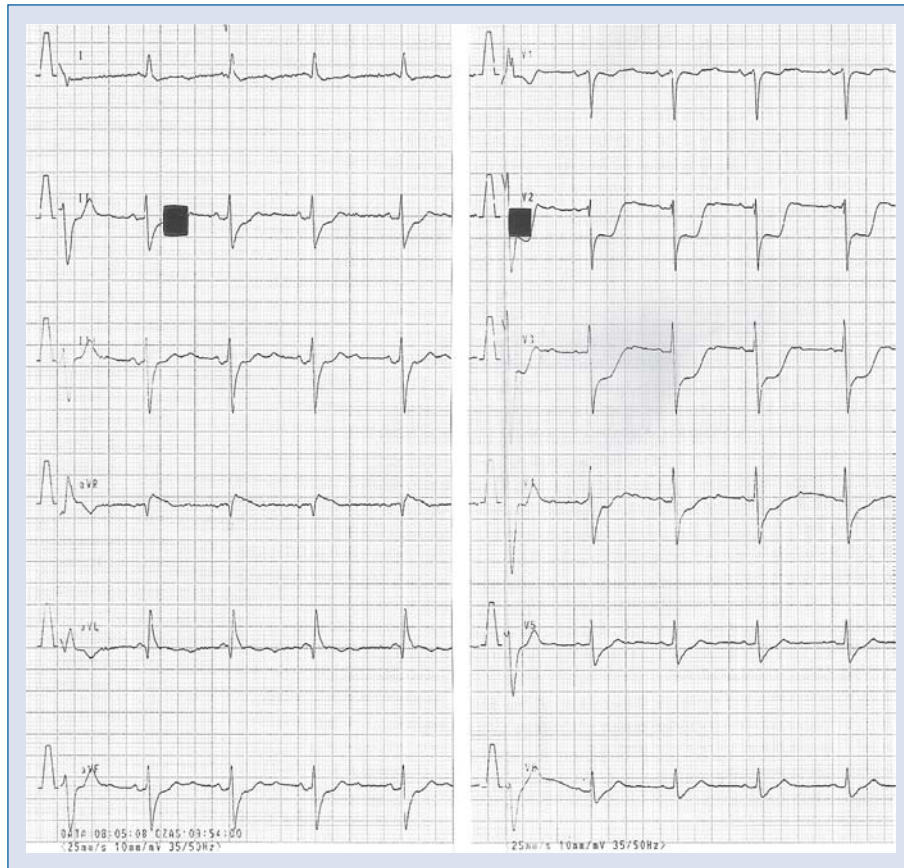


Figure 1. Admission electrocardiogram. Normal sinus rhythm 60 bpm, left axis deviation with severe deep ST segment depressions in leads II, III, aVF, V2–V6 and concomitant ST segment elevation in lead aVR.

Case report

An 80 year-old female with a history of AMI (eight years ago), hypertension, a previous smoker with hypercholesterolemia and positive family history for coronary artery disease was admitted to our hospital due to severe chest pain radiating down both arms, lasting about six hours and associated with diaphoresis and dyspnea. The pain did not respond to the sublingual administration of nitrates at home.

On admission, the patient had decreased blood pressure (70/50 mm Hg) with signs of cardiogenic shock and pulmonary congestion. An electrocardiography (ECG) on admission showed normal sinus rhythm of 60 bpm, left axis deviation with severe deep ST segment depressions in leads II, III, aVF, V2–V6 and concomitant ST segment elevation in lead aVR (Fig. 1).

Since the cardiac markers on admission were also slightly elevated (troponin I 2.96 ng/mL), the patient was scheduled for emergency cardiac catheterization. Coronary angiography revealed complete occlusion of distal LM with TIMI flow 0 throughout left coronary system (Fig. 2) and chronic



Figure 2. Coronary angiogram: right anterior oblique projection. Complete occlusion of distal left main coronary artery with TIMI flow 0 throughout left coronary system.

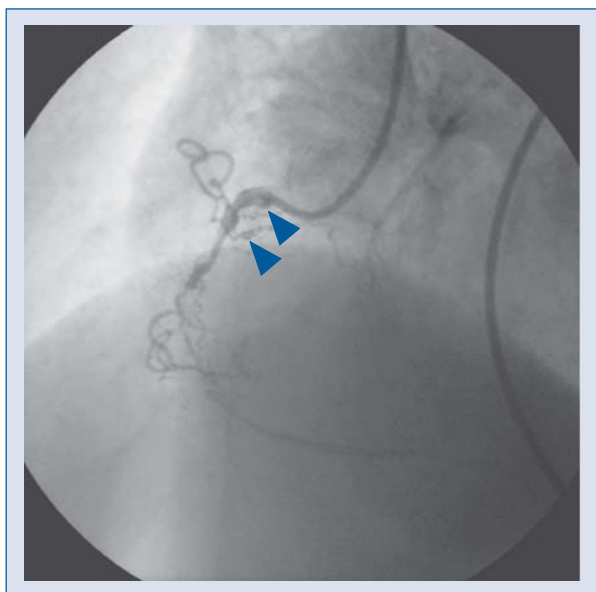


Figure 3. Coronary angiogram: left anterior oblique projection. Complete obstruction of right coronary artery in medium segment with some collateral flow from collaterals in proximal part of right coronary artery to the left anterior descending artery (arrows).



Figure 4. Coronary angiogram: right anterior oblique projection. After successful recanalization and stent implantation of left main and proximal circumflex artery. Chronic total occlusion of left anterior descending artery.

total occlusion of right coronary artery in medium segment with some collateral flow from collaterals in proximal part of right coronary artery to the left anterior descending artery (Fig. 3).

A cardiothoracic surgery consultation was obtained. However, the patient was refused surgery due to her clinical status and high risk of perioperative mortality in the case of emergency coronary artery bypass grafting (CABG) (EuroSCORE 18 points).

It was decided that PCI of LM be made. The BMW Hi-Torque guide wire (Abbott Vascular, Santa Clara, CA, USA) was advanced through the LM to the proximal part of the left circumflex artery. After crossing the site of obstruction, an abciximab bolus was given and intravenous infusion was started. The LM and proximal part of the circumflex were predilated with subsequent dilatations with 2.0×20 mm and 3.0×20 mm Sprinter RX balloons (Medtronic, Minneapolis, MN, USA). Since the occlusion in the proximal part of the left anterior descending artery was assessed as a chronic total occlusion very difficult to approach, we decided to stent just LM and proximal part of left circumflex artery, leaving the right coronary artery and left anterior descending artery for the planned CABG procedure in the future. The stenting of LM and proximal part of circumflex artery was done with

normal cobalt-chromium bare metal stent Coroflex Blue 3.5×19 mm (Braun, Melsungen, Germany) with a very good result: TIMI 3 flow and myocardial blush grade (MBG) 3 (Fig. 4). The procedure was complicated by two episodes of fast ventricular tachycardia requiring electrical cardioversion with twice 200 J shocks to restore sinus rhythm.

After restoring the blood flow through the LM, the patient's blood pressure and clinical symptoms had dramatically improved. So we decided not to use an intra-aortic balloon pump, also because of the great tortuosity of femoral and iliac arteries.

The patient peak creatin-phospho-kinase was 7619 U/L with creatine kinase-MB 1285 U/L, and her peak troponin I was 448.5 ng/mL. A post-procedure transthoracic echocardiogram showed akinesia of apical and anterior segments with quite good contractility of the inferior wall, with ejection fraction of about 38%.

Standard medical management with aspirin, clopidogrel, enoxaparin, beta-blocker, angiotensin-converting enzyme inhibitor and statin was applied.

A few days later, the patient did refuse the proposed elective CABG operation. Her later post-myocardial infarction course was uncomplicated and she was discharged to a cardiac rehabilitation center after 11 days. At three month follow-up she was still in a good general condition.

Discussion

This case shows a complex presentation of an elderly patient with AMI due to LM occlusion with chronic total occlusions of left anterior descending and right coronary artery. There has been limited literature involving such patients.

Previous studies have reported that the incidence of LM occlusion is 0.03 to 0.04% in patients undergoing elective coronary angiography and 0.37 to 2.96% in patients with AMI undergoing emergency cardiac catheterization [1, 2, 10, 11]. However, the real incidence of acute LM occlusion is unknown.

Clinical presentations of acute LM occlusion are usually very dramatic, including cardiogenic shock, pulmonary edema, respiratory failure and malignant ventricular arrhythmias with very high mortality, reported in some studies to be as high as 58% [5–11]. Although the incidence of acute LM occlusion is low, clinical observations from different studies suggested that it should be suspected when acute anterior myocardial infarction is complicated by the above-mentioned dramatic conditions. The likelihood of LM occlusion is higher when some typical ECG patterns are present, as in our case.

From an anatomical point of view, the left ventricular myocardium is mainly supplied by the left coronary artery, and that is why acute LM occlusion usually results in severe left ventricular dysfunction leading to nearly immediate clinical deterioration, leaving no chance to take the patient to the catheterization laboratory. However, as we know, LM occlusion does not always lead to a fatal outcome [2, 3, 12]. In fact, some patients can survive several years, even without intervention. Previous studies have suggested that the presence of collateralization is crucial for the prognosis [2, 3, 12] and only patients with a dominant right coronary artery and good collaterals are able to survive to emergent revascularization. That observation is also supported by a study by Yip et al. [5] in which authors found that the presence of intercoronary collaterals, a dominant right coronary artery, or an incompletely occluded LM was higher in the survival group of 18 patients with AMI with total or subtotal LM occlusion. In fact, it is probable that the presence of collaterals running from proximal part of right coronary artery to the left anterior descending artery (as shown in Fig. 3) enabled our patient to survive until emergent revascularization.

The management of acute LM occlusion includes thrombolytic therapy, emergency CABG and

primary angioplasty. Although the role of thrombolytic therapy in patients with AMI is well established, it can only achieve normal coronary flow in about 60% of patients. Moreover, thrombolytic therapy has been only reported sporadically in the treatment of LM occlusion [13] and no reliable data exists to support its usage in that clinical entity nowadays.

Although many recent studies suggest that LM stenosis in patients without acute coronary syndrome can be treated both with PCI with drug-eluting stent or with CABG with comparable outcomes, severe LM disease, especially in the bifurcation, is still an indication for CABG according to both European and American guidelines.

No conclusive evidence exists on the best choice of treatment strategy in acute LM closure [5–11]. From the physiological point of view, prompt and maximal revascularization of the LM area, by PCI or CABG, seems the optimal treatment. However, when acute LM closure happens, hemodynamic deterioration usually follows quickly and sudden death may occur. Therefore, there may be not enough time for emergency CABG in this setting and primary PCI can offer an immediate restoration of coronary flow. The risks connected with PCI involve the risk of failed procedure, acute re-occlusion and long-term re-stenosis. The latter could to some extent be overcome probably by drug-eluting stents or by using PCI only as a bridge over to CABG, saving patients' lives in the acute phase of myocardial infarction, as in our patient. Potential benefits include the possibility of revascularization immediately after diagnostic procedure (and thus sooner than by CABG) and without the risks of thoracotomy and cardioplegia. Moreover, in the case of cardiogenic shock, CABG should not be a treatment option without prior stabilization, so this excludes primary CABG in most cases.

No prospective randomized trials exist concerning the treatment choice. In the ULTIMA Registry [8], 40 cases of emergency LM PCI for AMI were reviewed. The total in-hospital death rate for the whole study group was 55%, 70% for the balloon-alone group and 35% for the primary stent group. This favors the stent placement in this setting. In another report by Shigemitsu et al. [9] seven patients with AMI due to LM occlusion were treated with PCI as a bridge over to CABG and six patients were treated with CABG directly. Mortality was 46%. The authors of that study concluded that CABG played a key role in the treatment of these patients, although nearly half of them required

an emergency PCI for stabilization as a bridge over to CABG. Sakai et al. [6] presented a group of 38 AMI patients with LM stenosis and reduced TIMI flow who received emergency primary PCI. Most of them were in cardiogenic shock. There was 55% mortality, especially among those patients with cardiogenic shock: the success rate of angioplasty in that subgroup was only 68% versus those with preserved left ventricular ejection fraction.

In the presented case, we decided to perform PCI because our patient was declined from surgery due to her clinical status and high risk of perioperative mortality in the case of emergency CABG surgery (EuroScore 18 points). We performed a successful coronary intervention, deploying stent and relieving the total occlusion of the LM achieving TIMI 3 and MBG 3 flow. Our procedure could be judged as a bridge to potentially lower-risk elective CABG, saving the life of a high-risk patient in the face of AMI with cardiogenic shock.

During the procedure we used bare-metal stent (cobalt-chromium) instead of a drug-eluting one, following the current guidelines, which reserve a drug-eluting stent as a class IIb recommendation in PCI during AMI.

An important question nowadays is whether there is a chance to improve treatment results of LM occlusion in this devastating clinical condition, especially in the presence of a huge thrombus, as described in many cases in the literature. Probably a specific antithrombotic strategy is needed. Also some thrombectomy devices, such as X-sizer or excimer laser may play a role [14].

Conclusions

In the case of an elderly patient with AMI complicated by cardiogenic shock due to LM occlusion with concomitant chronic total occlusion of right and left anterior descending coronary arteries, primary PCI as a bridge over CABG with bare-metal stent deployment was successfully performed, thus contributing to the patient's survival and clinical improvement. Further observations concerning LM occlusion cases are needed to establish the optimal treatment option.

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