

## Percutaneous Coronary Intervention of Acute Left Main Occlusion

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### Abstract

Acute myocardial infarction (MI) due to left main coronary artery occlusion in the absence of collateral circulation is extremely rare, but carries a very high mortality rate. Survival is dependent on the dominant right coronary artery, collateral blood flow to the left coronary artery and rapid revascularization.

**Keywords:** Left Main (LM); Percutaneous Coronary Intervention (PCI); Acute Myocardial Infarction (AMI)

### Introduction

ST-elevation myocardial infarction (STEMI) with acute LM occlusion is rare, with reported incidence of 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]. Its prognostic determinants differ according to clinical conditions such as age, presenting with cardiogenic shock, acute pulmonary edema and involvement of coronary arteries such as coexisting intercollaterals, a dominant right coronary artery (RCA) and experience of cardiologists such as rapid establishment of complete reperfusion [3].

Over the last decade, many percutaneous interventions or coronary bypass surgery for unprotected LMCA had been reported. However, these patients either had stable coronary artery disease or a partially occluded LMCA in the setting of acute coronary syndromes with well supporting collateral flow.

In this paper, we reported primary percutaneous coronary angioplasty of a 79 year-old male with acute total occlusion of unprotected LMCA without collateral flow from the right coronary system.

### Case Report

A 79-year-old male was admitted to our hospital with severe chest pain lasting for 5 hours. The patient had been diagnosed with coronary artery disease 3 years ago. He was treated with ACE inhibitor, aspirin, beta-blocker, statins and clopidogrel. The electrocardiogram (ECG) revealed diffuse ST segment elevations in V2-V5, II, III and avF. Physical examination indicated that the patient was clammy and hypotensive (74/46 mmHg), with bilateral pulmonary rales in the both lungs. Laboratory examinations revealed that Troponin I (30.0 ng/ml) and Creatine Kinase MB (66.2 ng/ml) were obvious elevated; Myoglobin (51.0 ng/ml) was in the normal range. The diagnosis of acute myocardial infarction and cardiogenic shock were established. Then, 300 mg aspirin per os (chewed) and 600 mg clopi-dogrel per os were loaded just before the PCI.

The patient was immediately transferred to the catheterization laboratory. However, he quickly became unconscious and artificial ventilation under endotracheal intubation was performed. Under the support of intra-aortic balloon pump and temporary pacemaker, angiography revealed total occlusion of the left main artery (Figure 1A arrow) and 3 distinct stenosis of proximately 50-80% in proximal, middle and distal position of right coronary artery (RCA) (Supplementary 1). The RCA was deemed to be a dominant vessel but with no angiographic collateral vessels to the left coronary system.

After crossing the total occlusion with a 0.014 inch Pilot 50 wire into the left anterior descending (LAD), the lesion was dilated with a 2.5×20 mm Voyager balloon (Abbott Vascular, USA) with an inflation pressure of 6 atm×4s. Angiography indicated Thrombolysis In Myocardial Infarction (TIMI) grade 1 flow in the left coronary artery and revealed severe plaque burden at the proximal of the LMCA and LAD (Figure 1B). Thus, we deployed Sirolimus-eluting Excel stents (JiWei Corporation, China) both in the left main artery (3.5×24 mm, 16atm×3s, Figure 1C arrow) and in the distal left main-proximal LAD (3.0×18 mm, 14atm×4s, Figure 1D arrow), with their edges overlapping 3 mm. Ultimately, a weight-adjusted intracoronary bolus of GP IIb/IIIa inhibitor (Tirofiban, 0.5 mg) and sodium nitroprusside were injected. The time from onset of symptoms until the establishment of TIMI-3 flow was 6 hours, with a “door-to-balloon” time of approximately 60 minutes. The patient was transferred to the cardiovascular intensive care unit and died 6 hours post-intervention.

### Discussion

The left coronary system provide blood supply to most of the left ventricular myocardium; therefore, acute occlusion of the left coronary system in the absence of collateral circulation is invariably fatal event. It carries a very high mortality rate due to the loss of a large myocardial area and usually results in severe left ventricular dysfunction.

Previous study reported a series of 8 patients who had acute LMCA obstruction with myocardial infarction. Five of the 8 patients underwent PCI, and successful revascularization was achieved in all 5 patients. The use of an IABP was required in all 8 patients. Two patients died in the catheterization laboratory from pump failure, and a 3<sup>rd</sup> patient died later of congestive heart failure [4]. Another study reported 15 out of 16 patients with sudden total occlusion or severe

occlusion of LM died in the hospital due to cardiogenic shock [5]. Goldberg and colleagues postulated that survival after LM occlusion is dependent on the rate of occlusion and the development of right-to-left collateral blood flow [6].

In this case, the RCA was dominant, but no collateral vessels were identified. The patient's conditions worsen rapidly, presenting cardiogenic shock, pulmonary edema and unconsciousness. Therefore reperfusion must be regained quickly to prevent further myocardium loss and serious complication.

At present, the therapeutic strategies for total or subtotal occlusion of LM include thrombolytic therapy, PCI, and emergency coronary artery bypass grafting. Primary PCI has been proven to be superior in both the short and long term outcomes comparing to fibrinolysis. Although LM occlusion with shock has been thought as a class IA indication for acute surgical reperfusion [7], considerable time delays for emergency CABG are not acceptable in that emergency condition such as hemodynamic deterioration. Fortunately, primary PCI can offer an immediate restoration of coronary flow and provide possibility for further revascularization [8-11]. According to the latest ACC/AHA/SCAI guidelines, primary PCI has been established as a class II, level of evidence A recommendation for acute LM occlusion with symptom onset <12 hours and door-to-balloon time of less 90 minutes [12].

There is limited experience with PCI of acute myocardial infarction due to occlusion of left main coronary artery (LMCA) in the absence of collateral circulation. In 2005, Howard et al reported a survival case after sirolimus-eluting stent implantation in a 57-year-old male with acute occlusion of the unprotected left main coronary artery [13]. The time from onset of symptoms until the establishment of TIMI-3 flow was 120 minutes, with a "door-to-balloon" time of approximately 60 minutes. In 2011, Çetin et al also presented a similar case of a 50 year-old male successfully treated with primary PCI [14]. However, in our case, the patient is much older (79 vs. 50) and the revascularization time from symptom onset is much longer than previous study (6 hours vs. 2 hours), suggesting that advanced age and late revascularization (>2hours) seem to be predisposing factors for the poor prognosis of acute LM occlusion without collateral circulation.

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## References

1. Erbel R, Meinertz T, Wessler I, Meyer J, Seybold-Epting W (1984) Recanalization of occluded left main coronary artery in unstable angina pectoris. *Am J Cardiol* 53: 1725-1727.
2. Spiecker M, Erbel R, Rupprecht HJ, Meyer J (1994) Emergency angioplasty of totally occluded left main coronary artery in acute myocardial infarction and unstable angina pectoris-institutional experience and literature review. *Eur Heart J* 15: 602-607.
3. Quigley RL, Milano CA, Smith LR, White WD, Rankin JS, et al. (1993) Prognosis and management of anterolateral myocardial infarction in patients with severe left main disease and cardiogenic shock. The left main shock syndrome. *Circulation* 88: II65-70.
4. Iwasaki K, Kusachi S, Hina K, Nishiyama O, Kondo J, et al. (1993) Acute left main coronary artery obstruction with myocardial infarction--reperfusion strategies, and the clinical and angiographic outcome. *Jpn Circ J* 57: 891-897.
5. Quigley RL, Milano CA, Smith LR, White WD, Rankin JS, et al. (1993) Prognosis and management of anterolateral myocardial infarction in patients with severe left main disease and cardiogenic shock. The left main shock syndrome. *Circulation* 88: II65-70.
6. Goldberg S, Grossman W, Markis JE, Cohen MV, Baltaxe HA, et al. (1978) Total occlusion of the left main coronary artery. A clinical, hemodynamic and angiographic profile. *Am J Med* 64: 3-8.
7. Antman EM, Anbe DT, Armstrong PW, Bates ER, Green LA, et al. (2004) ACC/AHA guidelines for the management of patients with ST-elevation myocardial infarction; A report of the American College of Cardiology/American Heart Association Task Force on Practice Guidelines (Committee to Revise the 1999 Guidelines for the Management of patients with acute myocardial infarction). *J Am Coll Cardiol* 44: E1-1E211.
8. Valeur N, Gaster AL, Saunamäki K (2005) Percutaneous revascularization in acute myocardial infarction due to left main stem occlusion. *Scand Cardiovasc J* 39: 24-29.
9. Grygier M, Araszkiewicz A, Lesiak M et al. (2009) 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. *Cardiol J* 16: 568-72.
10. Hussain F, Nguyen T, Elmayergi N, et al. (2012) The acutely occluded left main coronary artery culprit in cardiogenic shock and initial percutaneous coronary intervention: a substudy of the Manitoba "no option" left main PCI registry. *Can J Physiol Pharmacol* 90: 1325-31.
11. Karabay KO, Bagirtan B, Sancaktar O (2011) Percutaneous revascularization of total or subtotal left main occlusion in the setting of acute myocardial infarction. *Turk Kardiyol Dern Ars* 39: 661-667.
12. Levine GN, Bates ER, Blankenship JC, et al. (2012) ACCF/AHA/SCAI Guideline for Percutaneous Coronary Intervention: executive summary: a report of the American College of Cardiology Foundation/American Heart Association Task Force on Practice Guidelines and the Society for Cardiovascular Angiography and Interventions. *ACCF; AHA; SCAI. Catheter Cardiovasc Interv* 79: 453-95.
13. Bush HS, Strong DE, Novaro GM (2005) Successful use of sirolimus-eluting stents for treatment of ST-elevation acute myocardial infarction caused by left main coronary artery occlusion. *Tex Heart Inst J* 32: 421-423.
14. Cetin M, Kocaman SA, Bostan M et al. (2011) Primary percutaneous coronary intervention for the treatment of a patient with cardiogenic shock due to acute total occlusion of unprotected left main coronary artery without supportive collateral flow. *Future Cardiol* 7: 749-55.