

Case Report

Primary Percutaneous Coronary Intervention in an Acute Myocardial Infarction Due to the Occlusion of the Left Main Coronary Artery

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A 75-year-old woman with no prior medical history was admitted to the hospital because of retrosternal pain for six hours, presenting in a state of cardiogenic shock, specifically hypotension, dyspnoea and slight confusion. Her admission ECG showed ST-segment elevation in the anterolateral leads. Having been started on aspirin, clopidogrel, heparin and dopamine, the patient was immediately transferred to the catheterisation laboratory. The coronary angiogram showed total occlusion of the bifurcation of the left main (LM) coronary artery and some collateral flow from the right coronary artery (RCA), the latter itself presenting multiple critical stenoses. Percutaneous coronary intervention (PCI) was performed with deployment of stents at the LM bifurcation, which resulted in the relief of the obstruction, the restoration of the flow in the left coronary artery and the immediate clinical improvement of the patient. The patient left the hospital in good general condition after being treated for ten days and underwent a successful second PCI in the RCA two months later.

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Primarily PCI has been established as a major therapeutic modality in the management of acute ST-elevation myocardial infarction (STEMI), having earned a class I, level of evidence A recommendation, according to the latest European Society of Cardiology guidelines. This applies to patients with symptom onset <12 hours, requires the ability to open the vessel in a timely fashion, with the goal of a medical contact-to-balloon or door-to-balloon time of 90 minutes or less and should be performed by experienced personnel in an appropriate laboratory environment.¹ Compared to fibrinolysis, primary PCI has proven to be superior in both the short and long term, when it comes to death, nonfatal myocardial infarction, haemorrhagic stroke and amount of salvaged myocardium.² Within 3 hours of pain onset PCI and fibrinolysis are de-

emed equally effective as far as salvaged myocardium is concerned; nevertheless, PCI should be credited with fewer haemorrhagic strokes.

In the case of cardiogenic shock complicating an acute myocardial infarction, which carries a high mortality rate, emergency revascularisation by means of either PCI or coronary artery bypass grafting (CABG) is considered to be of utmost necessity.³ In this setting PCI may be performed on multiple vessels within 36 hours of pain onset. In this report we describe the case of an elderly female patient who suffered an acute STEMI, subsequently complicated by cardiogenic shock due to an occlusion in the left main coronary artery, and was successfully treated by means of primary PCI. We found no similar case report in a review of the Greek literature.

Case presentation

A 75-year-old woman with no prior medical history was admitted to the hospital because of spells of retrosternal pain over the previous 6 hours, accompanied by slight dyspnoea. On her admission she presented in a state of cardiogenic shock, displaying a blood pressure of 85/60 mmHg, a heart rate of 100 bpm and slight confusion. The ECG showed ST-segment elevation in leads I, aVL, V₂-V₆ and atrial fibrillation (Figure 1). We administered 5000 IU unfractionated heparin iv, 300 mg aspirin *per os* (chewed), 600 mg clopidogrel *per os*, and started her on a dopamine drip at 7 µg/kg/min. It was decided to perform emergency coronary angiography with standby PCI.

Having placed an intraaortic balloon pump (IABP) in the catheterisation laboratory, we proceeded with the coronary angiogram. The right coronary artery (RCA) showed three distinct stenoses of approximately 70-80% diameter reduction in its proximal and middle portion and provided collateral flow to the left coronary artery (LCA) (Figure 2). As soon as contrast was injected into the latter, a total occlusion of the left main artery bifurcation became evident (Figure 3). In view of the patient's unstable condition, we decided on revascularisation by means of PCI, a choice further encouraged after consulting with the heart surgeons, given the likely elevated risk of perioperative mortality in the case of emergency CABG surgery. We administered a weight-adjusted

intravenous bolus of 6.2 mg of abciximab (GP IIb/IIIa inhibitor) and commenced with the intervention. Separate angioplasty guide wires were advanced into the left anterior descending (LAD) and the left circumflex (LCx) arteries. After the guide wire had been passed into the LAD, thus partly restoring the flow in the LCA, the lesion in the left main artery was revealed (Figure 4). We performed multiple subsequent dilations, both in the proximal LAD and at the left main bifurcation, with 2.5 x 20 mm, 3.0 x 20 mm and 3.0 x 10 mm sized angioplasty balloons inflated up to pressures of 14 Atm and for a total of 180 seconds. Ultimately, we deployed bare metal stents, both in the distal left main-proximal LAD (3.0 x 16 mm) and in the proximal left main artery (3.5 x 18 mm), with their edges overlapping in such a way that they did not coincide over the left main bifurcation.

The final result was excellent, having fully restored the flow in the LCA, which demonstrated grade 3 TIMI (Thrombolysis In Myocardial Infarction) flow (Figure 5). There was no stenosis at the ostium of the LCx after the deployment of the stents, nor was any "kissing balloon" technique applied (Figure 6). The relief of the obstruction effected an immediate increase in the patient's arterial pressure to the level of 100/70 mmHg. There was further clinical and haemodynamic improvement over the following days, which allowed tapering down the dopamine drip within 48 hours, at which point the IABP support was also removed.

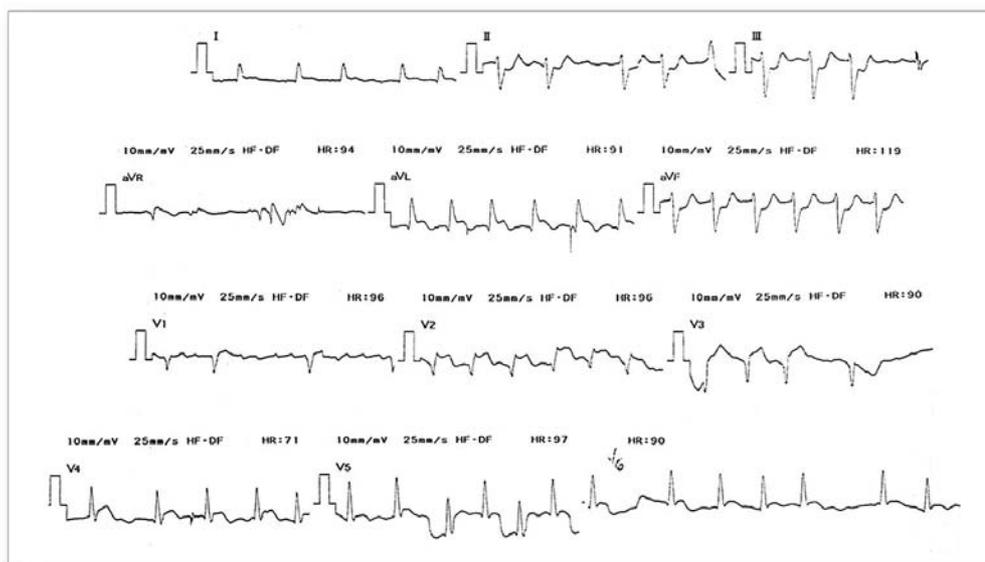


Figure 1. Admission ECG, showing ST-segment elevation in leads I, aVL, V₂-V₆.

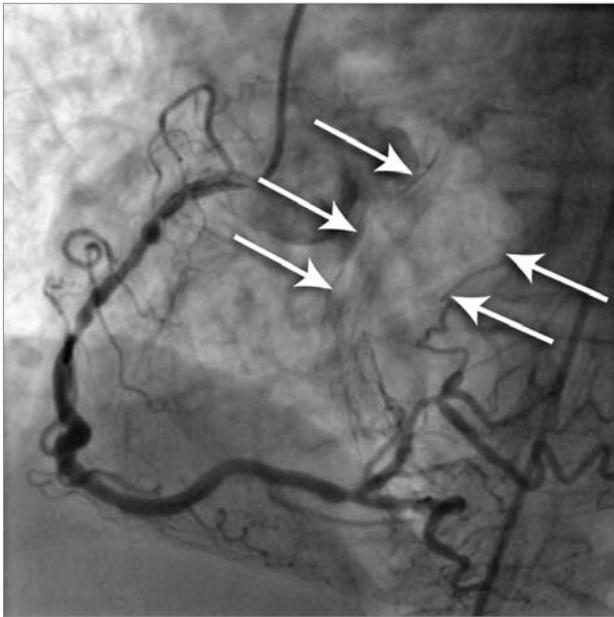


Figure 2. Left anterior oblique projection of the right coronary artery, showing multiple stenoses and some collateral flow to the left coronary artery (arrows).



Figure 3. Right anterior oblique projection of the left coronary artery, showing total occlusion of the left main artery.

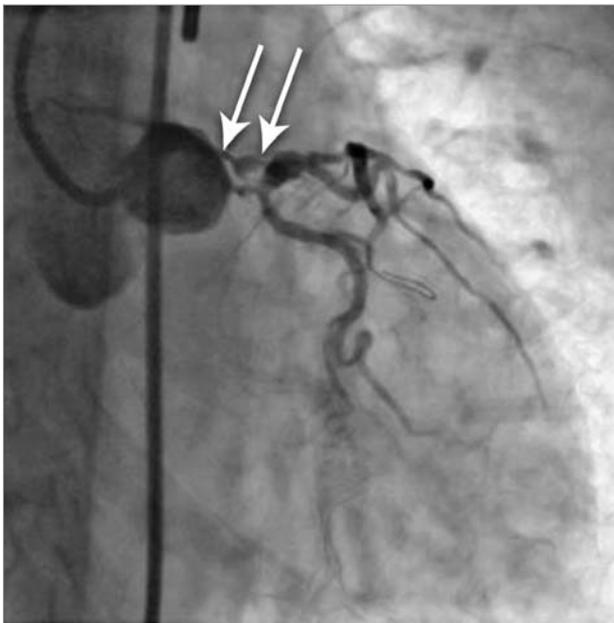


Figure 4. Right anterior oblique projection of the left coronary artery, showing advancement of the guide wire into the left anterior descending artery, partially restored flow in the left coronary artery, and revealing the left main artery stenosis.



Figure 5. Right anterior oblique projection of the left coronary artery, showing that the successful deployment of stents in the left main artery effected a complete restoration of flow in the left coronary artery.

An echocardiographic study was performed immediately after the PCI, and showed severe hypokinesis of the anteroapical segments of the left ventricle and a global ejection fraction of approximately 25%. Biochemical markers of myocardial cell death exhibited a typical course-fall and the patient herself en-

joyed an uncomplicated course thereafter, to be discharged ten days later in good general condition. She underwent a successful second PCI in the RCA two months later. On angiographic follow-up the stents in the left main and the LAD were shown to be patent, effecting grade 3 TIMI flow in the LCA; left ventricu-

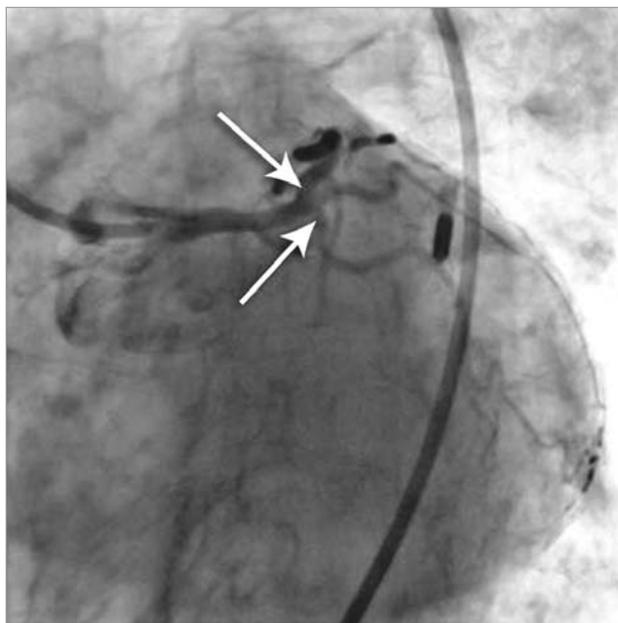


Figure 6. Left anterior oblique projection of the left coronary artery, caudally angulated (spider view); final result after the successful intervention. Ostial-proximal segments of the left anterior descending and left circumflex arteries are highlighted (arrows).

lography showed an ejection fraction of $\sim 30\%$ and moderate to severe hypokinesis in the anteroapical wall. The discharge medications included aspirin, clopidogrel, carvedilol, lisinopril and atorvastatin. The patient has been enjoying an uneventful, angina-free course for 7 months since the primary PCI.

Discussion

Cardiogenic shock consists in the marked and persistent organ hypoperfusion characterised by reduced systolic arterial pressure <90 mmHg and a reduced cardiac index <1.8 L/min/m² in the face of elevated left ventricular filling pressure (pulmonary capillary wedge pressure >20 mmHg).⁴ Cardiogenic shock complicating an acute myocardial infarction carries a high mortality rate, both short- and long-term. The randomised clinical SHOCK trial studied 302 patients who suffered cardiogenic shock developing within 36 hours of the onset of acute myocardial infarction (MI) and who were treated with emergency revascularisation, either by PCI or by CABG surgery. Survival rates at 30 days and 12 months varied from 55.6-57.4% and 46.8-51.9%, respectively, showing no statistically significant difference between the two treatment arms. In the CABG arm there were more patients with diabetes mellitus, three-vessel disease and left main disease.

In the case under study we decided upon PCI in view of the very likely increase in the risk of mortality the patient would have to face because of the inevitable time delay needed for the attainment of surgical reperfusion. We performed a successful emergency intervention, deploying stents and relieving the total occlusion at the left main bifurcation; thus, we achieved TIMI flow grade 3 in the left coronary artery. Immediately after the restoration of the flow, systolic arterial pressure rose, this being followed by a stepwise clinical and haemodynamic improvement. We deployed bare metal stents instead of drug-eluting ones, following the current guidelines, which reserve a class IIb recommendation for deploying the latter in a setting of an acute MI. Both the multi-centre randomised TYPHOON trial (using sirolimus-eluting CYPHER stents) and a recent meta-analysis of seven other trials recruiting a total of 2357 patients (using either sirolimus or paclitaxel-TAXUS-eluting stents) determined that there was no statistically significant difference in death, reinfarction, or stent thrombosis (in-hospital and at 12 months) between bare metal stents and drug-eluting ones. However there was less need for revascularisation at 12 months (due to lower rates of restenosis) in the drug-eluting stents arm.⁵⁻⁶

The European Society of Cardiology's current guidelines on acute MI do not advocate performing angioplasty on non-culprit lesions in the setting of primary PCI. Nevertheless, multi-vessel angioplasty (including non-culprit lesions) may be reserved for patients suffering an acute MI when complicated by cardiogenic shock within 36 hours of pain onset (class I recommendation, level of evidence C).¹ In our case we did not perform an angioplasty in the RCA subsequently to the successful one on the culprit lesion in the left main artery, despite the presence of cardiogenic shock, because the RCA lesions were deemed angiographically stable and concentric and because deployment of any more stents might raise the risk of early stent thrombosis. A second, planned, PCI was ultimately performed on the RCA, wherein stents were successfully deployed.

Occlusion of the main stem of the LCA does not account for many myocardial infarctions. In a series of 1736 patients with an acute MI who underwent primary PCI, only 2.2% of these could be associated with an obstruction of the left main artery causing TIMI flow grade ≤ 2 .⁷ Primary PCI was performed in all of them, with an in-hospital mortality rate of 55%. Cardiogenic shock complicated 74% of the cases,

47.1% among the survivors and 95.2% among the patients that did not survive. PCI was successful in 100% versus 57.1%, respectively. In-hospital mortality reached a mean of 55%, 71.4% among patients with shock and 10% among those without.⁷

To recapitulate, in the case of an elderly female patient with an acute myocardial infarction complicated by cardiogenic shock due to the occlusion of the left main coronary artery, primary PCI with deployment of bare metal stents was successfully performed, thus contributing to the patient's survival and clinical improvement.

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