
Case report

Cardiogenic shock due to acute left main coronary artery occlusion: successful treatment with primary angioplasty

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A 56-year-old patient was admitted with cardiogenic shock due to an acute anterior myocardial infarction. Cardiac catheterization with coronary angiography disclosed a thrombotic occlusion of the left main coronary artery. Prompt mechanical recanalization of the infarct-related artery with multiple stent implantations associated with prolonged circulatory and respiratory supports allowed for a partial recovery of the left ventricular function and the discharge of the patient.

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Introduction

Cardiogenic shock associated with acute myocardial infarction is a dramatic clinical condition with a very poor prognosis¹ but early successful myocardial revascularization seems to improve survival^{2,3}. Percutaneous transluminal coronary angioplasty (PTCA), performed in selected centers, is probably the fastest available technique of recanalization of the infarct-related artery and of myocardial reperfusion in acute myocardial infarction. Primary PTCA is more advantageous than traditional fibrinolytic treatment, in terms of infarct artery patency, recurrent ischemia, re-infarction and mortality⁴. This is particularly so in anterior infarctions with or without clinical signs of ventricular dysfunction^{5,6}. Moreover, the vast experience of interventional cardiologists in conjunction with the significant technical improvement of materials and new devices have extended the use of PTCA to even more complex stenoses, also involving the protected or unprotected left main coronary artery⁷, in stable and unstable clinical and hemodynamic conditions.

We report the case of a patient with an acute myocardial infarction in cardiogenic shock due to a total, acute thrombotic occlusion of the left main coronary artery, who underwent emergent primary PTCA with angiographic and clinical success.

Case report

A 56-year-old male heavy smoker with no previous history of cardiac disease was referred to our hospital for a typical clinical picture of an acute myocardial infarction, 2.5 hours after the onset of symptoms. On admission the patient was soporous, cyanotic and with cold diaphoresis; arterial pressure was 90/60 mmHg, heart rate 110 b/min, respiration rate 24/min and hemoglobin saturation 85%. The electrocardiogram showed extensive antero-lateral acute infarction with a right bundle branch block plus a left anterior hemiblock, probably of acute onset. Mechanical ventilation was promptly started through oro-tracheal intubation. Fluid administration and inotropic pharmacological support were initiated before transfer to the cath-lab. An intra-aortic balloon pump was inserted percutaneously through the left femoral artery. Diagnostic left heart catheterization disclosed a volumetrically normal left ventricle with an extensive antero-lateral and apical akinesia; calculated ejection fraction was 25%; a widely patent right dominant coronary artery without significant atherosclerotic involvement; no collateral flow to the left coronary artery; total thrombotic occlusion of the left main coronary artery 10 mm from the ostium with distal Thrombolysis in Myocardial Infarction (TIMI) 0 flow (Fig. 1, left panel). As in every primary PTCA procedure, the patient

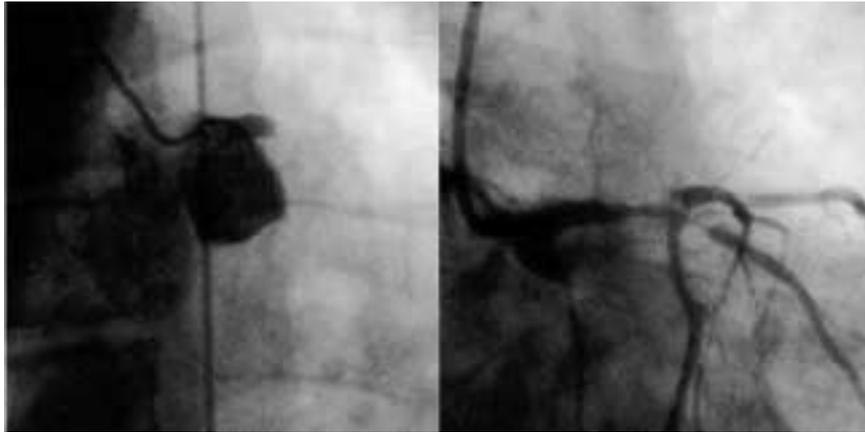


Figure 1. Right anterior oblique view of the left coronary angiogram. Left panel: total occlusion of the left main stem. Right panel: complex stenosis of the left main trifurcation disclosed after the first balloon inflation.

was given abciximab (i.v. bolus + infusion). A 0.014" coronary guidewire was passed beyond the occlusion and a brief inflation of a 3.0 mm/20 mm-length balloon at low pressure allowed for the restabilization of TIMI 2 coronary blood flow with disclosure of a complex lesion of the trifurcation of the left main coronary artery. This lesion involved and significantly narrowed the ostia of the anterior descending, the ramus medianus and the circumflex arteries (Fig. 1, right panel). A 3.5 mm/18 mm-length Multilink Duet stent was then implanted in the left main coronary artery extending to the proximal left anterior descending artery and a 3.0 mm/11 mm-length Penchant stent was implanted at the ostium of a well developed ramus medianus artery (Fig. 2, left panel). Given its persistent patency, the left circumflex artery was left untreated. TIMI 3 flow was achieved approximately 4 hours from symptom onset of acute myocardial infarction (Fig. 2, right panel). Nevertheless creatine phosphokinase peak was 8954 U/l and the patient underwent a prolonged stay in the intensive care unit with extended intra-aortic balloon and ventilatory supports because of repeated episodes of pulmonary edema and severe left

ventricular dysfunction (minimal ejection fraction 18%). The patient was finally discharged in NYHA functional class II with an ejection fraction of 32%.

Discussion

Among the several types of cardiogenic shock, in terms of 6-month survival, the one associated with acute myocardial infarction has the potential advantage of benefiting from early myocardial revascularization³. Despite the relatively wide use of primary PTCA, total acute occlusion of the left main coronary artery is still a rare angiographic finding⁸ probably because death usually impedes the possibility of performing cardiac catheterization. In this particular clinical setting, angiographic and clinical success of percutaneous revascularization is less satisfactory than that in stable clinical conditions⁷. Moreover, treatment of the distal left main coronary artery stenosis, involving the bifurcation is technically more demanding for the interventional cardiologist⁹.

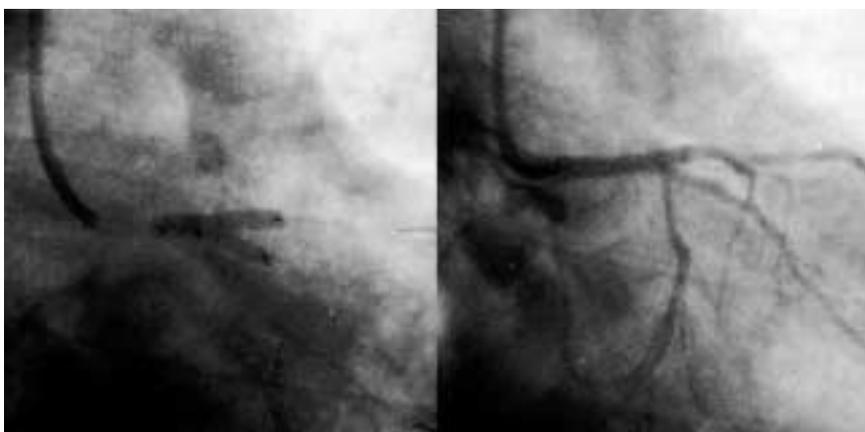


Figure 2. Right anterior oblique view of the left coronary angiogram. Left panel: stent implantation at the ostium of ramus medianus branch through the left main stent with kissing balloon. Right panel: final angiographic result of the interventional procedure.

In this case all these unfavorable features were present: acute myocardial infarction with cardiogenic shock was related to the occlusion of the left main coronary artery. This occlusion was due to an acute thrombosis on a complex, critical lesion involving the trifurcation of the left main coronary artery. Percutaneous revascularization was preferred to coronary artery bypass grafting in order to re-establish the patency of the left main coronary artery more rapidly, increasing left ventricular perfusion. Stent implantation, now mandatory in the percutaneous treatment of left main coronary artery disease⁷, rapidly optimized the vessel lumen obtaining a better achievable flow while allowing for a shorter time of ischemia due to balloon inflation. Left main coronary artery stenting in the clinical scenario of acute myocardial infarction has also been proposed as a bridge to cardiac surgery¹⁰. A subsequent coronary artery bypass graft, performed in better hemodynamic and clinical conditions, not only avoids the possible catastrophic consequences of subacute stent thrombosis¹¹, where the rate can be particularly high in the case of stenting of a bifurcation lesion, but can offer the patient a more complete revascularization, which is particularly important in patients with decreased left ventricular function. Our patient was not subsequently referred to the cardiovascular surgeon because his hospital stay, mainly in the intensive care unit, was longer than the time-interval of maximal incidence of subacute stent thrombosis and because the percutaneous approach allowed for the treatment of the only, obvious stenosis. This was so even though stent implantation in the left main coronary artery trifurcation caused the ostium of the left circumflex artery to be confined and narrowed. Despite the fact that there were no new subsequent episodes of acute ischemia this could have contributed to the very slow stabilization of the left ventricular function and of hemodynamic and clinical pictures. Nevertheless, this case confirms that in critical clinical conditions with a particularly challenging anatomical situation, stent-supported PTCA can be a lifesaving and definitive treatment; the relatively short duration of cardiogenic shock before the procedure could have played a significant role in the positive outcome¹².

References

1. Hands ME, Rutherford JD, Muller JE, et al. The in-hospital development of cardiogenic shock after myocardial infarction: incidence, predictors of occurrence, outcome and prognostic factors. *J Am Coll Cardiol* 1989; 14: 40-6.
2. Moosvi AR, Khaja F, Villanueva L, Gheorgiade M, Douhat L, Goldstein S. Early revascularization improves survival in cardiogenic shock complicating acute myocardial infarction. *J Am Coll Cardiol* 1992; 19: 639-46.
3. Hochman JS, Sleeper LA, Webb JG, et al, for the SHOCK Investigators. Early revascularization in acute myocardial infarction complicated by cardiogenic shock. *N Engl J Med* 1999; 341: 625-34.
4. Weaver WD, Simes RJ, Betriu A, et al. Comparison of primary coronary angioplasty and intravenous thrombolytic therapy for acute myocardial infarction. *JAMA* 1997; 278: 2093-8.
5. Stone GW, Grines CL, Browne KF, et al. Influence of acute myocardial infarction location on in-hospital and late outcome after primary percutaneous transluminal coronary angioplasty versus tissue plasminogen activator therapy. *Am J Cardiol* 1996; 78: 19-25.
6. Garcia E, Elizaga J, Perez-Castellano N, et al. Primary angioplasty versus systemic thrombolysis in anterior myocardial infarction. *J Am Coll Cardiol* 1999; 33: 605-11.
7. Ellis SG, Tamai H, Nobuyoshi M, et al. Contemporary percutaneous treatment of unprotected left main coronary stenoses - initial results from multicenter registry analysis. *Circulation* 1997; 96: 3867-72.
8. Antoniucci D, Valenti R, Santoro GM, et al. Systematic direct angioplasty and stent-supported direct angioplasty therapy for cardiogenic shock complicating acute myocardial infarction: in-hospital and long-term survival. *J Am Coll Cardiol* 1998; 31: 294-300.
9. Park SJ, Park SW, Hong MK, et al. Stenting of unprotected left main stenoses: immediate and late outcomes. *J Am Coll Cardiol* 1998; 31: 37-42.
10. Spiecker M, Erbel R, Rupprecht HJ, Meyer J. 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* 1994; 15: 602-7.
11. Fabbicocchi F, Trabattoni D, Galli S, Bartorelli AL. Emergency stenting of totally occluded left main coronary artery in acute myocardial infarction. *J Invasive Cardiol* 1999; 11: 309-12.
12. Hochman JS, Boland J, Sleeper LA, et al. Current spectrum of cardiogenic shock and effect of early revascularization on mortality: results of an international registry. *Circulation* 1995; 91: 873-81.