

Case report

Emergency stenting of the unprotected left main coronary artery

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Left main coronary artery;
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We report a case of successful stenting of the unprotected left main coronary artery as a salvage procedure in a patient with tight ostial left main coronary artery stenosis who had cardiac arrest following diagnostic coronary angiography.

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Introduction

Left main coronary artery (LMCA) disease occurs in 3 to 7% of patients undergoing cardiac catheterization¹⁻³. The mortality rate for patients with this disease and undergoing diagnostic cardiac catheterization is 0.86%. This is 20 times higher than the 0.03% mortality rate observed for patients with single-vessel disease⁴. The decrease in coronary blood flow secondary to catheter contact or dye injection may trigger the vicious cycle of ischemia-hypotension-further ischemia that leads to acute left ventricular dysfunction and cardiac arrest. If a patient with severe LMCA stenosis develops any significant instability during the procedure, an intra-aortic balloon pump is inserted and prompt percutaneous transluminal coronary angioplasty (PTCA) or coronary artery bypass graft (CABG) is performed⁵. In this report we describe a successful emergency stenting of the unprotected LMCA in a patient with severe LMCA stenosis who had cardiac arrest following routine diagnostic coronary angiography.

Case report

A 53-year-old female who presented with effort angina and a positive bicycle exercise test at a workload of 75 W underwent diagnostic left heart catheterization and coronary angiography. Ventriculography showed a normal left ventricular function. The right coronary artery was normal and there were no collaterals supplying the left system. Left coronary angiography revealed a tight ostial LMCA stenosis (Fig. 1). A few minutes following the procedure, the patient developed

chest pain, ST segment depression on the anterior electrocardiographic leads, atrioventricular junctional rhythm at 50 b/min and hypotension. Prompt administration of inotropic agents, fluid challenge, transvenous ventricular pacing and intra-aortic balloon counterpulsation did not improve the clinical and hemodynamic condition of the patient and ventricular fibrillation unresponsive to repeated direct current shocks developed. With ongoing cardiopulmonary resuscitation, a 6F XB 3.5 guiding catheter (Cordis, Johnson & Johnson, Miami, FL, USA) was positioned near the left coronary ostium and dye injection revealed TIMI 0 flow in the left coronary artery. Intravenous unfractionated heparin was administered in a bolus dose of 70 IU/kg; a 0.014" high-torque floppy guide wire (Guidant, Santa Clara, CA, USA) was advanced through the LMCA stenosis and placed in the left anterior descending coronary artery. Using a 3 mm compliant balloon (Crossail, Guidant), two dilations were performed in the LMCA, at 8 atm for 10 s and at 10 atm for 20 s, followed by deployment of an 8/3.5 mm stent (Tetra, Guidant) at the LMCA ostium, with the distal stent edge not reaching the LMCA bifurcation. The stent was fully expanded using a 4 mm non-compliant balloon inflated at 14 atm (Nc Viva, Boston Scientific Corporation, Natick, MA, USA). After stenting, direct current shocks restored sinus rhythm. Left coronary angiography showed TIMI 3 flow both in the left anterior descending and circumflex coronary arteries but haziness at the distal stent edge (Fig. 2); abciximab was administered and intra-aortic balloon counterpulsation was maintained for 24 hours despite normal blood pressure.

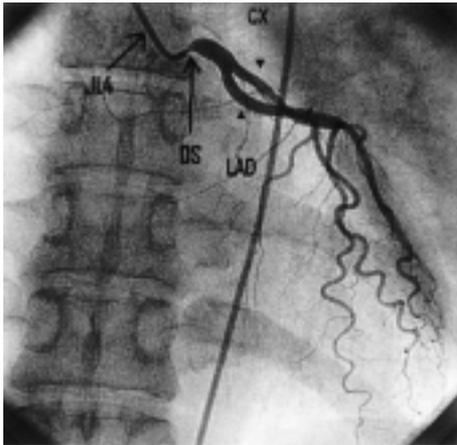


Figure 1. Antero-posterior view showing tight ostial stenosis of the left main coronary artery. CX = circumflex coronary artery; J14 = left Judkins catheter 4; LAD = left anterior descending coronary artery; OS = ostial stenosis.

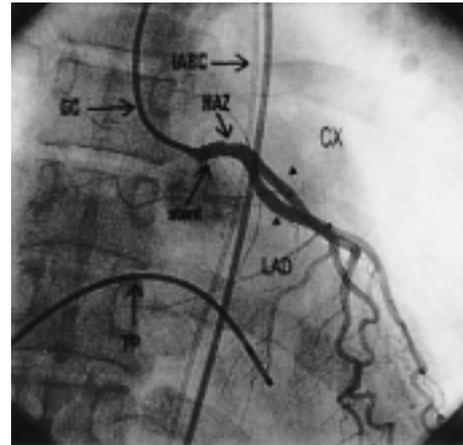


Figure 2. Antero-posterior view showing the stented left main coronary artery with haziness at the distal stent edge. GC = guiding catheter; HAZ = haziness; IABC = intra-aortic balloon counterpulsation; TP = temporary pacemaker. Other abbreviations as in figure 1.

Following percutaneous coronary intervention (PCI) the patient was painless and hemodynamically stable; the peak troponin I concentration was 8.5 ng/ml. Cardiac catheterization performed 24 hours later confirmed the angiographic success⁶ of the PCI without any haziness (Fig. 3) and normal left ventricular function. The patient was discharged after 7 days. She was asymptomatic and resumed aspirin, ticlopidine and beta-blocker therapy. A coronary angiography was scheduled for 4 months later. Nevertheless, 3 months after discharge the patient complained of chest pain at rest. Electrocardiography revealed ST segment depression on the electrocardiographic leads V₄, V₅, and V₆. Coronary angiography revealed restenosis of the LMCA ostium (Fig. 4). For this reason it was decided to submit the patient to CABG using the left internal mammary artery for the left anterior descending coronary artery. The postoperative course was satisfactory. At 6 months of follow-up she was symptom-free and exercise testing was negative.

Discussion

In patients with tight LMCA stenosis who develop acute left ventricular dysfunction and cardiac arrest during coronary angiography, medical therapy alone, though optimal, is often insufficient. On the other hand, emergency CABG is effective but is a time-consuming procedure entailing the risk of irreversible extensive myocardial damage. Therefore, emergency PCI has become the preferable initial revascularization strategy for rapid stabilization of the patient⁷⁻¹². In the present case, LMCA stenting allowed prompt restoration of the coronary blood flow before extensive myocardial necrosis and irreversible pump failure developed. In fact, the release of serum cardiac markers was minimal and the left ventricular function was normal. An important issue is whether CABG should be performed immediately after the rescue PCI^{8,11} or whether it should be deferred until signs of ischemia recur during follow-up^{9,12}. Unfortunately, few articles have been published

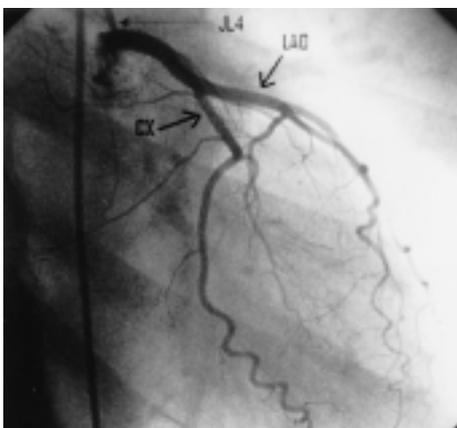


Figure 3. Right anterior oblique caudal view showing the stented left main coronary artery without haziness 24 hours after the percutaneous coronary intervention. Abbreviations as in figure 1.

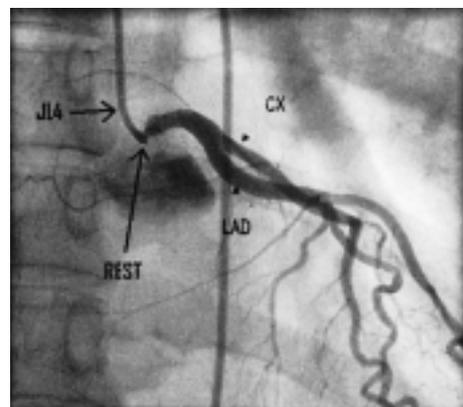


Figure 4. Antero-posterior view showing restenosis of the left main coronary artery. REST = restenosis. Other abbreviations as in figure 1.

in the literature and it is not yet possible to establish a definitive strategy in these cases. Some authors report that emergency treatment of the LMCA leads to a high probability of surgery and death within 1 year of follow-up⁷. Anyway, because of the procedural success of PCI⁶, we did not perform the CABG immediately after the PCI but decided to discharge the patient and submit her to strict clinical and angiographic follow-up. Abciximab and intra-aortic balloon counterpulsation were administered to reduce the risk of stent thrombosis¹³⁻¹⁶. Haziness at the distal stent edge was not found 24 hours after the PCI and this suggests a thrombotic etiology. According to this hypothesis, treatment with abciximab is likely to be an important factor in the resolution of haziness. LMCA stenosis recurred early at the LMCA ostium, exactly at the same site of the original narrowing. This event was probably due to the fact that the stent was implanted too distally during the emergency procedure.

Finally, the present case raises another, perhaps provocative, issue. Severe LMCA disease may become unstable and even reach a stage at which cardiac arrest may occur during "simple" diagnostic coronary angiography. It is therefore preferable that all centers, even the peripheral ones, have operators with experience in interventional cardiology before embarking in routine diagnostic coronary angiography.

In conclusion, this case confirms the effectiveness of emergency stenting of the LMCA for the treatment of life-threatening LMCA complications by promptly re-establishing coronary blood flow to the myocardium.

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