Case Report

Emergency Intervention for Unprotected Left Main Coronary Artery Stenosis: Case Report and Review of the Literature

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Left main coronary artery stenosis is an important cause of symptomatic coronary artery disease, although relatively infrequent. The current guidelines recommend coronary artery bypass grafting as the first line treatment and standard of care, but percutaneous coronary intervention is likely to lead to faster reperfusion of coronary flow, avoiding the delays of a major surgical intervention. Our patient overcame cardiogenic shock after the flow of the left main coronary artery was rapidly restored through percutaneous coronary intervention and 6 days later, when hemodynamically stable, he underwent elective coronary artery bypass graft surgery. One year after the intervention, the patient has a normal functional status and an ejection fraction of 52%. This result is compatible with several small studies showing that percutaneous coronary intervention in left main coronary artery occlusions is feasible and effective, with a good short- and mid-term prognosis.

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Left main coronary artery (LMCA) stenosis is an important cause of symptomatic coronary artery disease, although relatively infrequent. It is also an independent indicator of increased morbidity and mortality rates among patients with coronary artery disease; cardiogenic shock is one of those complications. The current guidelines describe coronary artery bypass grafting (CABG) as the standard of care, but as an emergency procedure it can be time consuming and carries the risk of extensive and irreversible myocardial damage if not done expeditiously. Percutaneous coronary intervention (PCI) warrants rapid reperfusion of the LMCA, saving the life of the patients in most cases by allowing rapid restoration of flow and preserving myocardial viability prior to an elective CABG surgery.

Case presentation

We present the case of a 54-year-old male with a previous history of type 2 diabetes mellitus, arterial hypertension and hypercholesterolemia. The patient was a heavy smoker and worked as a truck driver. He came to the Emergency Department after 30 minutes of retrosternal chest pain, 10/10 intensity, non-radiated, associated with shortness of breath. In the Emergency Department his systolic blood pressure (SBP) was found to be in the range of 60-80 mmHg with an undetectable diastolic blood pressure (DBP), for this reason a dopamine drip at 20 μg/kg/min was started. The initial electrocardiogram (ECG) showed sinus tachycardia at a rate of 120 bpm with an extreme left axis deviation and ST-segment elevation in the anterior and lateral leads. The patient was given

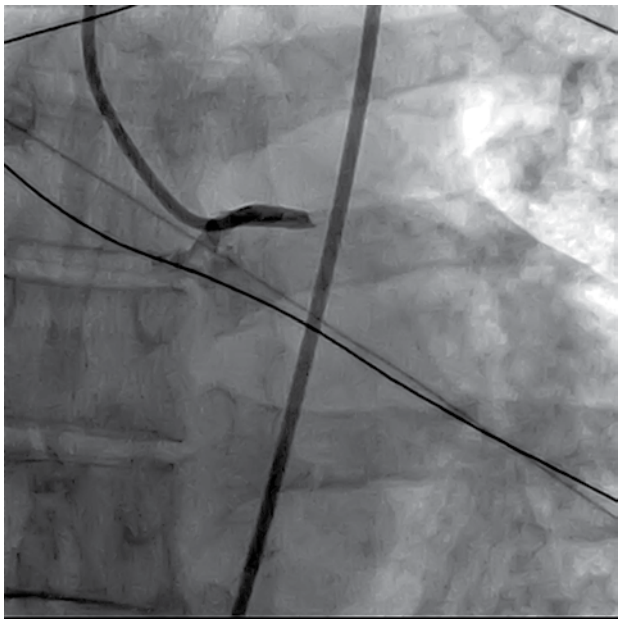

Figure 1. Complete occlusion of the left main coronary artery. Right anterior oblique view.

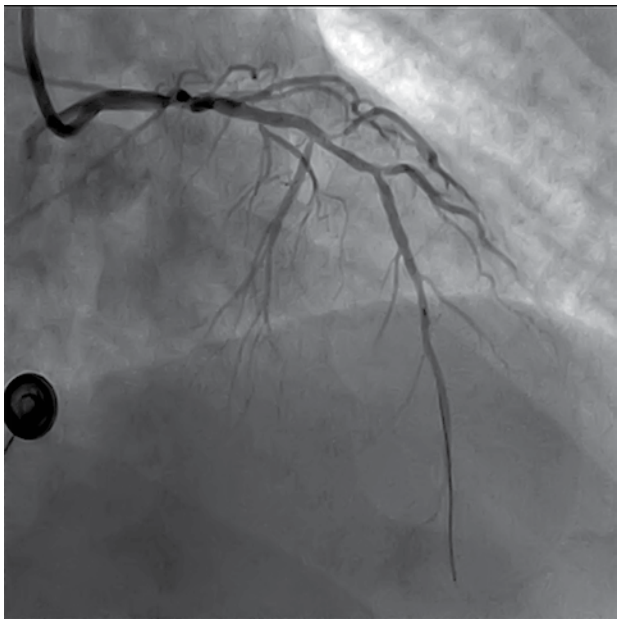

Figure 2. Post reperfusion image. Notice the wire in the distal part of the left anterior descending artery (LAD). There is 60% occlusion of the LAD at the level of the bifurcation. Right anterior oblique view.

5000 units of heparin IV bolus followed by 1000 units per hour in the emergency room, and the interventional cardiology service was consulted.

Since the patient was in shock we decided to take him to the catheterization laboratory for rapid reperfusion with PCI. At that time he required infusions of dopamine and phenylephrine to keep his mean arterial blood pressure above 60 mmHg. Angiography revealed 100% stenosis in the LMCA (Figure 1) with an associated clot. Angioplasty was performed, initially with a 2-0 balloon and subsequently 3-0 and 4-0 cutting balloons to the distal LMCA with less than 10% residual stenosis. After this procedure an intra-aortic balloon pump was placed, as well as a Swan-Ganz catheter. After the angioplasty of the LMCA, a medium-sized left anterior descendent coronary artery (LAD) and left circumflex coronary artery (LCCA) were visualized (Figure 2). The LAD presented 60% stenosis at the level of the bifurcation with the diagonal branch. The right coronary artery (RCA) was found to have 80% proximal stenosis but no immediate interventions were performed in relation to these findings.

The Swan-Ganz catheter showed an elevated wedge pressure (25-30 mmHg) and a pigtail catheter placed in the left ventricle (LV) showed an LV diastolic pressure of 45 mmHg. Both these findings were compatible with pulmonary edema, for which a total dose of 120 mg furosemide was given. The patient had a prolonged stay (6 days) in the coronary care unit (CCU), after which he was considered stable enough to be taken to the operating room, where he underwent an off-pump CABG x3, including a left internal mammary artery graft to the LAD, a saphenous vein graft to the diagonal branch, and a saphenous vein graft to the RCA with placement of an intra-aortic balloon pump and a Swan-Ganz catheter. The patient's postoperative course was satisfactory. He was kept in the CCU during his hospitalization, and 13 days after admission he was considered stable enough to be discharged home. The patient's blood pressure was stable without the use of vasopressors, and he was able to walk in the CCU with no shortness of breath or chest pain. One year after the procedure, the patient is free of symptoms, has not had any admissions to hospital, and his latest echocardiogram 11 months after the procedure revealed preserved LV systolic function with an ejection fraction of 52%.

Discussion

The association between acute myocardial infarction and cardiogenic shock represents a high mortality rate for those patients affected. Early revascularizа-

tion, either by surgery or PCI, increases 1-year survival to 47% compared with 34% survival after aggressive initial medical stabilization.[1] It has also been demonstrated that early reperfusion of an infarct-related artery is associated with an improved outcome in cases of shock.[2-4] As a stabilizing maneuver for revascularization, placement of an intra-aortic balloon pump is a class I recommendation.[5]

PCI has been proven to be a safe and effective treatment for most significant coronary stenoses,[6,7] but few data support interventions in the LMCA. It was found that 5-7% of patients who undergo coronary angiography have significant LMCA disease.[10,11]

The American College of Cardiology/American Heart Association guidelines for the management of acute myocardial infarction in the presence of cardiogenic shock emphasize immediate CABG as the first line of treatment.[5] CABG is a fairly safe alternative; however, as an emergency procedure it is logistically not always feasible, because even when the operating theatre and the surgical team are available, the preparations for cardiac surgery may take longer than the patient's hemodynamic condition allows. Virani et al,[8] in a retrospective study of 1731 cases with LMCA stenosis, showed that only the presence of acute coronary syndrome when the patient presented at the hospital predicted the occurrence of cardiac events among patients awaiting CABG. This means that in cases of the type described here CABG is mandatory, but urgent CABG is associated with poor surgical outcomes.[9] Catheter interventions do not require extensive preparations and can be carried out within minutes, leading to immediate restoration of hemodynamics and potentially saving lives.[10]

Recently, the "2009 Focused Updates: ACC/AHA Guidelines for the Management of Patients With ST-Elevation Myocardial Infarction" have moved the indication for left main percutaneous coronary intervention from Class III to Class IIb in those left main lesions that are suitable for PCI, based primarily on the fact that the SYNTAX trial failed to show PCI to be non-inferior to CABG in patients with left main and 3-vessel coronary artery disease.[12] Several European studies have reported that PCI of an LMCA lesion in patients with acute myocardial infarction is feasible and effective, giving the patients a good mid-term prognosis.[13-16]

Based on a growing number of research studies, more cardiologists are performing PCI in an unprotected LMCA, allowing initial revascularization and rapid stabilization of the patient who experiences acute myocardial infarction and concomitant cardiogenic shock. In our patient, with the emergent PCI we were able to reperfuse the LMCA, enabling restoration of the coronary blood flow and improving the patient's hemodynamic condition. This allowed us to stabilize the patient and later perform an elective CABG, ultimately saving his life and his quality of life by preserving his ventricular function.

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