Catastrophic Complication of Stent Perforation in a Uremic Patient with Acute Myocardial Infarction

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Catheter-induced coronary artery dissection is a rare but devastating complication of coronary angiography and percutaneous coronary intervention (PCI). Complications during PCI include coronary artery dissection, intramural hematoma, coronary artery perforation, and occlusion of branch vessels. Stent perforation is more unusual and potentially fatal. Here, we report a 68-year-old uremic woman who underwent primary PCI for her acute myocardial infarction. Unfortunately, dissection of the left proximal coronary artery by a guide catheter, followed by stent implantation, resulted in stent perforation through the middle left coronary artery and severe laceration of the left coronary orifice. Cardiogenic shock leading to cardiac arrest occurred. Emergency coronary artery bypass grafting and aortomy for left coronary orifice repair were conducted. The patient's postoperative course was uneventful, and she was discharged 15 days after surgery. From the successful outcome in this patient, we speculate that both better selection of patients and lesions for angioplasty and surgical standby may prove to be life-saving and effectively decrease subsequent mortality for patients experiencing devastating complications during PCI. [*J Chin Med Assoc* 2009;72(4):207–209]

Key Words: acute myocardial infarction (AMI), coronary artery bypass grafting (CABG), percutaneous coronary intervention (PCI)

Introduction

Since the 1960s, coronary artery bypass grafting (CABG) has been the major therapy for coronary artery diseases, until 1978, when Gruentzig[1] successfully carried out percutaneous coronary intervention (PCI). Nevertheless, complications during PCI have been reported in different studies.[2]

Catheter-induced coronary artery dissection[3] and stent perforation[4] are rare but devastating complications of PCI. We present a case of guide catheter-induced dissection of the left proximal coronary artery followed by stent implantation, which resulted in stent perforation and severe laceration of the left coronary orifice, complicated with cardiac tamponade and cardiac arrest.

Case Report

A 68-year-old female with a history of end-stage renal disease developed severe chest pain, with cold sweating and dyspnea in the morning before admission. She was urgently sent to the emergency room (ER) for assistance.

In the ER, electrocardiography showed ST elevation in leads V1, V2, V3 and V4, combined with Q-wave and inverted T-wave in the inferior leads. Cardiac enzyme was elevated at the same time. Under the impression of acute myocardial infarction (AMI), primary PCI was conducted immediately. Baseline coronary angiography showed chronic total occlusion of the right coronary artery, near-total occlusion of the distal left circumflex artery, and long angulated, 90% calcified stenotic lesion of the middle portion of the left anterior descending coronary artery (LAD) (Figure 1).

Medical treatment was applied first until her family agreed to invasive treatment. PCI was conducted, complicated with dissection of the left proximal coronary artery. Rescue stenting was conducted with 2 Express stents. One 3.5×20-mm stent was implanted at the proximal site and another 3.0×20-mm stent was implanted at the distal site of the dissected segment of

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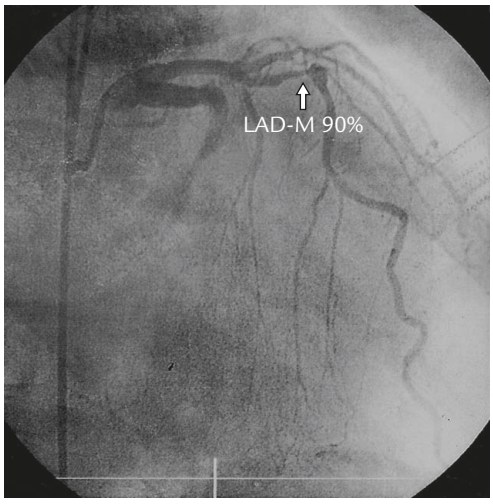

Figure 1. Coronary angiography shows LAD-M 90% stenosis and LCX-P 100% occlusion.

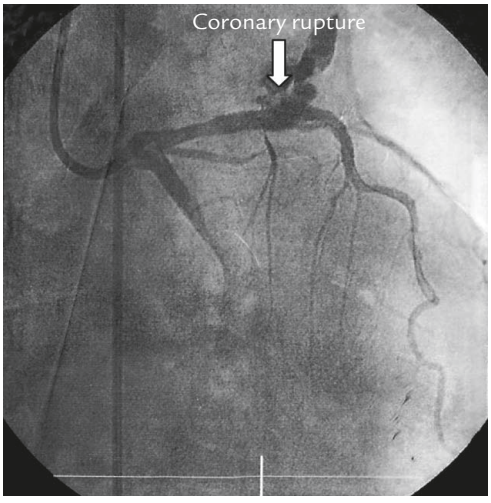

Figure 2. Angiography shows a class III perforation after stent implantation in the middle segment of the left anterior descending artery.

the LAD. Unfortunately, perforation of the middle LAD was found after stent implantation (Figure 2). Cardiogenic shock complicated with cardiac arrest occurred immediately. Echocardiography showed massive pericardial effusion, and confirmed cardiac tamponade. After emergency pericardiocentesis, the patient was sent to the operation room for open heart surgery. CABG with 4 anastomoses, and direct suture repair for laceration of the middle LAD were performed. After the removal of the aortic cross-clamp, a massive volume of blood poured from the back of the pulmonary artery near the left coronary orifice. Therefore, the heart arrested again. Transverse aortomy was performed, and dissection and perforation of the left main coronary artery was found. Blood leakage stopped after the left

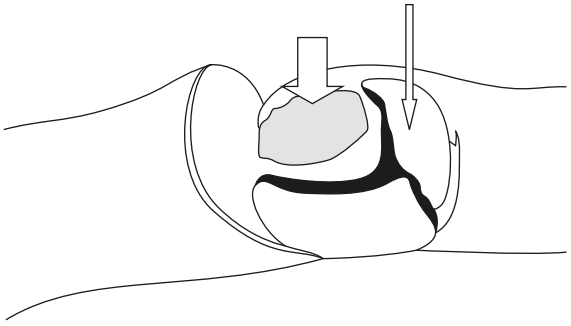

Figure 3. Aortomy for repair of laceration of left coronary orifice with Goretex patch (thick arrow). Thin arrow points to the right coronary sinus.

coronary orifice was repaired with a Goretex patch (Figure 3). The patient was successfully weaned from cardiopulmonary bypass after 110 minutes of cardiac arrest and 145 minutes of cardiopulmonary bypass. The entire operation took approximately 300 minutes. No myocardial damage was detected postoperatively. The patient's postoperative course was uneventful, and she was discharged 15 days after surgery.

Discussion

Complications during PCI include coronary artery dissection, intramural hematoma, coronary artery perforation, and occlusion of branch vessels. Dissections are found in up to 50% of patients immediately after PCI.[2] Perforation or frank rupture of coronary arteries occurs in 0.2–0.6% of patients undergoing PCI. With the advent of stenting, coronary artery perforation is an uncommon but potentially fatal complication. In a series of over 10,000 PCIs (6,836 with stenting) from 1993 to 2001, the risk of perforation was 0.84%.[3] However, perforation can also occur during stent deployment. Significant cardiac events occurred in 29 of 84 patients with a perforation (35%), and included MI in 15, repeat PCI in 4, CABG in 11, and death in 7.

The percentage of patients experiencing complications differs according to the severity classification of the perforation. Perforation is classified according to angiographic appearance. Class I is defined as with extraluminal crater without extravasation. Class II is with pericardial or myocardial blushing, and class III is with perforation >1 mm in diameter with contrast streaming or cavity spilling.[3]

Cases experiencing complications of MI from coronary artery perforation were 0% for class I, 14% for class II, and 50% for class III lesions, while those experiencing complications of cardiac tamponade were 8% for class I, 13% for class II, and 63% for class III

lesions.[4] Emergency CABG is required in 37–63% of patients,[5] and is almost always indicated for class III lesions.

Overall mortality with coronary artery perforation is approximately 5–10%. The main predictors of mortality are older age, cardiac tamponade, the need for emergency surgery, and the severity of the perforation. In a report of 62 patients, death (19%) occurred only in patients with class III perforations.[4,5]

Cardiac tamponade induced by perforation is generally manifested by unstable hemodynamics such as bradycardia and hypotension due to massive amounts of blood in the pericardial space which compromise bilateral ventricle function and subsequently induce vagal stimulation. If the patient's hemodynamics are acceptably stable, echocardiography is useful to verify the amount of blood in the pericardial space. However, if the patient is hemodynamically unstable, emergent pericardiocentesis should be performed instantly via the subxiphoid approach. Subsequently, emergency CABG should be performed. In a study of 91 cases of acute tamponade during catheterization, pericardiocentesis was the mandatory and effective therapy in 82%.[6]

Technical improvements in stenting have significantly decreased the incidence of major complications of PCI over the last 15–20 years. In 2 reported series, the need for emergent coronary bypass surgery (CABG) reduced dramatically from 1.5% in 1992 to 0.14% in 2000,[7] and from 2.9% in 1979–1994 to 0.3% in 2000–2003.[8]

Emergency coronary bypass surgery for failed coronary angioplasty can be done effectively but with an operative mortality higher than that encountered in comparable patients managed with primary elective surgery. Mortality rates vary considerably, ranging from 0% to 26%.[9,10] The predisposing factors for adverse outcome of emergency bypass surgery include cardiogenic shock, delayed operation, patient age, and so on. Few patients transferred for surgery under cardiorespiratory resuscitation survive. Among those transferred in cardiogenic shock, mortality rates approached 100%.[10] Although there are many measures that can be temporarily taken to stabilize these patients, they have virtually no chance of survival with only conservative treatment. It is frustrating for a surgeon to operate on a patient in cardiogenic shock or cardiac arrest after a failed angiography because the surgical mortality rate approaches 100%. For that reason, it is crucial not to postpone emergency CABG until circumstances have turned catastrophic, or to stabilize the situation before handing the patient over to the surgical team.

From the successful outcome in this patient, we speculate that both better selection of patients and lesions for angioplasty and surgical standby may prove to be life-saving and effectively reduce subsequent mortality for patients suffering devastating complications during PCI.

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