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Emergency Revascularization Strategies In An Acute Myocardial Infarction Due To The Occlusion Of The Left Main Coronary Artery: A Report Of Three Cases

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ABSTRACT

Although acute left main coronary artery (LMCA) occlusion is rare, it carries a very high mortality rate. Several studies have compared the efficacy of elective coronary artery stenting and coronary artery bypass grafting (CABG) in patients with LMCA disease. However, a definite reperfusion modality has yet to be established in ST-elevation myocardial infarction (STEMI) due to acute total occlusion of LMCA, which has catastrophic clinical results. We presented three patients with acute anterior STEMI and angiographically documented acute total occlusion of LMCA. All of them were taken to the catheterization laboratory. One patient who was referred to CABG for emergency revascularization died. One died on the 3th day of admission because of heart failure.. The other patient, thrombolysis in myocardial infarction (TIMI) III flow was achieved after percutaneous coronary intervention (PCI), and he was discharged with acceptable short-term results.

Key words: Myocardial infarction, cardiogenic shock

ÖZET

Akut sol ana koroner arter tam tıkanması nadir görülmesine rağmen yüksek ölüm riski taşımaktadır. Birçok çalışmada sol ana koroner arter lezyonu olan hastalarda koroner bypass grafting (CABG) ile koroner by-pass'ın etkinliği karşılaştırılmıştır. Sol ana koroner arterin tam tıkanmasına bağlı olarak ölümcül klinik sonuçlara yol açan ST yükselmeli miyokard enfarktüsü'nde henüz kesin bir reperfüzyon seçeneği tanımlanmamıştır. Biz burada ST yükselmeli miyokard enfarktüsü ile hastanemize başvuran ve yapılan anjiyografide sol ana koroner arter akut tam tıkanmasının gösterildiği üç hasta örneğini sunuyoruz. Hastaların tamamı acil olarak kateterizasyon laboratuvarına alındı. Hastalardan 1'i revaskülarizasyon amacıyla koroner by-pass'a gönderilirken öldü. Bir hasta başvurunun üçüncü günü sistolik pompa sebebiyle öldü. Diğer bir hastada perkutan koroner bypass sonrası TIMI III akım sağlandı. Takipleri normal seyreden hasta taburcu edildi.

Anahtar kelimeler: Miyokard enfarktüsü, kardiyojenik şok.

INTRODUCTION

Primary percutaneous coronary intervention (PCI) has been decreed as a major therapeutic strategy in the management of acute ST-elevation myocardial infarction (STEMI), having deserved 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 proficiency 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 a suitable laboratory environment (1).

ST-elevation myocardial infarction due to acute total occlusion of left main coronary artery (LMCA) causes severe hemodynamic instability as a effect of large infarction area of the myocardium. Cardiogenic shock (CS) has a high in-hospital mortality rate regardless of infarction-related artery, with rapid development in the setting of acute total occlusion of LMCA (2,3). Data show that primary PCI in acute LMCA occlusion is feasible.

In this paper, we presented three patients who underwent primary PCI for STEMI due to acute total occlusion of LMCA.

CASE REPORTS

From 2009 to 2010, three male patients were admitted to our emergency department with acute anterior STEMI and angiographically documented acute total occlusion of LMCA. All the

patients had chest pain and there was no history of previous myocardial infarction, PCI, or CABG. On presentation, two patients were in CS. After the initial assessments, all the patients were taken to the catheterization room with minimum delay. Two patients underwent PCI and, after diagnostic coronary angiography, one patient was transferred to the surgery room for emergency CABG. Before PCI all patients received acetylsalicylic acid 300 mg and weight-adjusted unfractionated heparin immediately. Tirofiban, as a bolus and subsequent infusion was started to the patients who were established PCI.

Case 1

A 54-year-old man was admitted to the emergency department 5 hours after the onset of typical chest pain. He was taken to the catheterization laboratory with the diagnoses of acute anterior myocardial infarction (AMI) and CS. Coronary angiography showed total occlusion of the LMCA as the culprit lesion (Figure 1A). After predilatation with 2.5x15mm sized angioplasty balloon, revealed that circumflex artery (Cx) is dominant. Therefore a metal stent 4.0 x12 was implanted to the culprit lesion with enclosing Cx and thrombolysis in myocardial infarction (TIMI) II flow was achieved. Then we decided to reperfusion left anterior descending artery (LAD). Because of that we have dilated the lesion with 1.5x 10mm and 2.5x 15mm sized angioplasty balloons. After dilatation, 2.75 x15 mm a metal stent was implanted. Operation was successful (Figure 1B). Patient was transferred to the coronary intensive care unit. On bedside echocardiography, left ventricular ejection fraction was measured as 30% and there was significant wall motion impairment. During the follow-up, he presented in a state of CS, displaying a blood pressure of 70/50 mmHg, a heart rate of 120 bpm and was suffered from the symptoms of heart failure, for which intravenous dobutamine, dopamine and adrenaline were administered. However, the patient's clinical status didn't improve and he died due to pump failure on the 3th day of the hospitalization.

Case 2

A 40-year-old man was accepted to the emergency department with typical chest pain lasting 4 hours and 30 minutes. He was taken to the catheterization laboratory with the diagnoses of anterior AMI and CS. He had a history of diabetes mellitus as a risk factor for coronary heart disease. Diagnostic coronary angiography was performed, which revealed total occlusion of the LMCA as the culprit lesion (Figure 2A). A thrombus image was shown at the middle part of right coronary artery (Figure 2B). Then he was referred to surgery for emergency revascularization, but he died within one hour of admission during preparation of the surgical team.

Case 3

A 49-year-old man patient was admitted to the catheterization laboratory from the emergency department with acute coronary syndrome. He had a history of hypertension and diabetes mellitus as risk factors for coronary heart disease. Physical examination was normal with a blood pressure of 100/60 mmHg. The patient was transferred to the catheterization laboratory from the emergency department with a minimum delay after the initial evaluation. Coronary angiography showed 95 % occlusion of the LMCA (Figure 3A). After predilatation with a small-size balloon, a stent, 3.5 x9 mm in size, was placed to the culprit lesion and TIMI III flow was achieved (Figure 3B). The patient was discharged healthy on the fifth day of admission.

DISCUSSION

Acute total occlusion of LMCA is uncommon. Its actual incidence cannot be estimated as many patients with this condition because

of the sudden cardiac death before reaching the hospital. Clinical presentations of acute LMCA occlusions are usually very dramatic, including CS, pulmonary edema, respiratory failure, reported in some studies to be as high as 58% (4,5). The left ventricular myocardium is mainly supplied by the left coronary artery, and that is why acute LMCA occlusion usually results in severe left ventricular dysfunction leading to nearly immediate clinical deterioration, leaving no chance to take the patient to the catheterization laboratory (6-8).

Despite significant improvement in the reperfusion treatment, AMI complicated by CS is associated with poor short and long-term prognosis (9,10). The randomised clinical SHOCK trial studied 302 patients who suffered CS developing within 36 hours of the onset of acute myocardial infarction 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 (11).

Buszman et al. (12) reported that PCI was comparable with CABG in terms of mortality, major adverse events, and major adverse cardiac and cerebrovascular events at the end of 28 months. Moreover, left ventricular ejection fraction improved significantly only in the PCI group, which was attributed to restoration of physiologic antegrade flow in the LMCA and major vessels, lack of per operative reperfusion injury, and low incidence of myocardial infarction.

Seung et al. (13) found no significant differences between the two revascularization strategies in the risk for death or composite end-points (death, Q-wave myocardial infarction, or stroke). Moreover, the rate of target vessel revascularization was significantly higher in the PCI group. Sakai et al. (10) reported that, compared to stable patients, those with CS had a lower successful angioplasty rate (68% vs. 100%) and higher rates of in-hospital mortality (71% vs. 10%) and 1-year mortality. The predictors of prognosis have been implicated as development of CS, success of reperfusion therapy, and presence/absence of collateral circulation and a dominant right coronary artery (14,15). In our small series, 1 patient who was referred to CABG for emergency revascularization died. One died on the 3th day of admission suggesting that prompt reperfusion may be more important in this unstable condition. In the remaining 1 patient, TIMI III flow was achieved after PCI, and he was discharged with acceptable short-term results.

Developments in stenting techniques and using of drug-eluting stents have improved in-hospital and long-term results in terms of both reocclusion and target vessel revascularization. In our cases, drug-eluting stents were not available and the main aim of our treatment was to stabilize the hemodynamic condition of the patient.

In conclusion, considering relatively short reperfusion time, need to restore hemodynamic stability rapidly, and adverse influence of delays in initiating surgery, PCI may be a more appropriate strategy in patients presenting with STEMI due to acute occlusion of LMCA.

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