Emergency revascularization procedures in patients with acute ST-elevation myocardial infarction due to acute total occlusion of unprotected left main coronary artery: a report of five cases

Korumasız sol ana koroner arter akut tam tıkanıklığına bağlı gelişen akut ST yükselmeli miyokart enfarktüsünde acil revaskülarizasyon rejimleri: Beş olgu sunumu

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Several studies have compared the efficacy of elective coronary artery stenting and coronary artery bypass grafting (CABG) in patients with unprotected left main coronary artery (ULMCA) disease. However, a definite reperfusion modality has yet to be established in ST-elevation myocardial infarction (STEMI) due to acute total occlusion of ULMCA, which has catastrophic clinical results. We presented five patients (3 males, 2 females; mean age 59 years; range 53 to 67 years) with acute anterior STEMI and angiographically documented acute total occlusion of ULMCA. On presentation, all the patients had chest pain and four patients were in cardiogenic shock. All the patients were taken to the catheterization room with minimum delay. Intra-aortic balloon counterpulsation was used during coronary angiography in all the patients. Three patients underwent PCI and, after balloon predilatation, bare-metal stents were implanted and TIMI III flow was achieved. One patient who had atrial fibrillation on admission died on the 14th day of hospitalization after PCI due to pump failure. After diagnostic coronary angiography, two patients were submitted to surgery for emergency CABG. They both died, one within two hours of admission during preparation of the surgical team, and the other on the third postoperative day. Both were in cardiogenic shock on admission.

Key words: Angioplasty, transluminal, percutaneous coronary; coronary stenosis; myocardial infarction/therapy; myocardial revascularization; shock, cardiogenic/complications; stents.

Korumasız sol ana koroner arter lezyonlarının elektif tedavisinde perkütan koroner girişim (PKG) ile koroner arter baypas cerrahisinin (KABG) etkinliğini karşılaştıran çalışmalar bulunmakla birlikte, ölümcül sonuçları olan, korumasız sol ana koroner arter ani ve tam tıkanmasına bağlı akut ST yükselmeli miyokart enfarktüsünün tedavisinde hangi tedavi rejiminin uygulanacağına dair yeterli veri yoktur. Bu yazıda, akut ST yükselmeli miyokart enfarktüsü ile başvuran ve bunun korumasız sol ana koroner arter ani ve tam tıkanıklığına bağlı olduğu koroner anjiyografiyle gösterilen beş hasta (3 erkek, 2 kadın; ort. yaş 59; dağılım 53-67) sunuldu. Başvuru sırasında tüm hastalarda göğüs ağrısı vardı; dört hastada kardiyojenik şok gelişmişti. Zaman geçirmeden kateter laboratuvarına alınan tüm hastalara intraaortik balon pompası uygulandı ve koroner anjiyografi yapıldı. Üç hastaya PKG ile, balonla genişletme sonrasında düz metal stent takıldı ve TIMI III akım elde edildi. Başvuru sırasında atriyum fibrilasyonu olan bir hasta, PKG'den 14 gün sonra pompa yetersizliğinden kaybedildi. Tanısal koroner anjiyografi sonrasında KABG'ye karar verilen iki hasta ise yatış döneminde kaybedildi. Bunların biri cerrahi hazırlıkları sırasında, yatışın ilk iki saati içinde, diğeri ise ameliyat sonrası üçüncü günde öldü. Her iki hasta da başvuru sırasında kardiyojenik şoktaydı.

Anahtar sözcükler: Anjiyoplasti, translüminal, perkütan, koroner; koroner darlık; miyokart enfarktüsü/tedavi; miyokart revaskülarizasyonu; şok, kardiyojenik/komplikasyon; stent.

ST-elevation myocardial infarction (STEMI) due to acute total occlusion of unprotected left main coronary artery (ULMCA) causes severe hemodynamic instability as a consequence of large infarction area of the myocardium. Cardiogenic shock (CS) has a high in-hospital mortality rate regardless of infarct-related artery, with rapid development in the setting of acute total occlusion of ULMCA.[1-3] Several studies have

shown that early revascularization with hemodynamic support improves survival in patients with CS.[4,5] Therefore, prompt and complete reperfusion of the occluded ULMCA is important to improve clinical outcome. However, a definite reperfusion modality in this setting has not been clearly established.

In this paper, we presented five patients who underwent primary percutaneous coronary intervention (PCI) or emergency coronary artery bypass grafting (CABG) for STEMI due to acute total occlusion of ULMCA.

CASE REPORT

From 2003 to 2007, five patients (3 males, 2 females; mean age 59 years; range 53 to 67 years) were admitted to our emergency department with acute anterior STEMI and angiographically documented acute total occlusion of ULMCA. All the patients had chest pain and there was no history of previous myocardial infarction, PCI, or CABG. On presentation, four patients were in CS. After the initial assessments, all the patients were taken to the catheterization room with minimum delay. Intra-aortic balloon counterpulsation was used during coronary angiography in all the patients. Bedside echocardiography was performed in all but one patient. Three patients underwent PCI and, after diagnostic coronary angiography, two patients were transferred to the surgery room for emergency CABG. The decision for reperfusion modalities was made at the discretion of the physician.

All patients received aspirin 300 mg immediately. Before PCI, all patients received weight-adjusted unfractionated heparin and 300 mg loading dose of clopidogrel. Tirofiban, as a bolus and subsequent infusion, was also initiated during the procedure. In all the patients, after predilatation with a small-size balloon, bare-metal stents were implanted. No distal protection device was used. Procedural success with TIMI III flow was achieved in all the patients.

One patient who had atrial fibrillation on admission died on the 14th day of hospitalization after PCI due to pump failure. The remaining two patients were discharged from the hospital. Two patients who were submitted to emergency CABG died during in-hospital period, one within two hours of admission during preparation of the surgical team, and the other on the third postoperative day. Both were in CS on admission.

Case 1– A 58-year-old man was admitted to the emergency department 5.5 hours after the onset of typical chest pain. He was taken to the catheterization laboratory with the diagnoses of anterior acute myocardial infarction (AMI) and CS. Coronary angiography revealed total occlusion of the LMCA as the culprit lesion. After balloon predilatation, a stent 3.5 mm in diameter and 12 mm in length was implanted to the culprit lesion and TIMI (Thrombolysis In Myocardial Infarction) III flow was achieved. Emergency DC-cardioversion was performed for atrial fibrillation and intra-aortic balloon pump (IABP) support was established. On bedside echocardiography, left ventricular ejection fraction was measured as 30% and there was significant wall motion impairment. During the follow-up, the patient suffered from the symptoms of heart failure, for which intravenous dobutamine and furosemide were administered. However, the patient's clinical status did not improve and he died due to pump failure on the 14th day of hospitalization.

Case 2– A 59-year-old man was admitted to the emergency department with typical chest pain lasting 3 hours and 40 minutes. He was taken to the catheterization laboratory with the diagnoses of anterior AMI and CS. He had a history of smoking as a risk factor for coronary heart disease. An IABP was inserted and diagnostic coronary angiography was performed, which revealed total occlusion of the LMCA as the culprit lesion. The patient was referred to surgery for emergency revascularization, but he died within two hours of admission during preparation of the surgical team.

Case 3– A 67-year-old female patient was referred to our center with anterior AMI and CS. She had a history of hypertension and family history of coronary artery disease. The patient was transferred to the catheterization laboratory from the emergency department with a minimum delay after the initial evaluation. Coronary angiography showed total occlusion of the LMCA and a significant stenosis in the right coronary artery. An IABP catheter was implanted. Left ventricular ejection fraction was estimated as 30% by echocardiography. The patient was submitted to surgery for emergency revascularization, but she died on the third postoperative day.

Case 4– A 53-year-old male patient was admitted to the emergency department with chest pain of four hours onset. He had a history of diabetes mellitus and smoking as risk factors for coronary heart disease. Physical examination was normal with a blood pressure of 90/60 mmHg. The electrocardiogram showed anterior AMI. He developed nonsustained ventricular tachycardia. She was transferred to the catheteriza-

tion laboratory for primary PCI. Diagnostic coronary angiography revealed total occlusion of the LMCA. After insertion of an IABP and pre-dilatation with a small-size balloon, a bare-metal stent was implanted and TIMI III flow was achieved. No distal protection device was used. Elective CABG was recommended to the patient for other coronary artery lesions in the left anterior descending and circumflex coronary arteries, but the patient refused surgery.

Case 5– A 59-year-old female patient was admitted to the catheterization laboratory from the emergency department with anterior AMI and CS. She had a history of hypertension and diabetes mellitus as risk factors for coronary heart disease. After insertion of an IABP, emergency coronary angiography was performed. There was total occlusion of the LMCA and the right coronary artery was normal. After predilatation with a small-size balloon, a stent, 3.5 mm x 15 mm in size, was placed to the culprit lesion and TIMI III flow was achieved. The patient was discharged on the seventh day of admission.

DISCUSSION

Acute total occlusion of ULMCA is not common. Its actual incidence cannot be estimated as many patients with this condition develop sudden cardiac death before reaching the hospital. Furthermore, CS promptly ensues in this setting. Despite significant improvement in the reperfusion treatment, AMI complicated by overt CS is associated with poor short- and long-term prognosis.[5,6] The underlying pathophysiology of CS complicating AMI is excessive depression of myocardial contractility, resulting in reduced cardiac output and low blood pressure. Early revascularization of infarct-related artery reduces mortality in patients with CS. The SHOCK trial (Should We Emergently Revascularize Occluded Coronaries for Cardiogenic Shock) studied patients who were in shock due to left ventricular dysfunction that complicated AMI.[7] The results showed that early revascularization, via either surgery or PCI, increased 1-year survival to 47%, in comparison with 34% obtained by aggressive initial medical stabilization.

Treatment of ULMCA stenosis is currently one of the main indications for CABG. However, in several nonrandomized and randomized studies, investigators have reported the safety and feasibility of elective ULMCA stenting with either bare-metal or drug-eluting stents.[8-10] Recently, there is great interest in comparing elective PCI and CABG in significant LMCA stenosis in patients with stable coronary

artery disease. Buszman et al.[11] 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 perioperative reperfusion injury, and low incidence of myocardial infarction. Of note, patients with total occlusion of the LMCA or AMI were excluded in this study. In the MAIN-COMPARE registry (Revascularization for Unprotected Left Main Coronary Artery Stenosis: Comparison of Percutaneous Coronary Angioplasty versus Surgical Revascularization), Seung et al.[12] 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.

There are many reports of single cases or small series on successful PCI applications performed for total occlusion of ULMCA in patients presenting with AMI.[6,13-15] Cardiogenic shock that develops rapidly due to acute total occlusion of ULMCA has been reported as a poor prognostic factor even when successful reperfusion has been achieved. In addition, the presence of CS decreases the rate of successful reperfusion. In an analysis of 38 patients with anterolateral AMI due to acute total occlusion of ULMCA, Sakai et al.[6] 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.[2,16]

In our small series, two patients who were referred to CABG for emergency revascularization died. One died within the first two hours of admission during preparations for surgery, suggesting that prompt reperfusion may be more important in this unstable condition. In the remaining three patients, TIMI III flow was achieved after PCI, and two patients were discharged with acceptable short-term results.

Developments in stenting techniques and use 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 goal of our treatment was to stabilize the hemodynamic condition of the patient.

In conclusion, considering relatively short reperfusion time, the need to rapidly restore hemodynamic stability, 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 ULMCA.

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