

## Successful coronary artery bypass grafting in a patient with bilateral internal carotid artery occlusion: a case report

*İki taraflı internal karotis arter tıkanıklığı olan hastada başarılı koroner arter bypass greftleme: Olgu sunumu*

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The best management regimen for patients with coronary artery disease requiring surgery and bilateral total internal carotid artery occlusion remains controversial. A 61-year-old male patient presented with unstable angina pectoris. His medical history revealed that he had a cerebrovascular accident 11 years ago. On physical examination, he had dysarthria and monoparesis on the right upper extremity. Coronary and carotid angiography revealed critical coronary artery stenosis and total occlusion of bilateral internal carotid arteries, total occlusion of the right vertebral artery and 40% stenosis of the left proximal vertebral artery. After general intravenous fentanyl anesthesia, low dose heparin was administered, and coronary artery bypass grafting (CABG) was performed under off-pump beating heart condition. Systolic blood pressure was maintained above 120 mmHg to preserve cerebral blood flow during the operation. The postoperative course was uneventful and the patient was discharged in the 7<sup>th</sup> day postoperatively. If CABG is mandatory in patients having high cerebrovascular risk, off-pump CABG could be performed to reduce the stroke risk.

**Key words:** Arteriosclerosis; off-pump coronary artery bypass grafting; internal carotid artery occlusion.

Patients with diffuse arteriosclerosis present a major management problem during operation and in the postoperative period because the attention is focused on the symptomatic subsystem to the detriment of the remaining vascular system. The association of concomitant significant carotid artery stenosis and coronary artery disease ranges from 3.4% to 22%.<sup>[1]</sup> In general, the incidence of postoperative stroke after coronary artery bypass grafting (CABG) ranges from 0.7% to 5%.<sup>[2,3]</sup> Coronary revascularization in a patient with more than 90% internal carotid artery stenosis is associated with a postoperative stroke rate of more than 16%.<sup>[4-7]</sup> On-pump

Cerrahi gerektiren koroner arter hastalığı ve iki taraflı tam karotis arter tıkanıklığı olan hastalarda en iyi yaklaşım konusu tartışmalıdır. Altmış bir yaşında erkek hasta kararsız anjina pectoris ile kliniğimize başvurdu. Tıbbi öyküsünde 11 yıl önce geçirilmiş serebrovasküler olay vardı. Fizik muayenede, dizartri ve sağ üst ekstremitede monoparezi vardı. Koroner ve karotis anjiyografisinde kritik koroner arter darlığı ve iki taraflı internal karotis arterlerde tam tıkanıklık ve sağ vertebral arterde tam tıkanıklık, sol proksimal vertebral arterde %40 darlık vardı. İntravenöz fentanil genel anesteziyi takiben, düşük doz heparin uygulandı ve koroner arter bypass greftleme (KABG) atan kalp tekniğiyle yapıldı. Ameliyat sırasında serebral kan akımını korumak için sistolik kan basıncı 120 mmHg'nin üzerinde tutuldu. Ameliyat sonrası seyir sorunsuzdu ve hasta 7. günde taburcu edildi. Eğer serebrovasküler açıdan yüksek riskli olan hastalarda KABG zorunlu ise, inme riskini azaltmak için atan kalpte KABG gerçekleştirilebilir.

**Anahtar sözcükler:** Arteriyoskleroz; atan kalpte koroner arter bypass greftleme; internal karotid arter tıkanıklığı.

surgery increases the risk because of lowering the cerebral blood flow due to low systemic arterial blood pressure during cardiopulmonary bypass (CPB) and due to non-pulsatile flow characteristics when compared with physiological circulation during off-pump surgery. In this case, we performed double CABG with off-pump technique without the use of CPB to reduce the risk of postoperative cerebrovascular incident (CVI).

### CASE REPORT

A 61-years-old man presented to the outpatient department with severe, unstable angina pectoris. In his history,

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he had a CVI 11 years ago. On physical examination, there was dysarthria and monoparesis on the right upper extremity. He had been using an anti-epileptic drug (Epanutin) during the last eight years. Coronary angiography showed 90% stenosis in the proximal (before first diagonal branch) left anterior descending (LAD) coronary artery, 95% ostial stenosis in the high obtuse marginalis (OM) branch of the dominant circumflex artery and in non-dominant right coronary artery (RCA). In colored carotid Doppler ultrasonography, total occlusion of the bilateral internal carotid artery (ICA) and severe stenosis of the bilateral external carotid artery (ECA) were documented. Carotid digital subtraction angiography (DSA) revealed total occlusion of bilateral ICAs, total occlusion of right vertebral artery and 40% stenosis of the left proximal vertebral artery (Fig. 1a, b).

In the peripheral DSA, proximal total occlusion of the right superficial femoral artery (SFA) and 50% stenosis of the left SFA were observed.

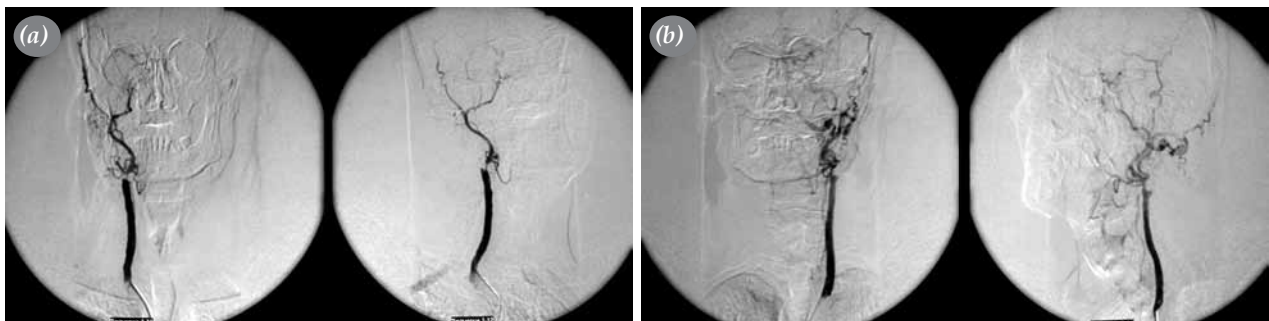
In the operation (elective) standard intravenous fentanyl anaesthesia was used. The operation was performed via standard median sternotomy. Following sternotomy the left internal mammary artery (LIMA) and saphenous vein grafts were harvested. Usual hemodynamic measurements were advocated intraoperatively. After placing the sternal retractor, the pericardial cavity was exposed. Coronary artery bypass grafting was performed with the use of tissue stabilizing system (Medtronic OCTOPUS 4, 29400 Tissue Stabilizer, Medtronic, Inc. USA) in beating heart off-pump situation. During the operation in order to protect cerebral blood supply care was taken to stabilize the systemic blood pressure over systolic 120 mmHg and mean 90 mmHg pressure. The first anastomosis was performed to a high upper OM branch with saphenous vein graft. By side clamping the ascending aorta the proximal end of this graft was anastomosed to it. The second anastomosis was performed to the LAD artery. During the anastomosing process esmolol was administered at between 50 to 200  $\mu\text{g}/\text{kg}/\text{min}$  infusion rates in order to reduce the heart rate with extension to the

systemic blood pressure. The operation was completed without any difficulty or complication. In the intensive care unit (ICU), the patient recovered from anaesthesia, awakened normally at the 6<sup>th</sup> hour and was extubated at the 14<sup>th</sup> postoperative hour. No new CVI was observed. The patient stayed in the ICU for 24 hours, experienced an uneventful postoperative course, and was discharged on the 7<sup>th</sup> day in good condition.

## DISCUSSION

A continuing controversy about the best management regimen for patients with coronary artery disease requiring surgery who also have bilateral total ICA occlusion remains. In case of highly compromised cerebrovascular status, the decision whether to perform CABG or not requires special patient-related considerations. The association of concomitant bilateral carotid artery total occlusion and coronary artery disease that requires CABG is unknown. Reports of perioperative neurological complications ranging between 7.4% to 20.3% are reported for patients who had undergone CABG without surgical treatment of significant carotid artery disease. The mortality rate for such patients also varies from 6.9% to 13.8%.<sup>[8]</sup> Another controversy exists about which technique to perform during CABG; off-pump or on-pump technique. Mishra et al.<sup>[9]</sup> reported almost comparable results in both techniques during CABG plus carotid endarterectomy (CEA). But they prefer to do a one-stage procedure using off-pump CABG to circumvent the deleterious effects of organ hypoperfusion and dysfunction with prolonged CPB time. We prefer both techniques in our cardiovascular surgery department depending on patient condition.<sup>[10-12]</sup>

In fact, CPB circulation provides unphysiological low blood flow rate to the cerebrum especially in patients with severe carotid stenosis. In the present case, bilateral carotid occlusion had high risk for low cerebral blood supply during CPB due to low systemic blood pressure and unphysiological blood flow. For this reason, we preferred off-pump CABG during the operation. A severe unstable angina made it necessary to perform coronary



**Fig. 1.** Digital subtraction angiography image of (a) right, (b) left carotid artery.

bypass in this patient. The operation was performed without any difficulties and complications with the off-pump technique. During operation, we took care of the systemic blood pressure and kept it over 120 mmHg systolic and 90 mmHg mean pressures. There was no new CVI postoperatively; the postoperative course passed smoothly without any complications, and the patient was discharged in good condition in the 7<sup>th</sup> day.

In conclusion, in case of highly compromised cerebrovascular status, the decision whether to undertake CABG or not, requires special patient-related considerations. If CABG is mandatory like in this patient, the use of off-pump technique if possible, may reduce the postoperative cerebrovascular incident rate.

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