Surgical treatment of massive pulmonary embolism occurring after coronary artery bypass surgery

Koroner arter bypass sonrası gelişen pulmoner embolinin cerrahi tedavisi

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A 45-year-old woman developed acute massive pulmonary embolism two weeks after coronary artery bypass surgery. After confirmation of pulmonary embolism with echocardiography, the patient underwent pulmonary embolectomy within one hour of admission and a huge amount of clot was extracted via an incision of the pulmonary artery. The source of thrombus could not be determined. The patient was discharged uneventfully. At the three-month follow-up, there were no signs of recurrence and pulmonary hypertension.

Key words: Coronary artery bypass/complications; echocardiography; embolectomy/methods; postoperative complications; pulmonary embolism/diagnosis/surgery.

Kırk beş yaşında kadın hastada koroner arter bypass ameliyatından bir hafta sonra masif pulmoner emboli gelişti. Ekokardiyografi ile pulmoner emboli doğrulandıktan sonra hasta acil olarak bir saat içinde ameliyata alındı. Pulmoner arter üzerine longitidunal insizyon yapılarak büyük miktarda trombüs çıkarıldı. Trombüs kaynağı belirlenemedi. Hasta sorunsuz olarak taburcu edildi. Üçüncü ayda yapılan kontrolde nüks ve pulmoner hipertansiyon bulgusuna rastlanmadı.

Anahtar sözcükler: Koroner arter bypass/komplikasyon; ekokardiyografi; embolektomi/yöntem; ameliyat sonrası komplikasyon; pulmoner emboli/tanı/cerrahi.

Asymptomatic venous thromboembolism occurs after coronary artery bypass graft (CABG) operation at a surprisingly high frequency (15% to 20%) and the incidence of pulmonary embolism (PE) ranges from 0.5% to 4%.[1] Massive PE is caused by the interaction of a large embolism with underlying cardiopulmonary disease, leading to hemodynamic instability. In the presence of shock, the mortality risk rises three- to sevenfold, the majority of deaths occurring within one hour of presentation.[2] Echocardiography is very useful in the diagnosis, recognition, and differentiation of PE and in assessing its severity.[3] This report describes the use of emergency pulmonary embolectomy as an effective and aggressive therapeutic approach to a massive pulmonary embolism in a 45-year-old woman.

CASE REPORT

A 45-year-old, obese, and hypertensive woman complained of stable angina pectoris of two-month history. She underwent four-vessel CABG operation with the left internal mammary artery grafted to the left anterior descending artery, and separate saphenous vein grafts to two obtuse marginal branches and the right coronary artery. The surgery was uncomplicated. Aortic cross clamp time was 55 minutes and cardiopulmonary bypass time was 70 minutes. On the first postoperative day, she was transferred from the intensive care unit. Graded compressive stockings were applied together with three days of low-molecular weight heparin and daily 150 mg of aspirin and she was discharged on the sixth postoperative day.

One week later, the patient sought medical help because of sudden-onset respiratory distress and chest pain. On admission, she had cyanosis and cold sweating, her vital signs were borderline stable with the following: respiratory rate 32/min, heart rate 110/min, and blood pressure 80/40 mmHg. Electrocardiography showed sinus tachycardia with negative T waves in leads V1 to V4. Within 15 minutes of presentation, she was transferred to the echocardiography laboratory and transthoracic examination (TTE) revealed right ventricular dilatation, paradoxical movement of the ventricular septum, and grade 3 tricuspid regurgitation (Fig. 1). Because of progressive deterioration in the patient's condition, we

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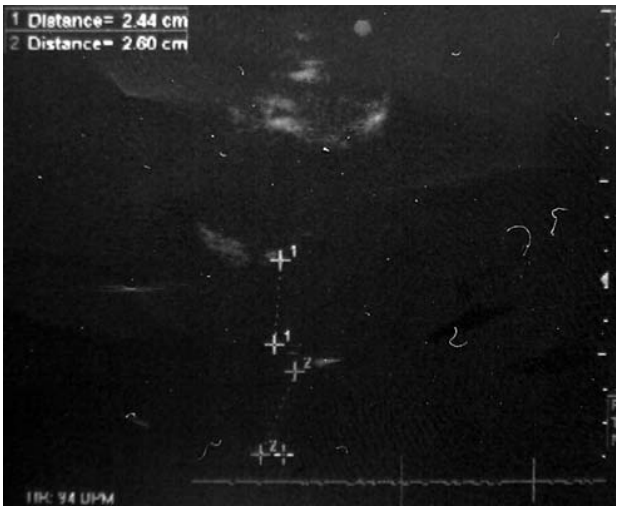

Fig. 1. Transthoracic echocardiogram shows right ventricular dilatation.

decided to perform emergency pulmonary embolectomy, and she was taken to the operating room in 60 minutes of admission.

Shortly after induction of anesthesia and when the patient was already intubated, systemic blood pressure fell to 50/30 mmHg so an intravenous bolus injection of 0.5 mg adrenaline was administered. The sternum was opened, transesophageal echocardiography (TEE) probe was inserted and the diagnosis of PE was confirmed. To prevent further deterioration to cardiac arrest, the patient was heparinized and placed on cardiopulmonary bypass (CPB) using aortic and bicaval right atrial cannulation. The procedure was performed without aortic cross-clamping. Under normothermic conditions, a longitudinal arteriotomy was made in the main pulmonary artery extending to the bifurcation and, with the use of a malleable clamp and vacuum aspirator, a huge amount of clot was gently extracted in several pieces (Fig. 2). Intraoperative TEE showed no remnants of thrombus either in the right atrium or right ventricle. Weaning from the heart-lung machine was successful in the first attempt with only moderate inotropic support. Total CPB time was 45 minutes.

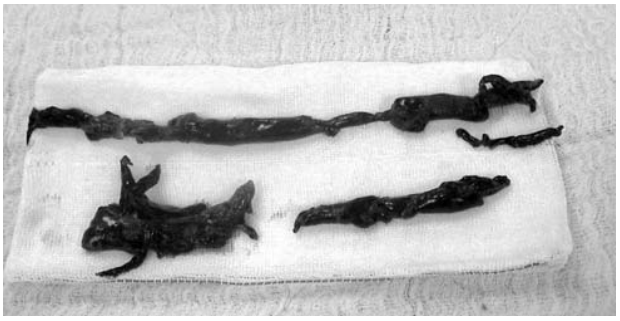

Fig. 2. Huge thrombus extracted from the pulmonary artery.

The postoperative course was uneventful. Follow-up TEE showed normal right ventricle contractility and no emboli. The patient was extubated on the following day. Venous sonography did not show any thrombus in the leg veins. The patient was discharged on warfarin and aspirin on the eighth day. At the 3-month follow-up visit, there was no recurrence of deep vein thrombosis and no signs of pulmonary hypertension.

DISCUSSION

Current thromboprophylaxis approaches after CABG surgery are mostly based on passive and active mobilization, compressive stockings, the use of antiplatelet therapy, and subcutaneous heparin in selected cases. Nevertheless, the incidence of asymptomatic deep vein thrombosis is fairly high. The incidences of deep vein thrombosis and PE following CABG operation range from 17% to 22% and from 0.6% to 0.8%, respectively.[4] Moreover, clots are often encountered in the leg from which the saphenous vein was not harvested.[5] Massive PE exceeding 50% pulmonary artery obstruction produce hemodynamic instability and, with the development of shock, the mortality risk rises several-fold, the majority of deaths occurring within one hour of presentation.[2] Hence, early diagnosis and urgent treatment is lifesaving. Elicitation of historical information, physical examination findings, and laboratory data is of great importance. Echocardiography is very useful in the diagnosis, recognition, and differentiation of PE and in assessing its severity.[3] Transesophageal echocardiography is superior in detecting extrapulmonary thrombi in localizations such as the inferior vena cava, right atrium and right ventricle.[6] Recent advances in spiral CT have enabled direct visualization of PE within the pulmonary arteries and dilatation of the right ventricle, but it was not possible to perform CT in our case because of rapid deterioration of the patient's condition.

Thrombolytic treatment is often effective, but the extent of the clinical benefit remains unclear. According to a report by the International Cooperative Pulmonary Embolism Registry, the rates of recurrent PE in 90 days and related mortality do not decrease in patients treated with thrombolytic therapy.[7] An earlier report of the same registry found the incidence of intracranial bleeding as 3% following thrombolytic therapy.[8]

In the past, high operative mortality rate was the major drawback of surgical pulmonary embolectomy. However, recent reports by many centers recommended pulmonary embolectomy as a safe and effective alternative to thrombolysis or catheter thrombectomy.[9,10]

Insertion of a vena caval filter is a common clinical practice for prophylaxis,[11] but it was not available in our case.

As the development of cardiac arrest before surgical intervention is the most frightening condition,[3] early decision making about surgical strategy is the cornerstone for the success of the procedure. Our patient was operated on within the first hour of admission.

In conclusion, a successful outcome after emergency pulmonary embolectomy necessitates urgent initiation of the operation before cardiac arrest develops and TTE or TEE are very useful for rapid diagnosis.

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