

## Treatment of massive pulmonary embolism after on-pump coronary artery bypass surgery: a case report

*Açık pompa koroner arter bypass cerrahisi sonrası gelişen masif pulmoner embolinin tedavisi: Olgu sunumu*

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A 45-year-old woman developed an acute massive pulmonary embolism two weeks after four-vessel coronary artery bypass graft surgery. After confirmation of pulmonary embolism with echocardiography the patient underwent emergent pulmonary embolectomy in one hour following admission and a huge amount of clot was extracted via longitudinal pulmonary arteriotomy. Intraoperative transesophageal echocardiography revealed no remnants of thrombus either in the right atrium or right ventricle. The patient was discharged uneventfully and did not develop deep vein thrombosis or pulmonary hypertension on the 3<sup>rd</sup> month of follow-up.

**Key words:** Coronary artery bypass surgery; echocardiography; pulmonary embolism.

Asymptomatic venous thromboembolism occurs after coronary artery bypass grafting (CABG) with surprisingly high frequency (between 15 and 20%) and the incidence of pulmonary embolism ranges between 0.5-4%.<sup>[1]</sup> Massive pulmonary embolism (PE) is caused by the interaction of a large embolism with underlying cardiopulmonary disease to produce hemodynamic instability. If shock is induced, the mortality risk rises three- to sevenfold; the majority of deaths occur within one hour of presentation.<sup>[2]</sup> Echocardiography is enormously useful in diagnosis as it is readily available, is useful in the recognition and differentiation of PE and is capable of assessing the severity of PE.<sup>[3]</sup> This report describes the use of emergent pulmonary embolectomy as an effective and aggressive therapeutic approach to a massive pulmonary embolism in an old woman.

### CASE REPORT

A 45-year-old obese woman with a history of hypertension complained of stable angina pectoris for two

Kırk beş yaşında kadın hastada dört-damar koroner arter bypass greftleme ameliyatından bir hafta sonra masif pulmoner emboli gelişti. Ekokardiyografi ile pulmoner emboli doğrulandıktan sonra hasta acil olarak bir saat içinde pulmoner embolektomi ameliyatına alındı ve longitudinal pulmoner arteriyotomi yapılarak büyük miktarda pıhtı çıkarıldı. Ameliyat sırası yapılan transözofageal ekokardiyografide sağ atriyum veya sağ ventrikülde pıhtıya ait herhangi bir iz tespit edilmedi. Hasta sorunsuz olarak taburcu edildi ve 3. ay kontrolünde derin ven trombozu ya da pulmoner hipertansiyon gelişmediği gözlemlendi.

**Anahtar sözcükler:** Koroner arter bypass cerrahisi; ekokardiyografi; pulmoner emboli.

months. She underwent four-vessel CABG with the left internal mammary artery grafted to the left anterior descending, and separate saphenous vein grafts, to two obtuse marginal branches and the right coronary artery. The surgery was uncomplicated, with an aortic cross-clamp time of 55 minutes and cardiopulmonary bypass (CPB) time of 70 minutes. On the first postoperative day, she was transferred out of the intensive care unit. Graded compressive stockings (GCS) were applied together with three days of low-molecular weight heparin and 150 mg of acetyl salicylic acid daily and she was discharged on the 6<sup>th</sup> day after operation.

One week later this patient sought medical help because of sudden-onset respiratory distress and chest pain. On admission, vital signs were borderline; respiratory rate 32/minute, heart rate 110/minute, and blood pressure 80/40 mmHg, with cyanosis and cold sweating. Electrocardiography revealed sinus tachycardia with negative T waves on leads V1 to V4. In 15 minutes she was transferred to the echocardiography laboratory

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and transthoracic examination (TTE) revealed right ventricular (RV) dilatation, paradoxical movement of the ventricular septum and grade three tricuspid regurgitation (Fig. 1). Because of progressive deterioration in the patient's condition we decided to perform emergent pulmonary embolectomy, and the patient was taken to the operating room in 60 minutes after admission.

Shortly after induction of anesthesia, when the patient was already intubated, systemic blood pressure fell to 50/30 mmHg so an intravenous bolus of 0.5 mg of adrenaline was done. While the sternum was opened, a transesophageal echocardiography (TEE) probe was inserted and the PE diagnosis was confirmed. Before further deterioration to cardiac arrest, the patient was heparinized and placed on CPB using aortic and bicaval cannulation. The procedure was performed without aortic cross-clamping. Under normothermic conditions a longitudinal arteriotomy till the bifurcation was made in the main pulmonary artery, 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 revealed no remnants of thrombus either in the right atrium or right ventricle. Weaning from the heart-lung machine was successful on the first attempt with only moderate inotropic support. Total CPB time was 45 minutes.

The postoperative course was uneventful. Follow-up TEE revealed normal right ventricle contractility and no emboli. The patient was extubated the following day. Venous sonography did not show any thrombi in leg veins. The patient was discharged on warfarin and acetyl salicylic acid on the 8<sup>th</sup> day. At the three-month follow-up visit there was no recurrence of deep vein thrombosis and no evidence of pulmonary hypertension.



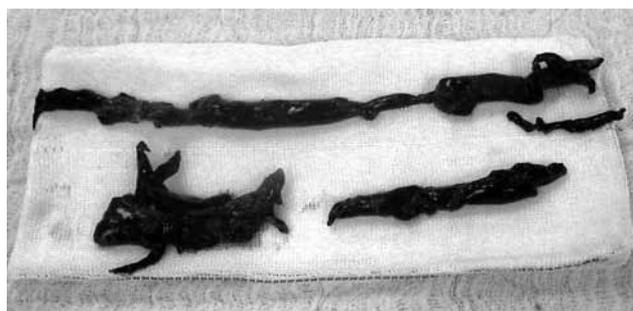
**Fig. 1.** Transthoracic echocardiogram revealing right ventricular dilatation.

## DISCUSSION

Current thromboprophylaxis approaches after CABG surgery are mostly based on passive and active mobilization, GCS, the use of antiplatelet therapy, and subcutaneous heparin in selected cases. Nevertheless the incidence of asymptomatic deep vein thrombosis (DVT) is fairly high. Several studies searching postoperative CABG patients reported 17-22% incidence of DVT and 0.6-0.8% of PE. According to these studies clots were often encountered also in the leg in which the saphenous vein was not harvested. Massive PE exceeding 50% pulmonary artery obstruction produce hemodynamic instability and if shock is induced, the mortality risk rises severalfold; the majority of deaths occur within one hour of presentation.<sup>[2]</sup> So early diagnosis and urgent treatment is lifesaving. To ascertain diagnosis, laboratory data should follow historical information and physical findings. Echocardiography is enormously useful in diagnosis as it is readily available, is useful in the recognition and differentiation of PE and is capable of assessing the severity of PE.<sup>[3]</sup> Transesophageal echocardiography is superior in detecting extrapulmonary thrombi in the inferior vena cava, right atrium and RV.<sup>[4]</sup> In recent years, technical advances in spiral CT enables direct visualization of PE within the pulmonary arteries and dilatation of the RV, but it was not possible to perform CT in our case because of the rapidly worsening patient's condition.

Treatment with thrombolysis is often effective but the extent of the clinical benefit remains unclear. The International Cooperative Pulmonary Embolism Registry (ICOPER) reported that the rate of recurrent PE in 90 days and related mortality does not decrease in patients treated with thrombolytic therapy.<sup>[5]</sup> Another previous study of the same registry had reported a 3% rate of intracranial bleeding with thrombolytic therapy.<sup>[6]</sup>

In the past, high operative mortality rates were the major drawback of surgical pulmonary embolectomy. However recent reports by many centers claim it to be a safe and effective alternative to thrombolysis or catheter thrombectomy.<sup>[7,8]</sup>



**Fig. 2.** Thrombus extracted out of pulmonary artery.

Insertion of vena caval filter is a common clinical practice for prophylaxis but we didn't have it readily available in our hands to apply.<sup>[9]</sup>

Cardiac arrest before the operative procedure is the most important determinant influencing mortality.<sup>[3]</sup> So early decision making on surgical intervention is the cornerstone for the success of the procedure. Our patient had been operated in one hour after her admission.

As conclusion, good outcomes after emergent surgical pulmonary embolectomy necessitate urgent initiation of the operation before development of cardiac arrest and TTE or TEE is enormously useful for rapid diagnosis.

#### **Declaration of conflicting interests**

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