

Surgical Experience of Subacute Pulmonary Thromboembolism with Severe Pulmonary Hypertension

Yuji Maruyama, MD,¹ Shigeo Yamauchi, MD,¹ Hidetsugu Ogasawara, MD,¹
Hajime Imura, MD,¹ Masami Ochi, MD,² and Kazuo Shimizu, MD²

Surgical treatment for subacute pulmonary arterial thromboembolism has previously been considered to be inappropriate. We undertook a pulmonary arterial thrombectomy and removal of a floating right heart thrombus in a patient who had been symptomatic for over a month. The pulmonary arterial pressure, which had been equal to the systemic pressure preoperatively, decreased gradually and almost normalized one month postoperatively. Pulmonary perfusion scintigraphy revealed a dramatic improvement and the patient returned to normal life activities. (Ann Thorac Cardiovasc Surg 2006; 12: 60–2)

Key words: subacute pulmonary thromboembolism, floating right heart thrombus, pulmonary hypertension

Introduction

Chronic symptoms with severe pulmonary hypertension is considered a contraindication for surgical treatment in patients with pulmonary thromboembolism (PTE).^{1,2} However, a large floating right heart thrombus requires urgent surgical removal.³⁻⁵ These two pathologies can simultaneously arise from the same focus. There have been few reports about such a possible combination. We surgically treated a patient with this problem, and gained a successful outcome. Pulmonary hypertension of 100 mmHg almost normalized after surgery and anti-coagulant treatment.

Case Report

A 55 year-old man with no previous history of cardiac or pulmonary disease was referred to our hospital for investigation of one month's symptoms of a dyspnea. His

arterial-blood gas showed a partial pressure of oxygen of 59 mmHg and carbon dioxide of 21 mmHg. His electrocardiogram revealed a deep S wave in lead I and a Q wave and inverted T wave in lead III, as well as complete right bundle-branch block and right ventricular hypertrophy. In the echocardiogram, a large floating thrombus was seen in the right atrium which partially prolapsed into the right ventricle (Fig. 1). The right ventricle was enlarged, and paradoxical septal ventricular motion and severe tricuspid regurgitation was present. The systolic pulmonary arterial pressure was over 100 mmHg (approximately equal to the systemic pressure) on the pulsed doppler echocardiogram. A deep venous thrombosis in his left leg was thought to be the origin of the cardiopulmonary thrombi. No further investigation was done because of allergy to the contrast medium. The patient was transferred to the operation room after a filter cartridge was inserted into the inferior vena cava.

At operation the main pulmonary artery was cross-clamped under total cardiopulmonary bypass and a large floating thrombus was removed from the right atrium. After removing thrombus from the right ventricle under cardiac arrest, we opened the main pulmonary artery and several large thrombi were removed from the right and left pulmonary arteries. When weaning from bypass, massive bleeding from the suture-line on the main pulmonary artery occurred and a modified Cabrol shunt us-

From ¹Department of Thoracic and Cardiovascular Surgery, Chiba-Hokusoh Hospital, Nippon Medical School, Chiba, and ²Department of Surgery, Nippon Medical School, Tokyo, Japan

Received June 1, 2005; accepted for publication September 6, 2005. Address reprint requests to Yuji Maruyama, MD: Department of Thoracic and Cardiovascular Surgery, Chiba-Hokusoh Hospital, Nippon Medical School, 1715 Kamagari, Inba, Chiba 270-1694, Japan.

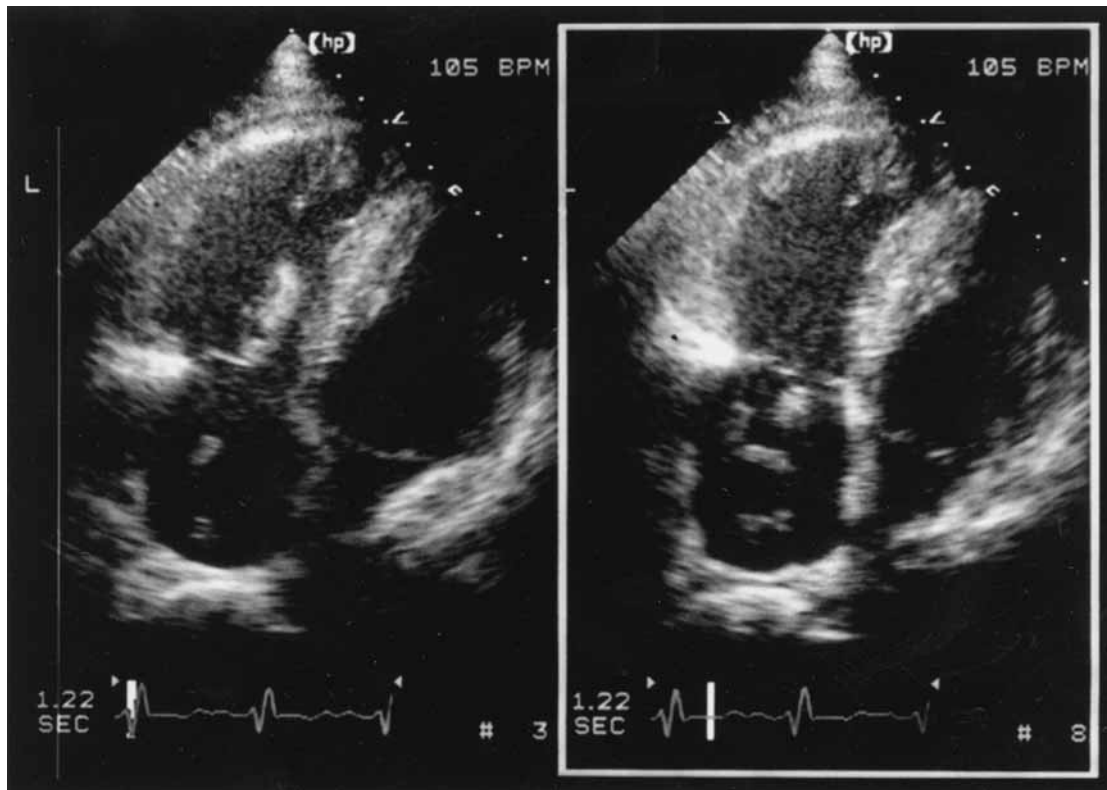


Fig. 1. Four-chamber apical echocardiographic views showing a free-floating thrombus in the right atrium (right panel: systole) partially prolapsing into the right ventricle (left panel: diastole).

ing a large pericardial patch and an 8 mm ePTFE tube was necessary to complete hemostasis. The patient was extubated on the third postoperative day and moved to a general ward on the 7th postoperative day. For anticoagulant therapy, a dose of 20,000-units of heparin a day was continued for 20 days and then were commenced warfarin and antiplatelet therapy. The postoperative change in the pulmonary arterial pressure was evaluated by a trans-thoracic echocardiogram and its gradual decrease was confirmed (70% of the systemic pressure during the operation and 30% after a month). A Swan-Ganz catheter examination was performed on the 34th postoperative day and revealed a normalized pulmonary arterial pressure (28/13 mmHg when the systemic pressure was 110/70 mmHg). The results of the pulmonary perfusion scintigraphy were consistent with the pulmonary arterial pressure findings. Although the filling defects were marked and perfusion was only seen in the right middle and left upper lobes on the 6th postoperative day, during the next 7 weeks, pulmonary perfusion dramatically improved and no significant filling defects were observed

(Fig. 2). A postoperative pathological examination revealed that the thrombi from the heart were fresh. However, those from the pulmonary artery were partially organized and appeared to be old.

Discussion

The indications for surgically treating severe PTE still remain controversial.¹⁻⁶ Lund et al. have previously recommended indications for PTE surgery.¹⁾ In their report, contraindications to surgery included PTE with symptoms for more than 7 days, several recurrent episodes, a systolic pulmonary artery pressure over 60 mmHg and any signs of older organized multiple emboli. Our case included their criteria of contraindications, and in fact, we probably would have hesitated to undertake surgery if a large floating thrombus in the right heart had not been found.

As to whether this patient was in an acute or in subacute phase, there was some evidence indicating progression beyond the acute phase. First, he had had symptoms

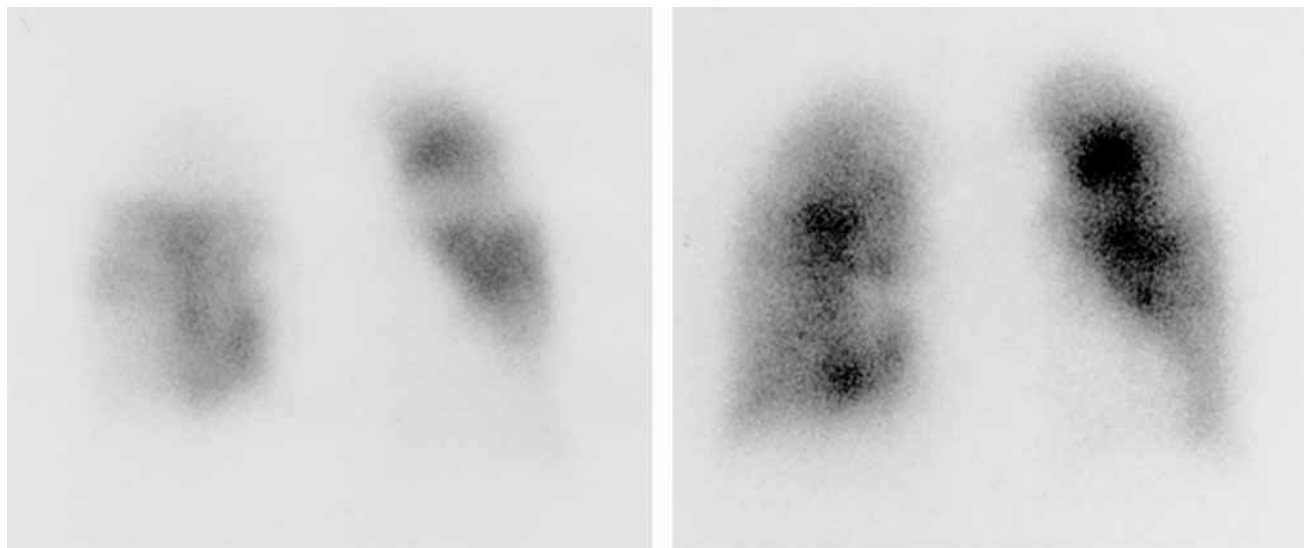


Fig. 2. Pulmonary perfusion scintigraphy showing complete filling defects in the right upper and lower lobes and left lower lobes on the 6th postoperative day (left), and no significant defects on the 55th postoperative day (right).

for more than a month and secondly his electrocardiogram already showed right ventricular hypertrophy on his arrival with no past history of any cardiac or pulmonary disease. Thirdly, the thrombus from the pulmonary artery had already become organized on pathological examination and therefore, we believe that it would have been difficult to remove or treat those thrombi by catheter evacuation or medical thrombolytic therapy.⁶⁾

The surgical removal of a thrombus in the right heart and pulmonary arteries is not technically difficult in itself. However, we would emphasize that surgeons have to be careful about bleeding from the pulmonary arteries on weaning from the bypass in cases in which the pulmonary pressure is severely increased.⁷⁾ We experienced this problem and used a Cabrol shunt to obtain adequate hemostasis.⁸⁾ The pulmonary artery, with severe hypertension, is extremely fragile and sometimes simple stitches may exacerbate the bleeding.

Conclusion

We successfully treated a patient who had had respiratory symptoms for more than a month with severe pulmonary hypertension. His pulmonary arterial pressure decreased and his pulmonary perfusion almost normalized one month after the operation. Our experience suggests a possible additional surgical indication for PTE.

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