Surgical Thrombectomy for Right Heart Thrombus with Acute Aortic Dissection

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An 81-year-old female complaining of severe back pain was admitted to hospital and diagnosed with acute type A aortic dissection with a thrombosed false lumen. Aggressive anti-hypertensive therapy was selected. On day 8, computed tomography showed pulmonary artery thrombus, and transthoracic echocardiography showed a 76 × 70 mm worm-like floating right heart thrombus. Thrombolytic therapy is reported to be the optimal treatment for patients with pulmonary embolism and floating right heart thrombus, but is contraindicated in acute aortic dissection. The patient underwent surgical thrombectomy, which revealed thrombus entrapped in the Chiari network. An inferior vena cava filter was placed. The patient recovered uneventfully and was discharged home after initiation of warfarin therapy.

Keywords: aortic dissection, pulmonary embolism, right heart thrombus, surgery

Introduction

Floating right heart thrombus (FRHT) occurs when deep venous thrombus detaches and temporarily becomes lodged in the right heart. Previous studies suggest that FRHT occurs in 7% to 18% of patients with pulmonary embolism (PE), and that PE with FRHT has a higher mortality rate than PE alone.1,2) FRHT requires emergency treatment, but reported case series are small and the optimal therapy remains unclear. Very little information is available regarding the optimal treatment of patients with acute aortic dissection complicated by PE and FRHT.

We describe herein an unusual case of acute type A aortic dissection complicated by PE and FRHT, that was successfully treated with surgical thrombectomy.

Case Report

An 81-year-old female with a history of chronic atrial fibrillation was admitted to hospital complaining of dyspnea and severe back pain. Chest X-ray on admission showed widening of the mediastinum with a cardiothoracic ratio of 75%, and normal lung fields. Electrocardiography showed atrial fibrillation with incomplete right bundle-branch block. Contrast-enhanced computed tomography (CT) showed aortic dissection with a thrombosed false lumen from the ascending aorta to the level of the diaphragm (aorta; 49 mm in diameter; false lumen; 9 mm in diameter) and a slight pericardial effusion (Fig. 1). Based on these findings, she was diagnosed with acute type A aortic dissection with a thrombosed false lumen. At the
point of diagnosis, her blood pressure was 120/70 mmHg and the complaints of back pain had disappeared. We considered that the indication of surgical repair for acute type A aortic dissection with thrombosed false lumen was at the borderline based on the Guidelines for Diagnosis and Treatment of Aortic Aneurysm and Aortic Dissection by the Japanese Circulation Society. In addition, the facilities to perform emergent surgery were not available at that time. Aggressive anti-hypertensive therapy aimed at less than 100 mmHg with blood pressure was initiated. CT performed the next day showed disappearance of the pericardial effusion and no increase in the diameters of the ascending aorta or false lumen, and we continued conservative therapy.

On day 4 and 8, repeat CT did not show any increase in the diameters of the aorta or false lumen, or any other new findings. On day 10, coagulation tests revealed increasing levels of fibrin degradation products to 40.2 µg/mL (normal range up to 10.0 µg/mL), D-dimer to 22.8 µg/mL (normal range up to 0.5 µg/mL), and fibrinogen to 580 mg/dL (normal range up to 400 mg/dL). Contrast-enhanced CT showed small thrombus in the pulmonary artery, and enlarged right ventricle, and reduction in diameter of ascending aorta (47 mm) and thrombosed false lumen (6 mm). Transthoracic echocardiography on the same day showed a 76 × 70 mm worm-like FRHT (Fig. 2). Pulsed Doppler echocardiography showed an estimated systolic pulmonary artery pressure of 40 mmHg. Deep venous thrombosis (DVT) resulting from bed rest was considered as a possible cause of PE, but clinical examination did not reveal edema of the lower limbs.

As recanalization or re-dissection of the thrombosed false lumen is potentially fatal in patients with acute

Fig. 1 Contrast-enhanced computed tomography images on admission, showing mediastinal hematoma (A, B), a false lumen from the ascending aorta to the level of the diaphragm (A–C), and a pericardial effusion (D).
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Thrombus entrapped within the Chiari network was observed (Fig. 3). There was a long remnant of the embryonic Chiari network in the right atrium, which may have acted as an anatomic barrier preventing massive PE. As the diameter of the ascending aorta and thrombosed false lumen decreased, we did not perform ascending aorta replacement. An inferior vena cava filter was placed, as anticoagulation therapy was not desirable during the acute phase of aortic dissection. The patient recovered uneventfully and was discharged home after initiation of warfarin therapy.

Discussion

We reported here in a patient with acute type A aortic dissection complicated by PE and FRHT, who was successfully treated by surgical thrombectomy. In patients with PE, the incidence of FRHT is reported to be 7% to 18%.1,2 PE with FRHT has a higher mortality rate than PE alone, but the optimal management of PE complicated by FRHT is unclear. Published reports differ in their recommendations for treatment, advocating surgical thrombectomy,1) anticoagulation therapy,3) or thrombolytic therapy.4,5) Surgical thrombectomy carries some risks including a treatment delay of at least hours, general anesthesia, cardiopulmonary bypass, and inability to remove pulmonary thrombi beyond the central pulmonary arteries. As nearly all patients with FRHT also have massive bilateral PE, treatment with anticoagulation therapy alone carries a risk of embolization of FRHT. In contrast, thrombolytic therapy can be administered quickly, and effectively treats all cardiac, pulmonary arterial, and femoral venous thrombi.
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Rose and colleagues\textsuperscript{6} conducted a retrospective study of patients with FRHT in 2002, and reported that the overall mortality rate was 28% in treated patients and 100% in untreated patients. They divided patients into four treatment groups: no treatment (9%), surgical thrombectomy (35.6%), anticoagulation therapy (35.0%), or thrombolytic therapy (19.8%); these groups had mortality rates of 100%, 23.8%, 28.6%, and 11.3%, respectively. Multivariate modeling with survival as the primary outcome found that thrombolytic therapy was associated with an improved survival rate compared with either anticoagulation therapy or surgical thrombectomy ($p<0.05$). These data indicate that thrombolytic therapy is the optimal treatment for patients with PE complicated by FRHT.

Despite patients with acute aortic dissection are forced to stay in bed for a long time, administrations of any anticoagulant in the acute phase of aortic dissection are avoided because they might be fatal in some cases. However, very few cases of acute aortic dissection complicated by DVT and PE have been reported. Estrera and colleagues\textsuperscript{7} reported that 2 of 129 patients (1.6%) with acute type B aortic dissection who underwent medical treatment developed PE. Morimoto and colleagues\textsuperscript{8} reported a case of acute type B aortic dissection in which a permanent inferior vena cava filter effectively prevented recurrence of PE resulting from DVT, without anticoagulation therapy.

Acute aortic dissection complicated by PE and FRHT is extremely rare. In the present case, although CT image and physical examination did not show obvious evidence of DVT, right heart thrombus as well as PTE may have derived from DVT caused by long-standing bed rest. Reportedly, 90% of all PTE derives from DVT. We suspect that small DVT splashed to the pulmonary arteries through Chiari network, and large DVT were caught by Chiari network in the right ventricle.

The optimal therapeutic strategy for these patients remains unclear, as thrombolytic therapy, which is the optimal therapy in patients with PE and FRHT, is contraindicated in patients with acute aortic dissection. After consideration of the above issues, surgical thrombectomy was successfully performed in our patient, and an inferior vena cava filter was placed to avoid the need for anticoagulation therapy during the acute phase of aortic dissection.

**Conclusions**

We report here in a patient with acute type A aortic dissection complicated by PE and FRHT, who was successfully treated by surgical thrombectomy. Further cases should be studied to determine the optimal therapeutic approach for such patients.

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**Disclosure Statement**

None.

**References**