

Thrombolysis for Saddle Pulmonary Embolism and 3-Chamber Thrombus

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Currently, the only widely accepted indication for thrombolysis in cases of pulmonary embolism is hemodynamic instability. However, the presence of a right-heart thrombus along with pulmonary embolism is a poor prognostic indicator, and the use of thrombolytic agents should also be considered in this circumstance. Furthermore, despite a risk of distal embolization, thrombolytic therapy may be implemented if the intracardiac thrombus also straddles a patent foramen ovale.

Herein, we present the case of a 92-year-old woman who presented at our institution after a syncopal event and multiple recent episodes of amaurosis fugax. Transthoracic echocardiography revealed a mobile right-heart thrombus that extended through a patent foramen ovale into the left atrium. Computed tomography of the chest showed a saddle pulmonary embolus. We used thrombolytic therapy to treat the patient, and imaging showed complete resolution of the thrombus and the embolism 2 days later. (*Tex Heart Inst J* 2010;37(2):234-6)

Key words: Heart diseases/ complications/mortality/ therapy; pulmonary embolism/ complications; thrombolytic therapy; thrombosis/ complications/drug therapy

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The reported incidence of a right-heart thrombus associated with pulmonary embolism (PE) ranges from 3% to 23%.¹ However, the prevalence of a right-heart thrombus in patients with a diagnosis of PE is increased in those who have hypotension, severe hypoxemia, and right ventricular strain. In 2003, Torbicki and colleagues² reported that a right-heart thrombus portends an increased mortality rate even in patients who appear clinically stable upon presentation. Currently, the only widely accepted indication for thrombolysis in cases of PE is hemodynamic instability. However, because a right-heart thrombus is a poor prognostic factor for PE, thrombolysis should also be considered in this circumstance. Despite the risk of distal embolization, thrombolytic therapy can still be considered even when the intracardiac thrombus extends into the left-sided circulation via a patent foramen ovale (PFO). Here, we present and discuss the case of a 92-year-old woman who had a saddle PE and a 3-chamber intracardiac thrombus.

Case Report

In September 2009, a 92-year-old woman presented at her local hospital after experiencing a syncopal event and several episodes of transient loss of vision during the preceding week. She reported no chest discomfort, difficulty breathing, or other focal neurologic deficits. She had no history of cardiac, pulmonary, or cerebral vascular disease, and she reported no prior episodes of syncope. Her medical history was significant only for hypertension.

The patient was hemodynamically stable upon her transfer to our institution. Results of a physical examination were noteworthy for elevated jugular venous pressure, a loud and widely split S₂, and left-lower-extremity edema. Laboratory results included a D-dimer level of 9,835 µg/mL and an elevated troponin level of 0.36 ng/mL. An electrocardiogram showed sinus rhythm with 1st-degree atrioventricular block, left anterior fascicular block, and T-wave inversions in the inferior leads. Chest radiography showed normal results. Transthoracic echocardiography (TTE) revealed a mobile right-heart thrombus that extended through a PFO into the left atrium (Fig. 1). Computed tomography of the chest revealed saddle PE (Fig. 2).

As a temporizing measure, the patient was immediately administered continuous, high-dose intravenous heparin for anticoagulation. Cardiothoracic surgeons were consulted regarding open pulmonary embolectomy. The risks and benefits of both pul-

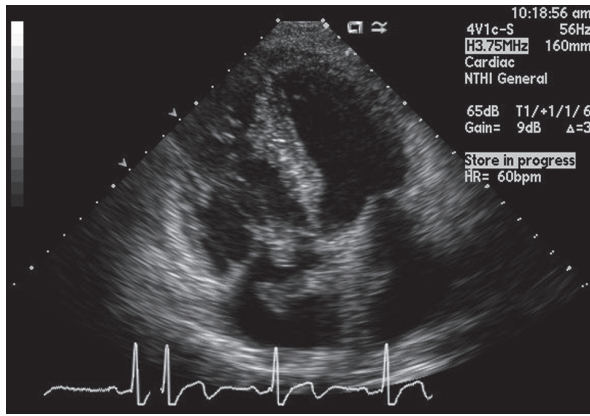


Fig. 1 A thrombus extends into the dilated right ventricle during diastole and also traverses a patent foramen ovale. The thrombus can also be seen in the left atrium.

Real-time motion images are available at www.texasheart.org/journal.

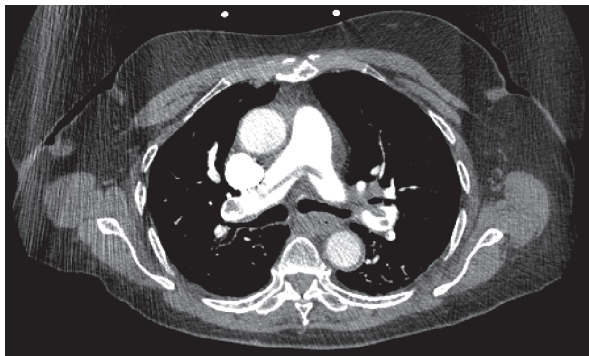


Fig. 2 Computed tomography of the chest shows a large saddle pulmonary embolus.

monary embolectomy and thrombolytic therapy were extensively discussed with the patient and her family. Because the patient's age made her a high-risk surgical candidate, the decision was made to proceed with thrombolytic therapy, and 100 mg of intravenous alteplase was infused over 2 hours. There was no sign of stroke, transient ischemic attack, or hemodynamic compromise during or after the infusion.

Within 2 days, TTE and chest computed tomography (PE protocol) were repeated. The intracardiac thrombus and saddle PE had both completely resolved (Fig. 3).

The patient was discharged from the hospital 10 days after initial presentation with instructions to take oral anticoagulants. At her 9-month follow-up examination, she remained asymptomatic.

Discussion

The defining feature in this case was a mobile right-heart thrombus that extended into the left atrium via a PFO. The right-heart thrombus correlated with the PE

and the patient's syncope. The thrombus in the left atrium was the likely cause of the patient's transient vision losses (amaurosis fugax). The therapeutic options available in such a situation are anticoagulation, thrombolysis, and surgery. However, the most effective therapy has not yet been clearly defined. Cases of right-heart thrombi have been reported and studied, as have thrombi that straddle interatrial communications. However, few reports have encompassed both of these features.

In the medical literature, the most extensive study of echocardiographically diagnosed right-heart thromboemboli was a retrospective analysis by Rose and colleagues in 2002.¹ They reviewed 177 cases from 1966 through 2000, 98% of which had associated PE. Nine percent of the patients received no treatment, 20% received anticoagulation, 35% received thrombolytic agents, and 36% underwent surgery. The respective mortality rates were 100%, 28.6%, 11.3%, and 23.8%. The only prospective series was reported by Pierre-Justin and Pierard in 2005.³ Systematic TTE was performed in 335 consecutive patients in whom PE had been confirmed. Twelve of the 335 were found to have a mobile right-heart thrombus that was similar to what we found in our patient. Three of the 12 received intravenous heparin alone, and 9 received thrombolytic agents. All 3 patients who received only heparin died. Of the 9 who received thrombolytic therapy, only 2 patients required adjunctive surgery (1 of whom died). Repeat TTE performed in the surviving patients 12 hours after the infusion of thrombolytic agents showed complete lysis of the right-heart thrombi and improved right ventricular function. These 2 studies show that thrombolytic therapy is not only a reasonable treatment, but that it may be the most effective form of therapy in patients who present with PE and right-heart thrombus.

The use of thrombolytic therapy in the treatment of thrombi that straddle interatrial communications is a less accepted method. In addition to the risk of hem-

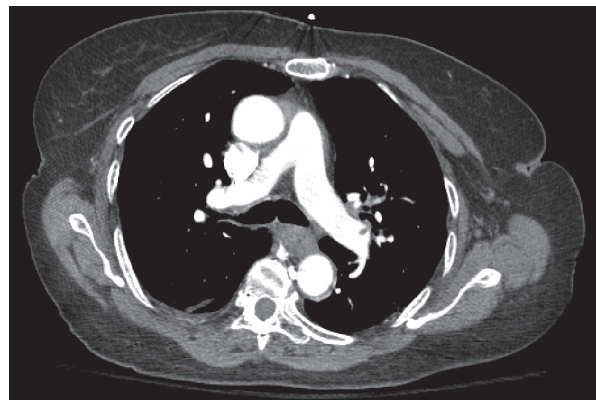


Fig. 3 Computed tomography shows complete resolution of the thrombus and the saddle pulmonary embolus 2 days after thrombolytic therapy.

orrhage, there is also a risk of distal embolization. This introduces the possibility of stroke during attempts to treat a thrombus that extends into the left-sided circulation. In 2006, Turkish investigators reported in a literature review that, in 46 documented cases of thrombi within interatrial communications, thrombolytic agents were used in only 6 patients.⁴ Four of the patients survived, and 1 died (the endpoint for the final patient was unknown). The same study reported that surgery was performed in 24 patients, 20 of whom survived. Eleven patients received only heparin, followed by oral anticoagulation; 7 of these patients survived. Although this study showed that surgery was the preferred form of management in the appropriate clinical candidate, it did not necessarily prove that surgery was more effective than were other methods.

In our patient, we concluded that the presence of a mobile right-heart thrombus would increase the risk of a poor outcome if intravenous heparin alone were used. In view of the patient's age, functional status, and wishes after we explained the options, we decided to proceed with thrombolytic therapy instead of surgery. Had the patient had a mobile right-heart thrombus alone, we likely would have suggested thrombolytic therapy regardless of her age. However, the fact that her thrombus

extended into a PFO made such a decision less straightforward.

In the absence of indications to the contrary, thrombolytic therapy can be considered in the treatment of a thrombus that straddles an interatrial communication, when the patient is thought not to be a favorable surgical candidate. This is especially true in the rare instance in which a right-heart thrombus is also present, although research data do support thrombolysis in this setting.

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