



Successful catheter-directed thrombolysis of a massive pulmonary embolism in a patient after recent pneumonectomy



Kyungmouk S. Lee^a, Akhilesh K. Sista^a, Oren A. Friedman^b, James M. Horowitz^c, Jeffrey L. Port^d, David C. Madoff^{a,*}

^a Department of Radiology, Division of Interventional Radiology, New York-Presbyterian Hospital/Weill Cornell Medical Center, New York, NY

^b Department of Medicine, Division of Pulmonary & Critical Care Medicine, New York-Presbyterian Hospital/Weill Cornell Medical Center, New York, NY

^c Department of Medicine, Division of Cardiology, New York-Presbyterian Hospital/Weill Cornell Medical Center, New York, NY

^d Department of Cardiothoracic Surgery, New York-Presbyterian Hospital/Weill Cornell Medical Center, New York, NY

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ABSTRACT

Massive pulmonary embolism (PE) after major thoracic surgery is an uncommon but life-threatening event that is challenging to manage. At present, the treatment of acute PE is either anticoagulation with or without systemic thrombolytic therapy. We report a case of a 65-year-old female with recent left pneumonectomy who developed a massive PE. The patient was successfully and safely treated with catheter-directed thrombolysis. To our knowledge, this is the first patient treated in this fashion.

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1. Introduction

Acute pulmonary embolism (PE) is life-threatening and the third most common cause of death in hospitalized patients. In the United States, approximately 100,000 to 180,000 people die each year from acute PE [1]. Poor outcome in acute PE is related to hemodynamic instability. In the International Cooperative Pulmonary Embolism Registry, patients with acute PE and systolic blood pressure <90 mmHg had a 90-day mortality rate of 52.4% versus 14.7% in the rest of the cohort [2]. Consequently, the American Heart Association has defined massive PE as acute PE with hemodynamic instability, that is, sustained hypotension (systolic blood pressure <90 mmHg for at least 15 min or requiring inotropic support), pulselessness, or persistent profound bradycardia (heart rate <40 beats per minute with signs or symptoms of shock) [3]. It should be noted that thrombus burden is not in this definition; one half of fatal cases of PE are actually caused by emboli with less than 50% obstruction or occlusion of less than two lobar arteries [4].

For patients with massive PE who are in shock, societal recommendations are to escalate treatment beyond anticoagulation using either thrombolytic techniques or surgical embolectomy [3,5]. Surgical embolectomy requires a median sternotomy with cardiopulmonary bypass and is most effective in patients with large, centrally located thrombi. Catheter-directed therapy is emerging as an attractive alternative

when systemic thrombolysis has failed or is contraindicated. Moreover, catheter-directed intervention may be considered a first-line treatment escalation option [6]. Especially in situations with high risk of bleeding such as recent thoracic surgery, catheter-directed thrombolysis (CDT) may be the safest therapeutic option for massive PE.

Herein is a case of successful CDT of a massive PE in a patient status postpneumonectomy.

2. Case report

A 65-year-old woman presented with 2 days of increasing dyspnea and perceived tachycardia. Six weeks prior, she underwent a left pneumonectomy to remove a neuroendocrine tumor. Her past medical history was significant for deep venous thrombosis in the right lower extremity for which she had completed a 6-month course of rivaroxaban. On physical exam, the patient was hemodynamically unstable, with a systolic arterial pressure of 82 mmHg \times >15 min and a heart rate of 128 beats per minute, qualifying her as being in the massive category. The systolic pressure remained less than 90 mmHg for at least 30 min. She was in respiratory distress and had difficulty speaking in full sentences. Her respiratory rate was 22 breaths per minute, and her oxygen saturation was 92% on room air. The patient had no fever or leukocytosis. The serum brain natriuretic peptide was elevated to 340 pg/ml, and the serum troponin was mildly elevated to 0.14 ng/ml. Chest radiography showed a clear right lung and an absent left lung. Contrast-enhanced computed tomography (CT) showed extensive thrombus in the interlobar pulmonary artery and segmental

* Corresponding author. Department of Radiology, Division of Interventional Radiology, New York-Presbyterian Hospital/Weill Cornell Medical Center, 525 East 68th Street P-518, New, York, NY 10065. Tel.: +1-212-746-2602; fax: +1-212-746-8891.

E-mail address: dcm9006@med.cornell.edu (D.C. Madoff).

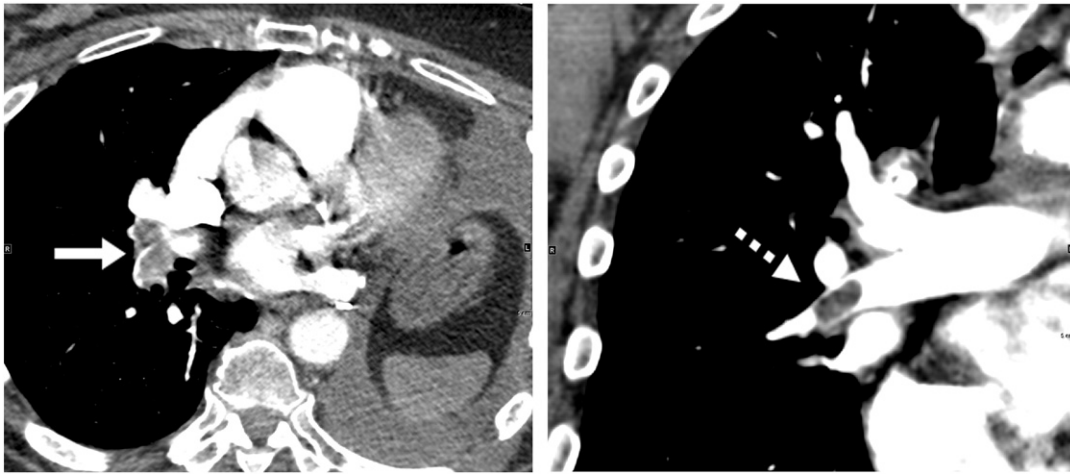


Fig. 1. Axial (left) and coronal (right) images from a CT of the chest with intravenous contrast demonstrate thrombus in the interlobar pulmonary artery (arrow, dotted arrow).

branches (Fig. 1). CT and bedside echocardiography showed right ventricular enlargement and dilatation.

Oxygen, normal saline, and intravenous continuous unfractionated heparin were initiated, but her signs and symptoms did not improve. Therefore, the patient was brought emergently to the interventional radiology suite for CDT. After access was obtained via the right common femoral vein, a right main pulmonary arteriogram was performed which demonstrated a large filling defect in the interlobar pulmonary artery with associated perfusion defects in the right lower lobe. The right main pulmonary artery pressure was elevated to 58/18 (mean 35) mmHg. A 5-French, 20-cm infusion length catheter was positioned within the thrombus in the right lower lobe pulmonary artery (Fig. 2). A loading dose of 6 mg of alteplase was infused directly into the clot followed by an alteplase infusion at 0.5 mg/h. Systemic intravenous heparin was concurrently administered with a goal partial thromboplastin time of 60 to 80 s.

After 14 h of monitored catheter-directed infusion in the intensive care unit, the patient returned to the interventional radiology suite. Right pulmonary arteriogram showed complete resolution of thrombus (Fig. 3). The right main pulmonary artery pressure improved to 39/6 (mean 18) mmHg. The pulmonary artery infusion catheter was removed.

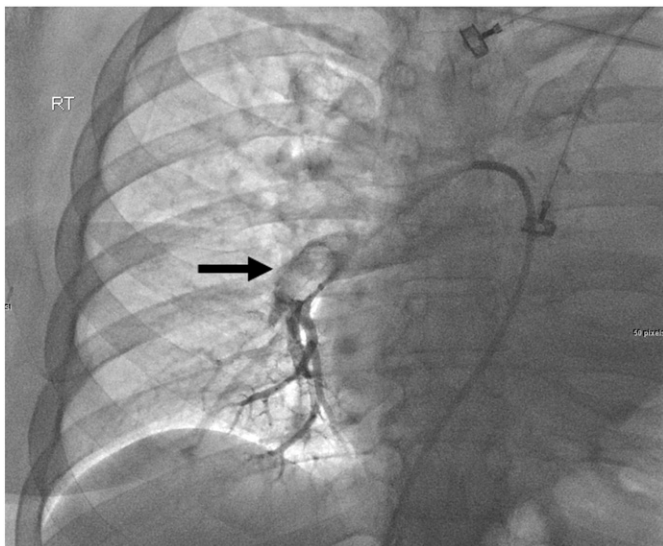


Fig. 2. Right pulmonary arteriogram demonstrates a 5-French, 20-cm infusion length catheter positioned within the thrombus in the right lower lobe pulmonary artery (arrow). The right main pulmonary artery pressure was elevated to 58/18 (mean 35) mmHg.

Her oxygen saturation was 100% on room air, and her systolic arterial pressure was 123 mmHg. Intravenous continuous unfractionated heparin was continued for 1 week. At that time, an inferior vena cava filter was placed given the history of deep venous thrombus in the lower extremity and to prevent future PE. The patient was also started on life-long rivaroxaban. The patient was discharged home, and a follow-up outpatient visit 1 month later confirmed that the patient remained symptom-free and back to her baseline level of activity.

3. Discussion

Herein, we report a case of a massive PE patient with recent pneumonectomy who was successfully and safely treated with catheter-directed infusion of tissue plasminogen activator (tPA). This clinical scenario highlights the challenges of managing acute PE after

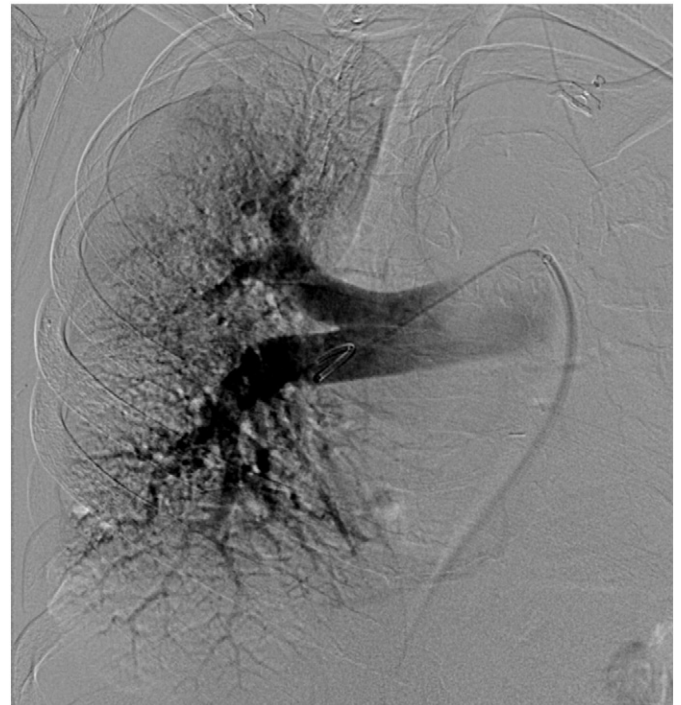


Fig. 3. After 14 h of CDT, repeat right pulmonary arteriogram demonstrates resolution of embolus in the right pulmonary artery with improved perfusion. The right main pulmonary artery pressure dropped to 39/6 (mean 18) mmHg.

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