



Challenging Case of Recurrent Saddle Pulmonary Emboli From Extensive Lower Extremity Deep Vein Thrombosis

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Author Disclosures: None



Background

The annual incidence of first-time deep vein thromboses (DVT) is estimated to be 100 in every 100,000 individuals ¹. Common predisposing factors to the development of DVT include prolonged immobility, recent surgery, recent injuries, malignancy, pregnancy, or certain medications ¹. Of patients who develop DVT approximately 1/3 develop Pulmonary Emboli (PE) ¹.

PE affect an estimated 1.15 in every 1000 people in the United States annually, and account for approximately 0.16% of all ED visits ¹. Despite the relatively low incidence, PE remains the third leading cause of cardiovascular related mortality with rates estimated as high as 30% ¹. Despite the greater incidence of DVT, PE carry almost a two-fold higher mortality rate. Management of PE ranges from surgical or minimally invasive options to pharmacologic management, depending on the severity of patient symptoms. Currently there are limited studies supporting performing peripheral thrombectomy in cases where a PE is provoked by an extensive DVT.

We present the case of a 59-year-old patient with extensive DVT who developed recurrent saddle PE despite undergoing first line intervention and recommended anticoagulation.

Methods

A comprehensive review of the patient's medical records was performed. Diagnostic modalities such as Transthoracic Echocardiogram (TTE), Computed Tomography Angiography Pulmonary Embolism (CTA PE), Pulmonary Angiogram (PA), and Venous Doppler Ultrasound (US) were performed. The patient's care involved a multidisciplinary approach including specialists in Interventional Radiology, Cardiology, Critical Care, and Hematology.

References

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Case Summary

59-year-old Male with PMHx of previous right lower extremity DVT after tibial fracture in 2022, thymic neoplasm, and prior IV drug use. Patient presenting with worsening exertional dyspnea with associated lightheadedness/dizziness, pleuritic chest pain, and pre-syncope episode earlier that day.

- Vitals: Afebrile, P = 121, BP = 96/63, RR = 20, SpO2 = 90% on RA
- ECG: Sinus tachycardia, RBBB, S1Q3T3 pattern, T wave inversions in inferior and anteroseptal leads
- NT-pro-BNP = 17,596 pg/mL
- High Sensitivity Troponin = 1171 ng/L
- Lactic Acid = 3.9 mmol/L
- CTA PE: Extensive large saddle pulmonary embolism extending into all pulmonary arteries bilaterally, with near complete occlusion of bilateral lobar branches (Figure 1). Significant right heart dilation noted (Figure 2) (RV:LV = 1.8). Stable anterior mediastinal mass measuring 5.8 x 3.1 cm.
- TTE: Right Ventricle dilation, systolic function reduced, akinesis of basal and middle segments with hyperkinesis of the apex consistent with McConnell's sign (Figure 3). Mild pulmonic and tricuspid valve regurgitation. Right atrial dilation noted (Figure3). Left ventricle systolic function is normal, with no regional wall motion abnormalities.
- Venous duplex ultrasound of bilateral lower extremities: Acute thrombus extending from left common femoral vein just proximal to the popliteal vein until the peroneal vein. Sub-occlusive thrombus in right popliteal vein, other right lower extremity veins without evidence of occlusion.

Hospital Course:

Patient diagnosed with sub-massive PE, PERT was activated, and he was taken for emergency mechanical thrombectomy. Pulmonary angiography demonstrated bilateral pulmonary arterial filling defects (Figure 4). Clots were extracted from three branches of the right and two branches of the left pulmonary arteries (Figure 5). Pulmonary artery pressure pre-procedure was 59 mmHg and improved to 47 mmHg post-procedure. His dyspnea, pleuritic chest pain, and sinus tachycardia resolved after thrombectomy and he was started on a continuous heparin infusion.

14 hours post-thrombectomy patient again developed dyspnea and pleuritic chest pain with sinus tachycardia noted on telemetry.

Repeat CTA PE: Recurrent sub-massive saddle pulmonary embolism extending into bilateral left and right main pulmonary arteries (Figure 6), with improvement in right ventricle size, however persistent RV strain noted (Figure 7), now with potentially developing right lung pulmonary infarcts.

Second emergent mechanical thrombectomy performed for recurrent sub-massive saddle pulmonary emboli (Figure 8). Emboli removed from three branches of the right and one branch of the left pulmonary arteries (Figure 9). Post-procedure he reported complete resolution of dyspnea, pleuritic chest pain, and resolution of sinus tachycardia.

Hematology/Oncology determined these were provoked PE and DVTs given the patient's malignancy and current IV drug use. Hypercoagulable work up was deferred given that it was previously negative, it was determined that patient will require life long anti-coagulation going forward, and he was started on Xarelto. Repeat TTE after 3 months demonstrated complete resolution of RV strain and return to normal size. There has been no reported recurrence of PE to date.

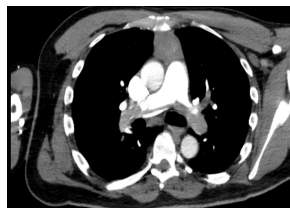


Figure 1: Initial CTA PE demonstrating large saddle embolism extending into the bilateral pulmonary arteries.

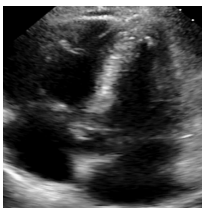


Figure 2: Pre-thrombectomy TTE demonstrating severe RV dilation, interventricular septal flattening, and RA enlargement.



Figure 3: Pulmonary angiography post-thrombectomy, with clots removed from three branches of the right and two branches of the left pulmonary arteries.

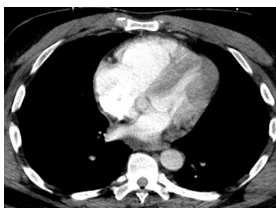


Figure 4: Repeat CTA PE demonstrating persistent RV enlargement with slight interval improvement compared to previous studies.



Figure 5: Pulmonary angiography after removal of emboli from 3 branches of the right and 1 branch of the left pulmonary artery, complete resolution of filling defects.

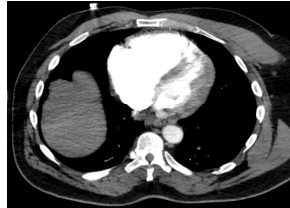


Figure 6: CTA PE demonstrating significant RV enlargement (RV:LV ratio = 1.8).



Figure 7: Pulmonary angiography demonstrating bilateral pulmonary artery filling defects with saddle component.

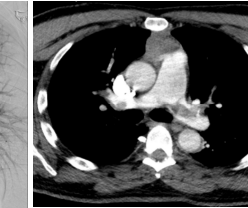


Figure 8: Repeat CTA PE demonstrating recurrence of PE in the left main pulmonary artery with extension in the right pulmonary artery.

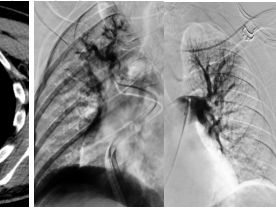


Figure 9: Repeat Pulmonary angiogram demonstrating thrombus in the left main upper and lower lobe arteries. Thrombus also noted in the junction between the right main and lower lobe arteries.

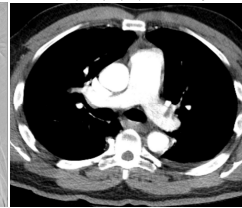


Figure 10: CTA PE performed 48 hours after second thrombectomy, demonstrating resolution of bilateral pulmonary emboli.

Discussion & Conclusion

Our patient had a prior history of provoked DVT for which he completed the recommended three-month course of anti-coagulation, now presenting with a new provoked DVT and PE in the setting of new thymic adenocarcinoma. Despite undergoing mechanical thrombectomy with complete clot removal and initiating full dose systemic anticoagulation the patient developed recurrent saddle pulmonary embolism 14 hours later, requiring a second thrombectomy. The etiology of the recurrent PE was suspected to be from the femoropopliteal DVT.

Current guidelines regarding endovascular intervention for DVT are limited to massive acute DVT affecting proximal lower extremity vessels (iliofemoral or femoropopliteal) with severe painful leg swelling ³. Asymptomatic proximal DVTs are often managed medically because of the limited evidence available regarding the benefits of endovascular interventions in mitigating clot propagation or PE recurrence ³.

In our patient's case, endovascular intervention for the DVT was initially considered because of its size and recurrence of PE despite first line intervention and parenteral anticoagulation. Ultimately intervention was deferred due to the absence of lower extremity symptoms and the limited available evidence of benefit in patients. Plans were made to pursue life long anticoagulation and re-evaluate DVT with lower extremity duplex ultrasound after 3 months, and if no significant reduction in size additional intervention would be considered.

The placement of a retrievable IVC filter was also considered in our patient. Studies have demonstrated the utility of these devices in cases where individuals need additional prophylaxis in the short term ⁴. Currently the recommendations are to leave these devices in place for a maximum of 14-21 days, however some devices have reportedly been successfully removed after 130 days ⁴. There are currently no studies investigating the benefit of these devices in such unique instances however it may provide potential benefit. The decision to place a temporary IVC filter was deferred due to the limited available evidence of its benefit and due to concerns for potential infection given the patient's current IV drug use.