

Extracorporeal Life Support and Catheter Thrombectomy after Systemic Thrombolysis and Cardiac Arrest in a Patient with Pulmonary Embolism

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Introduction

- Pulmonary embolism (PE) with high-risk features is associated with elevated mortality.
- Risk stratification tools can be crucial for guiding management but can be oversimplified.
- Recognition and classification of PE in patients with normotensive shock is challenging.
- This case illustrates the limitations of risk stratification tools and the utility of extracorporeal life support (ECLS) to facilitate rescue catheter directed thrombectomy.

Case Presentation

- A 46-year-old man with a history of hypertension, chronic kidney disease, gout, and family history of Factor 5 Leiden presented to our emergency department with syncope while walking to work. Earlier that morning, the patient reported having crushing chest which he thought was acid reflux.
- Initial vitals: T 97.9 F, HR 109 BPM, BP 124/88, RR 20 BPM, O₂ saturation of 95% on room air. He was comfortable appearing with an unremarkable physical exam.
- Lab values: hemoglobin 10.2 mg/dl, lactic acid (LA) 6.3 mmol/L, proBNP 252 pg/mL, and high sensitivity troponin T 53 ng/L (normal range 0-51 ng/L). EKG showed sinus tachycardia.
- CT angiography showed extensive bilateral PE extending from the proximal to distal right and left pulmonary arteries with concern for right heart strain (Figure 1).



Figure 1: CTA showing bilateral pulmonary emboli

- Transthoracic echocardiogram (TTE) noted massive right ventricular dilation with interventricular septal flattening and a classic McConnell's sign.
- PE classification: sPESI of 0 and was intermediate-low to intermediate-high risk based on European Society of Cardiology guidelines

Intervention and Treatment

- Pulmonary embolism response team (PERT) was notified. Patient was admitted to the ICU on a heparin drip with plan for percutaneous aspiration thrombectomy the next morning.
- Overnight, the patient suffered a pulseless electrical activity (PEA) cardiac arrest. After initial return of spontaneous circulation (ROSC), he developed cardiogenic shock requiring escalating vasopressor support.
- Systemic dose alteplase was administered to treat PE.
- Course was further complicated by two additional PEA cardiac arrests. After the third ROSC, LA was 15 mmol/L, PH was 6.9, alanine transferase was 83 U/L and creatinine 1.7 mg/dl.
- Shock team activated and patient placed on ECLS as a bridge to catheter aspiration thrombectomy.
- He was urgently cannulated in the cardiac catheterization laboratory using 23 Fr venous and 19 Fr arterial cannulas.
- Pulmonary angiogram then showed marked reduction in clot burden compared to admission CTA with residual thrombus in the right main pulmonary artery (Figure 2). This was extracted with aspiration thrombectomy using a 24Fr FlowTrieve catheter (Inari Medical Inc., Irvine, CA).

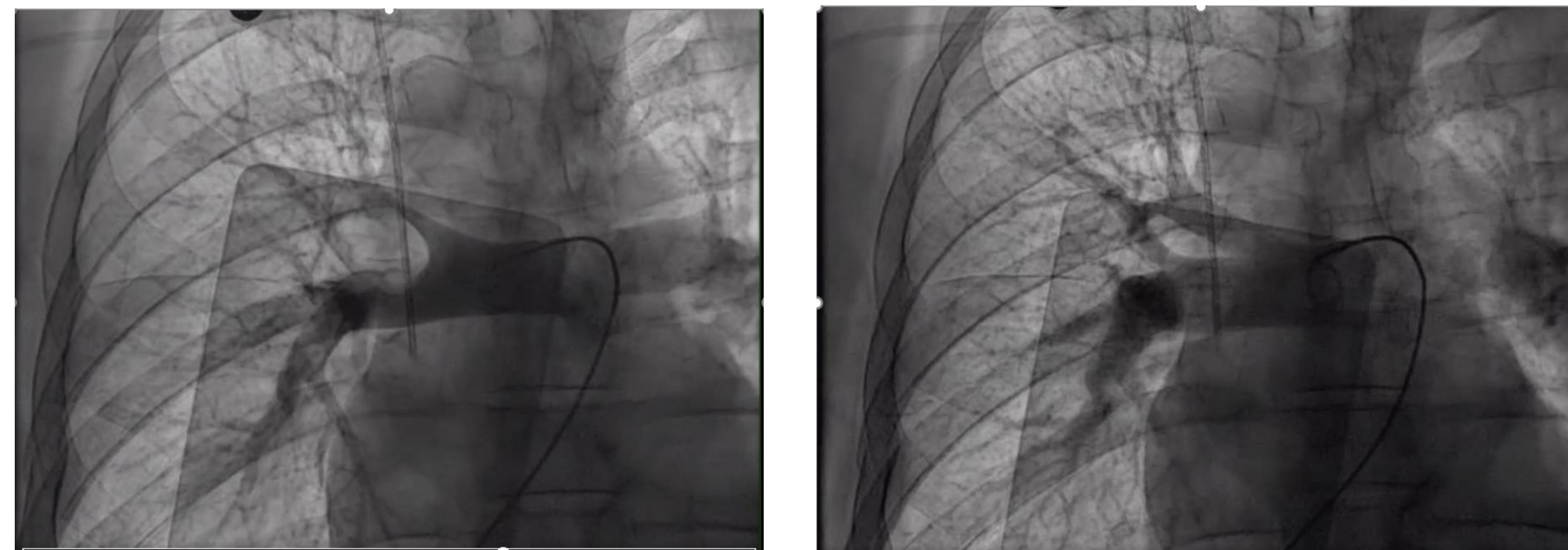


Figure 2: Pulmonary angiogram before and after thrombectomy right pulmonary artery

Hospital Course and Outcome

- Over the next 24 hours, his LA remained elevated >17 mmol/L but he exhibited >40 mmHg of pulsatility with improved right ventricular function on TTE and improving renal and liver function tests.
- By Day 3 his LA was reduced to 4mmol/L and he was successfully weaned off ECLS.
- His admission was prolonged and further complicated by healthcare associated pneumonia.
- He was eventually discharged to subacute rehabilitation on oral anticoagulation.
- Thankfully, this young patient survived to hospital discharge without major complications.
- It was determined that the patient is heterozygous for Factor 5 Leiden.

Discussion

- Our case highlights several important gaps in PE management.
- Current PE risk-stratification tools often underestimate short-term risk in patients who present with intermediate-high risk PE, normotension, and markers of poor organ perfusion.
- Inappropriate early risk prediction can lead to delays in aggressive care, as exemplified by this case.
- Utility of ECLS is demonstrated within the structure of a PERT and shock team as a rescue therapy for hemodynamically unstable patients while facilitating the use of catheter thrombectomy.
- Earlier administration of full dose alteplase and the trauma of recurrent cardiac arrests increased the risk of bleeding complications during ECLS support.
- Risk stratification tools and complex decision-making strategies in the contemporary management of PE are rapidly evolving and are likely to improve the care of normotensive shock patients in the near future.

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