When Low Risk Isn’t Low: Paradoxical Decompensation in Submassive PE

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Introduction

- Submassive (intermediate-risk) PE, characterized by right ventricular (RV) dysfunction without systemic hypotension, carries a high mortality risk, ranging from 2–3% in randomized trials and up to 15% in observational studies.
- The ACCP estimates 7-day to 12-month mortality for submassive PE at 2.3–3.9%.
- Surgical intervention is typically reserved for patients with massive PE or those experiencing hemodynamic instability.

Case Presentation

A 28-year-old previously healthy male presented with syncope, three days of exertional dyspnea, pleuritic chest pain, and bilateral leg swelling.

- He had a family history of DVT, PE, and Factor V Leiden deficiency but was untested.
- He was tachycardic, tachypneic, normotensive, O_2 saturation 99% on RA, later requiring 5L O_2.
- EKG showed S1Q3T3 and anterior T-wave inversions.
- CTA chest showed a saddle PE with bilateral emboli, interventricular septal deviation consistent with right heart strain, and moderate right atrial enlargement.
- The patient had a troponin of 131 ng/L and a proBNP of 7,640 pg/mL. Electrolyte abnormalities included potassium of 3.3 mmol/L, chloride of 113 mmol/L, and bicarbonate of 17 mmol/L, with an anion gap of 14. Glucose was 110 mg/dL. Additional findings included calcium of 7.7 mg/dL, albumin of 2.8 g/dL, total protein of 6.1 g/dL, and WBC count of 17.7 ×10⁹/L.
- With these findings, he had a low PESI score and was classified as intermediate-low risk with submassive PE, making him ineligible for interventional procedures.

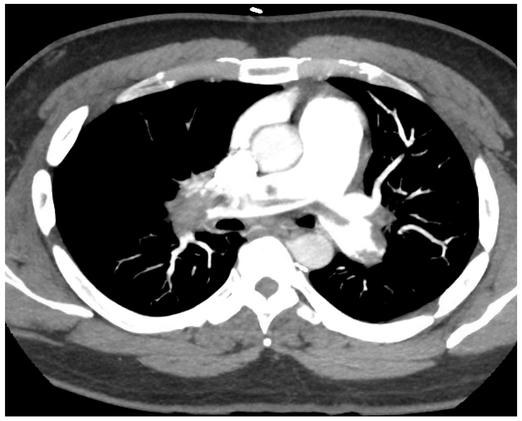

Figure 1: *CTA coronal view showing saddle PE*

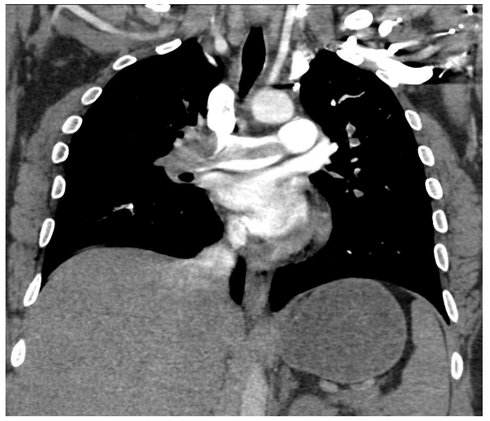

Figure 2: *CTA Sagittal view showing saddle PE*

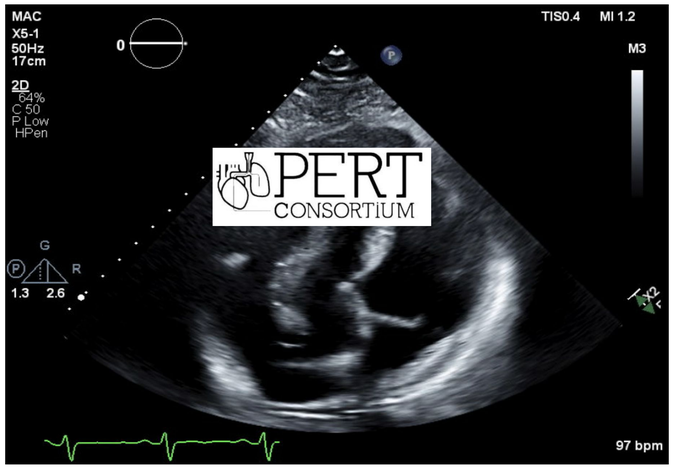

Figure 3: *Apical four-chamber view echocardiogram showing mobile mass within right ventricle*

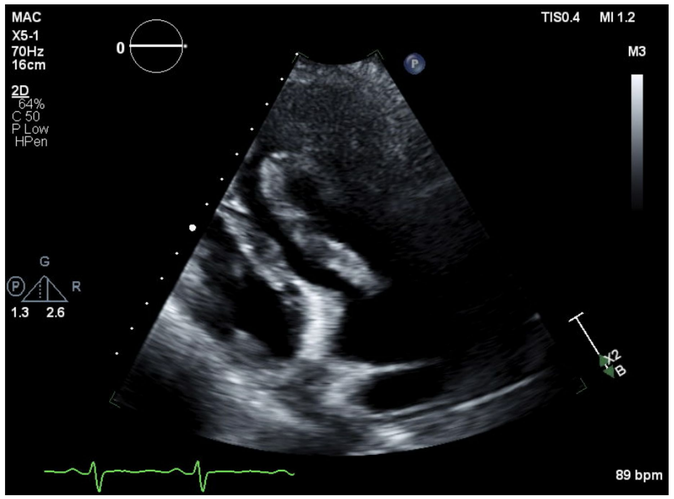

Figure 4: *Parasternal long axis view echocardiogram showing mobile mass within right ventricle*

Clinical Course

- The patient was treated with therapeutic low molecular weight heparin (LMWH), intravenous fluids, and transitioned to a heparin drip.
- Venous duplex ultrasound revealed near-occlusive thrombi in the right popliteal and calf veins, and occlusive thrombi in the left superficial femoral and calf veins. Pulsatile waveforms were noted, suggestive of elevated right heart pressures.
- Transthoracic echocardiography showed a preserved ejection fraction (EF) of 58%, with severe right ventricular (RV) dilation, interventricular septal flattening, RV pressure overload (RVSP 38 mmHg), and a mobile thrombus within the RV.
- Despite initial stability, he suddenly decompensated with chest pain, respiratory distress, and cardiac arrest. After 45 minutes of ACLS and thrombolysis, he was pronounced deceased.

Discussion

- Submassive PE poses a significant risk of sudden hemodynamic collapse.
- This case illustrates the diagnostic and management challenges with intermediate-risk PE, highlighting the limitations of risk stratification tools.
- Though his PESI score was low, sPESI classified him as high risk, and interpreting syncope differently could have altered his risk level.
- The case underscores the need to reexamine treatment thresholds and reinforces the critical importance of early echocardiography and timely multidisciplinary collaboration.