

BACKGROUND

Venous Thromboembolism (VTE):

- Most common cause of preventable death in post-operative patients¹
- In western countries, the in-hospital mortality of PE is 14%, and the 90-day mortality is 20%¹
- Patients with PE related right ventricular (RV) dysfunction have a 2.2 times increased risk of death or shock²
- Nearly 70% of PE related deaths happen within the first hours of symptom onset because of the “spiral of death” physiology³

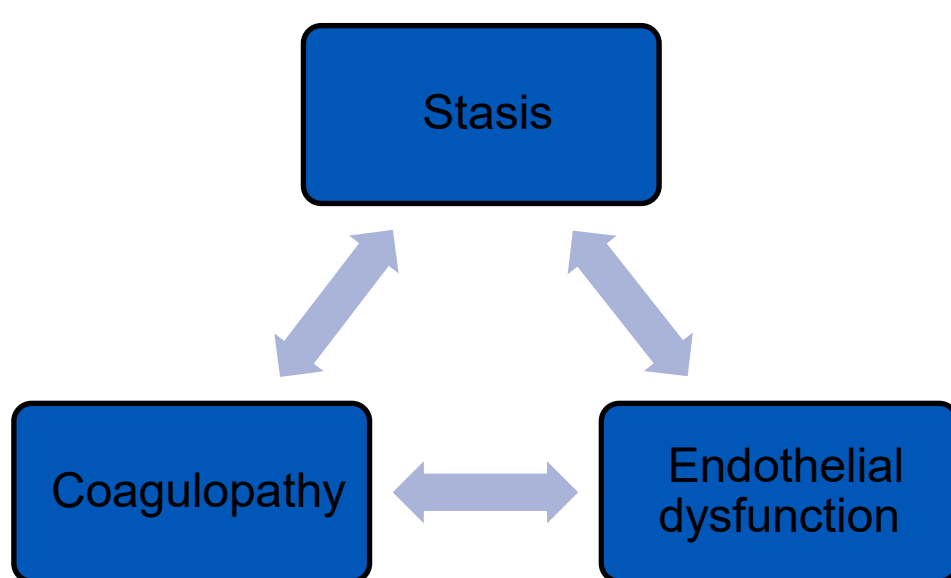
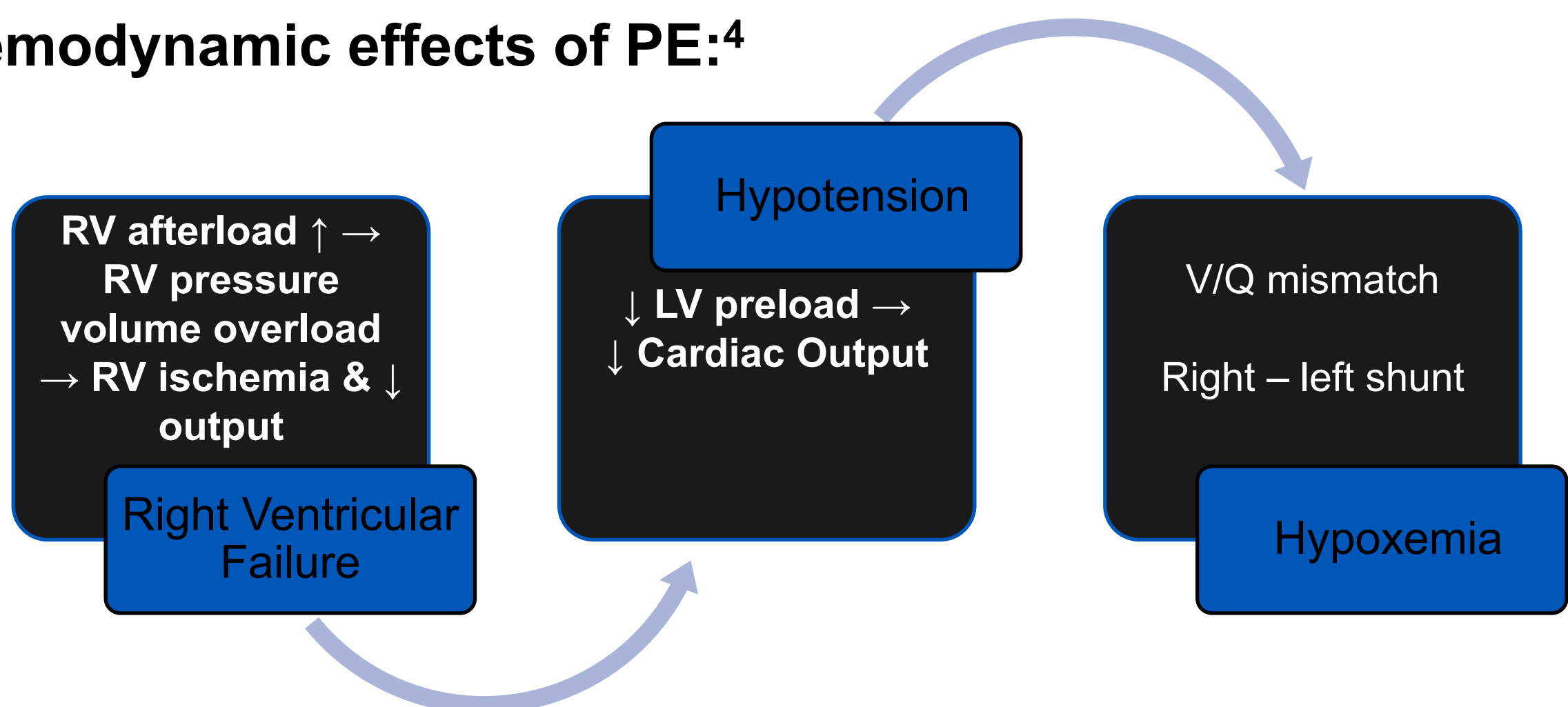


Figure 1: Virchow's triad

Hemodynamic effects of PE:⁴



European Society of Cardiology PE classification:^{5,6}

- Low risk (non-massive): normotension, no RV dysfunction
 - *Recommended management: outpatient anticoagulation*
- Intermediate-low risk: RV dysfunction OR elevated biomarkers
 - *Recommended management: no consensus guidelines*
- Intermediate-high risk (submassive): RV dysfunction AND elevated biomarkers, normal hemodynamics
 - *Recommended management: no consensus guidelines*
- High risk (massive): vasopressor support, profound bradycardia, or cardiac arrest
 - *Recommended management: thrombolytics, catheter directed therapies, or thrombectomy*

CASE DESCRIPTION

Case: 77-year-old male presenting with dyspnea on POD 15 following right lower lobe segmentectomy and lymphadenectomy for lung adenocarcinoma.

Vital signs: Respiratory rate 39, SpO₂: >90% on 4L NC, BP: 140/109, HR: 92 bpm

Investigations:

- TTE: 50mm x 48mm mass prolapsing from the right atrium to ventricle, severe RV enlargement, and severely reduced RV systolic function
- CT chest: bilateral segmental and subsegmental PE
- ECG: S1Q3T3
- Venous ultrasound: bilateral lower extremity DVT
- NT-ProBNP: 13360 pg/mL

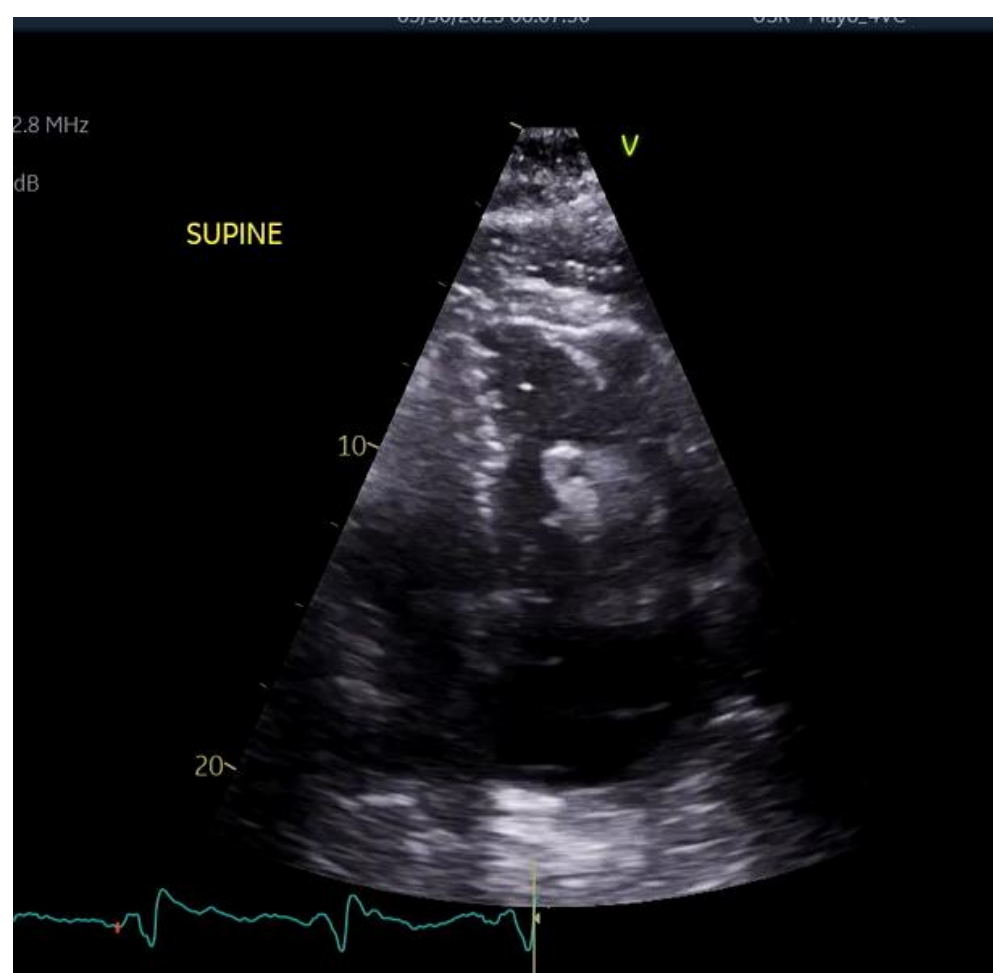


Image 1. TTE Apical 4 chamber view of clot-in-transit

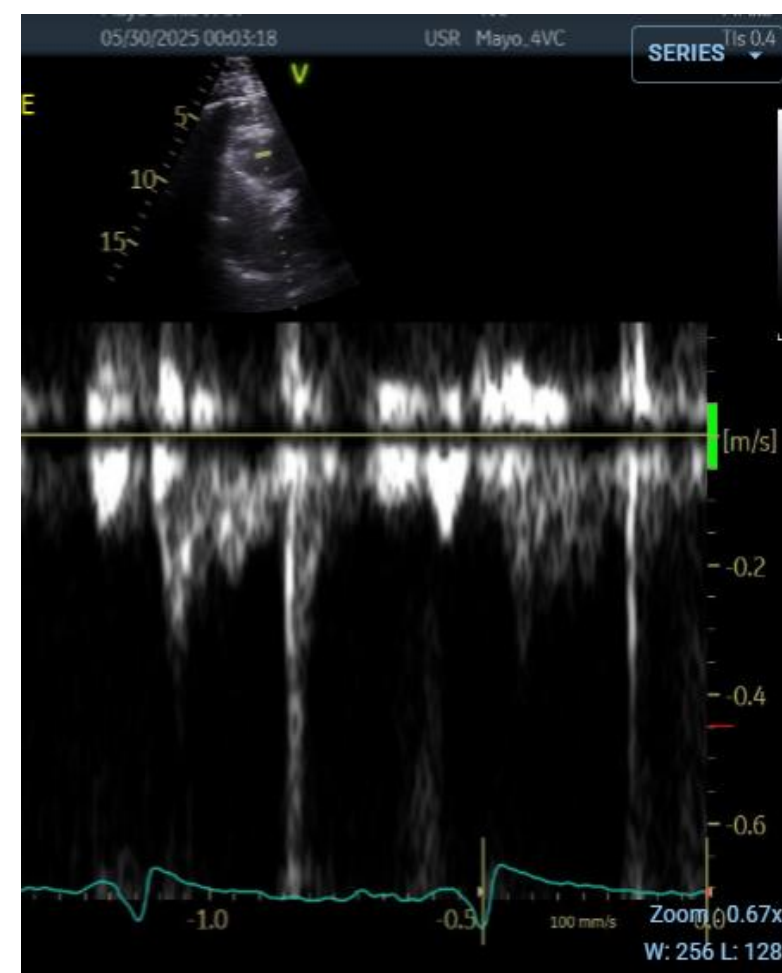


Image 2. Flying W Sign

Diagnosis: Intermediate-high risk PE with intracardiac clot-in-transit

Pre-operative Management Goals and Plan:

- Optimize respiratory status without compromising hemodynamics: CPAP
- Prevent clot propagation: systemic heparin infusion
- Contingency plan: femoral arterial and venous sheaths prophylactically placed
- Ideal procedure selection: avoid clot-in-transit segmentation, avoid post-operative bleeding → emergent open thrombectomy on cardiopulmonary bypass

Intraoperative management:

- Norepinephrine and milrinone for support to CPB
- Right atrium opened and pulmonary arteriotomy
- Uneventful bypass separation
- Improvement in RV dysfunction to mild-moderate



Image 3. Midesophageal 4-chamber view of clot-in-transit



Image 4. Retrieved clot

Post-operative management: IVC filter on POD 0, extubated on POD 1, discharged on POD 10 with improved RV function and normalization of RVSP

DISCUSSION

- In intermediate risk cases, no clear management guidelines exist. Treatment decisions should be tailored to the individual patient's clinical status and risk profile.
- Anticoagulation alone is often insufficient.
- Systemic thrombolysis can be used in intermediate risk PE, but carries the risk of clot fragmentation and is contraindicated in cases of high bleeding risk, such as in the post-operative period.
- Though new less invasive options for PE management exist including catheter directed therapies, they are not always favored due to the potential for clot fragmentation or dislodgment, risking worsening obstructive shock.
- Surgical thrombectomy remains a key therapeutic option, especially when patient factors (e.g. high bleeding risk, clot-in-transit) preclude the use of less invasive techniques.
- Contingency planning and ECMO consideration is needed for quick initiation of life saving measures.
- This case underscores the importance of the multidisciplinary team in implementing individualized therapies in intermediate-high risk PE.
- Future research should aim to provide more definitive guidance on the treatment of intermediate-risk PE.

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