

Internal Medicine Clerkship
Case Discussions

Venous Thromboembolic Disease
Student Guide

Objectives:

1. Identify characteristics and relevant review of systems that may suggest a venous thromboembolism including leg pain and swelling, chest pain, and shortness of breath.
2. Assess past medical history for risk factors and predisposing conditions including prior VTE, bleeding or clotting disorders, and causative medications.
3. Assess for familial risk factors including family history of bleeding or clotting disorders.
4. Identify key physical exam findings that:
 - a. Determine severity of disease including tachycardia and hypotension.
 - b. Assess for findings that may suggest an underlying etiology including leg pain or swelling and findings of venous insufficiency.
 - c. Determine presence of right heart failure including elevated jugular venous pressure.
5. Identify and interpret key laboratory and imaging tests and list indications, benefits, test characteristics, risks, and costs of testing that assess extent of thrombosis (including compression ultrasonography and CT angiogram) and assess severity of illness (including ABG and echocardiogram).
6. Describe a rational and evidence-based approach to treating a patient with venous thromboembolic disease:
 - a. Use a validated clinical risk score to establish pre-test probability for DVT or PE (Wells score).
 - b. Describe treatment for thrombosis including direct-acting oral anticoagulant medications, low molecular weight heparin, and thrombolysis.
 - c. Describe treatment for hemodynamic instability including oxygenation and fluid resuscitation.

Clinical Case:

A 35 year old white female reports to the emergency room because of sharp left-sided chest pain and shortness of breath for the past day. The patient was in excellent health until yesterday. She was awakened from sleep by the sharp left-sided chest pain. The pain worsened with motion and deep breathing. The pain has been increasing in severity and now she has severe left shoulder pain. She reveals having a similar, transient episode of chest pain about one year ago while she was vacationing in Michigan. Presently, she complains of shortness of breath and is very apprehensive about dying. She denies any cough, fever, or sputum production, but has had one episode of hemoptysis earlier today and, upon further questioning, notes some tenderness of the left calf. She is married and had one normal delivery three years ago. She is taking birth control pills. She has never been hospitalized except for delivery of her first child. The patient does recall having a left ankle fracture 6 years ago with a cast in place for 6 weeks. A review of systems is negative. She denies any history of venous problems. She works as a computer programmer. She has smoked one pack of cigarettes a day for the past eight years. She considers herself a social drinker. There is no family history of blood clots.

Questions:

1. What is the problem list and differential diagnosis for this patient on presentation to the emergency room?

Physical Exam:

Blood pressure 102/80; pulse 128; respiratory rate 32; oral temperature 37.0 C.

GEN: She appears to be in moderate respiratory distress. She is well developed and nourished.

HEENT: There is no tracheal deviation.

CV: Examination of the heart revealed an accentuated pulmonic component of the second sound.

Tachycardic, regular, no murmurs. There is no evidence of jugular venous distention

PULM: Her breathing is rapid and shallow. There is dullness to percussion and decreased breath sounds in the left base. There were no rhonchi or crackles or sounds of increased voice transmission.

ABD: soft, nontender, nondistended

EXT: no edema, cyanosis or clubbing. There is no calf tenderness or swelling. The shoulders revealed normal range of motion; no warmth or tenderness was noted. The other joints are normal.

Questions:

2. Interpret the findings on lung and cardiac exam
3. Which of the diagnoses that are highest on the differential are supported by the physical exam?

Dx	Pertinent Positives	Pertinent Negatives
PE		
PNA		
PTX		
CHF/MI		
DVT		

4. Does she have any risk factors for VTE?

Laboratory Data:

The emergency room physician orders the following tests:

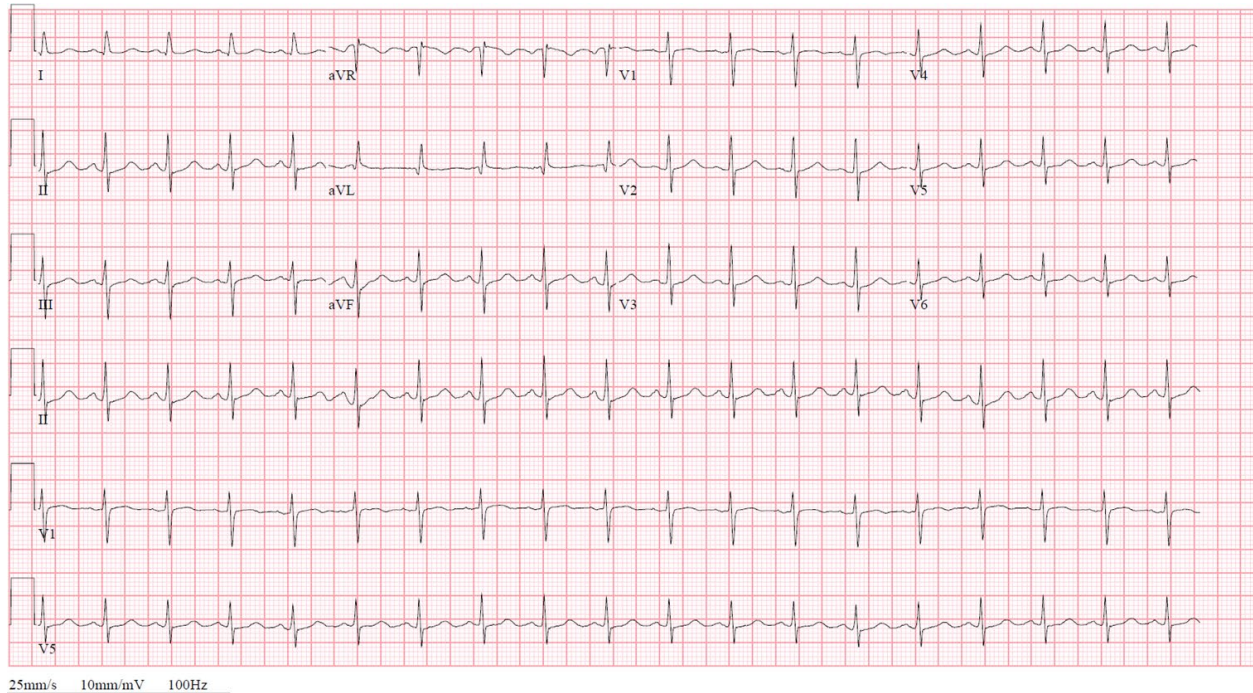
$$\begin{array}{r} \backslash \quad 15 \quad / \\ 11.5 \quad \text{-----} \\ / \quad 43 \quad \backslash \end{array} \qquad \begin{array}{r} 140 \mid 105 \mid 10 \mid / \\ \text{-----} \quad 85 \\ 3.8 \mid 24 \mid 0.7 \mid \backslash \end{array}$$

(83 polys, 1 band, 14 lymphs).

Blood Gases:

FIO ₂	pH	PCO ₂	PO ₂
0.21	7.48	30	80

EKG:

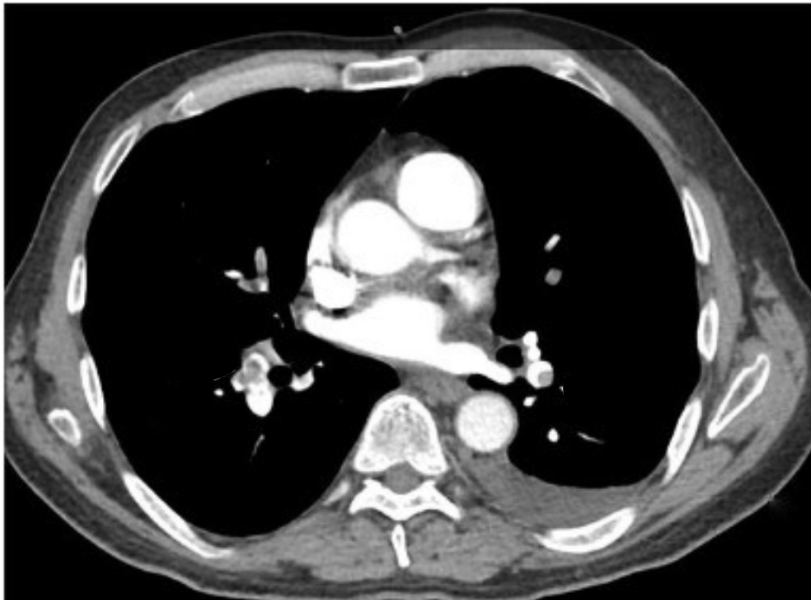


Questions:

- Interpret the arterial blood gas: 7.48/30/80.
- What acid base abnormality would you expect with an acute PE?

7. Interpret the EKG. Are there any EKG patterns that could suggest PE as a diagnosis?
8. What is your pre-test probability that she has a PE?
9. The following are tests that can be ordered for evaluation of patients with suspected acute PE. Describe a scenario when each test would be appropriate and which test should be ordered on our patient?
 - a. D-dimer
 - b. CT-PE protocol
 - c. VQ scan
 - d. Lower extremity ultrasound
 - e. Echocardiogram
10. How are VQ scans reported when considering pulmonary embolism?

Imaging is completed:



11. Interpret the CT findings. Does this finding explain the patient's left shoulder pain?

12. The following are options for treatment of acute PE/DVT. Explain when each treatment option would be appropriate and which would you choose for our patient?

- a. Heparin drip
- b. Low molecular weight heparin
- c. Warfarin
- d. Rivaroxaban (Xarelto)
- e. Dabigatran (Pradaxa)
- f. Aspirin

13. Define submassive and massive PE.

14. Should this patient be admitted?

15. How long should outpatient therapy be maintained? Fill in the “recommended duration of anticoagulation” for each of the VTEs mentioned below:

	Risk of recurrence	Recommended duration of anticoagulation
<i>Major Transient Risk factors (occur within 3 mos of VTE dx):</i> <ul style="list-style-type: none"> • Surgery with GA for ≥30min • Confined to bed in hospital for ≥3 days with acute illness • C-section 	<3% per year	
<i>Minor Transient Risk factors (occur within 2 mos of VTE dx)</i> <ul style="list-style-type: none"> • Surgery with GA <30min • Admit to hosp for <3 days • Estrogen therapy • Pregnancy, puerperium • Confined to bed out of hosp for ≥3 days • Leg injury with decreased mobility for ≥3 days • Long flight 	3-8% per year	
Unprovoked VTE	8-10% per year	
<i>Persistent risk factors</i> <ul style="list-style-type: none"> • Inflammatory bowel disease • Autoimmune d/o (APLA syndrome, RA) • Chronic infection • Chronic immobility (spinal cord injury) 	8-10% per year	
Active cancer	15% per year	

16. What treatment would you suggest in the following scenarios?

- A. Systemic Thrombolysis
- B. Catheter-directed thrombolysis
- C. Anticoagulation with Lovenox or DOAC (Apixiban)

<ul style="list-style-type: none"> BP 140/85, HR 100, RR, 30, O2 sat 92% on room air, mild respiratory distress. Saddle embolus found on CTA chest. 	
<ul style="list-style-type: none"> BP 70/45, HR 140, RR 32, O2 sat 90% on NRB. PE noted on CTA. Echo shows RV strain, troponin and BNP elevated. 	
<ul style="list-style-type: none"> BP 70/45, HR 140, RR 32, O2 90% on NRB. PE noted on CTA. Echo shows RV strain, troponin and BNP elevated. Hx of multiple GI bleeds requiring ICU stay, most recently 2 weeks ago. 	
<ul style="list-style-type: none"> BP 120/80, HR 90, RR 25, O2 93% on RA. Multiple PEs noted bilaterally on CT. Troponin +, BNP elevated, right heart strain on echo. 	
<ul style="list-style-type: none"> BP 128/70, HR 95, RR 22, O2 92% on RA on admission. Large PE in R main pulmonary artery. Patient started on lovenox and admitted. On hospital day #2, patient is more hypoxic with BP now 100/70, HR 110, RR 30 and O2 sat 92% on NRB. Troponin is now elevated 	

17. Does she need an IVC filter placed prior to discharge?

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Harrison's Principles of Internal Medicine, 21e. Chapter 117: Arterial and Venous Thrombosis

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Harrison's Manual of Medicine, 20e. Chapter 135: Pulmonary Thromboembolism and Deep-Vein Thrombosis

<https://accessmedicine-mhmedical-com.archer.luc.edu/content.aspx?bookid=2738§ionid=227558429>

Symptom to Diagnosis: An Evidence-Based Guide, 4e. Chapter 15-11: Pulmonary Embolism

<https://accessmedicine-mhmedical-com.archer.luc.edu/content.aspx?bookid=2715§ionid=249059853>