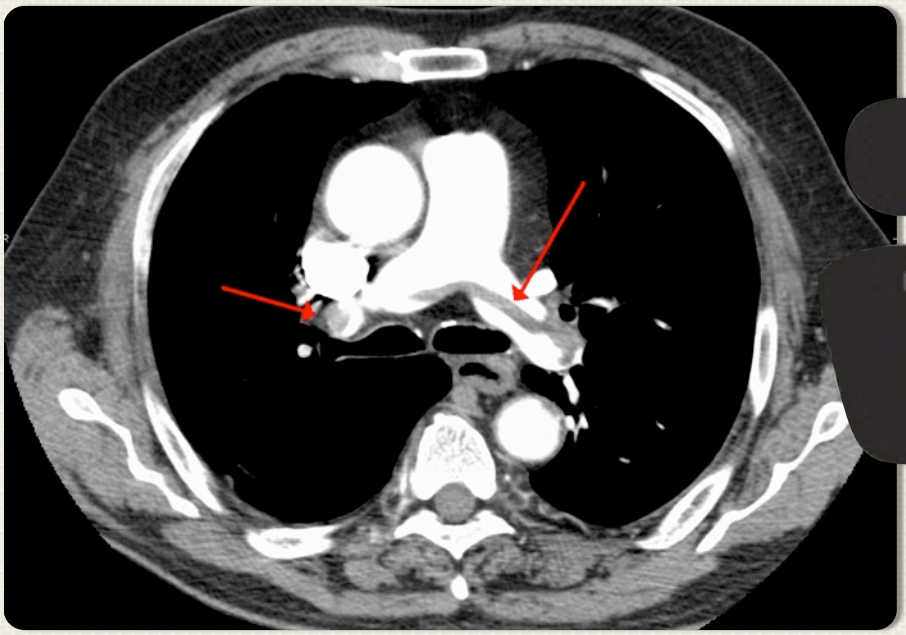
EMERGENCY MEDICINE CASES



SUMMARY OF EPISODE 21 PART 1: RESPIRATORY EMERGENCIES, WITH DR. ANIL CHOPRA AND DR. JOHN FOOTE

Differential diagnosis of dyspnea

PREPARED BY CLAIRE HESLOP

Big Categories to Consider:

- Respiratory
- Cardiac*
- Anemia (Hb<80)
- Neuromuscular (eg: Guillan Barre)
- Metabolic acidosis of any cause

*The most common presentation of MI in patients >85y/o is dyspnea. Effusion and tamponade may also present as dyspnea; use ED U/S!

COPD patients are at higher risk than the general population for PE, CHF, pneumonia, tamponade, pneumothorax and MI.

Rizkallah and colleagues found **20% of COPD exacerbation admissions had PE** (1).

Suspect other processes if your patient with COPD presents **atypically** from their usual episodes, or if they are **not improving** with medical therapies for their exacerbation (2).

MEDICALLY UNEXPLAINED DYSPNEA: "MUD"

A condition characterized by a sensation of a need to take a deep inspiration or the feeling of an 'oppressive' chest plus symptoms of anxiety, in the *absence* of wheeze, cough, or sputum, ECG, CXR or peak flow abnormalities, and *without* cardiopulmonary explanations for their dyspnea. It has been called "the IBS of respirology". Patients are often over-investigated without significant findings. A diagnosis of MUD should not be made on a single ED visit, but should be considered in patients who have had extensive previous work-up for the same symptoms in the past.

Risk factors and tools for investigating PE

Classic Risk Factors for PE "THROMBOSIS"

Trauma/**T**ravel
Hypercoagulable state/**H**RT
Recreational drugs (IVDU)
Older
Malignancy
Birth Control
Obesity/**O**bstetrical*
Surgery
Immobilization
Sickness†

*the risk of PE is highest in the first 6 weeks postpartum

†chronic illnesses such as Lupus, CAD, CHF & COPD contribute to risk.

Varicose veins *are a risk factor for PE,* but when they generate clots, they may be less likely to embolize.

Note: 20% of PE patients will have no identifiable risk factors at presentation.

Suspect PE when you see RAPID onset of symptoms, dyspnea+/- tachypnea, and pleuritic chest pain. Always be alert to older patients *who present atypically.*

Overuse of the D-dimer can lead to over-investigation and anticoagulation, unless used wisely and in the correct clinical context.

Tips for using D-Dimer wisely:

1) use a high sensitivity assay,

2) test *low risk* patients,

3) test when you expect it will be negative (to rule out PE),

4) don't test D-dimer if you plan to order a CT regardless.

Use **Well's criteria** (3) to assess pretest probability for PE:

Criterion	Points
Suspected DVT	3.0
An alternate diagnosis is less likely than PE	3.0
Heart rate > 100 beats/min	1.5
Immobilization or surgery in the previous four weeks	1.5
Previous DVT/PE	1.5
Hemoptysis	1.0
Malignancy (on treatment, treated in past six months)	1.0

Score range	Mean probability of PE	% with this score	Interpretation of risk
0-2 points	3.6%	40%	Low
3-6 points	20.5%	53%	Moderate
> 6 points	66.7%	7%	High

What about the PERC rule?

The "Pulmonary Embolism Rule-Out Criteria" (PERC) is a step 2 decision support for excluding PE. If **none of the eight** PERC features are present in a patient that has been deemed low risk by Well's criteria or by clinical gestalt, then no further tests are indicated.

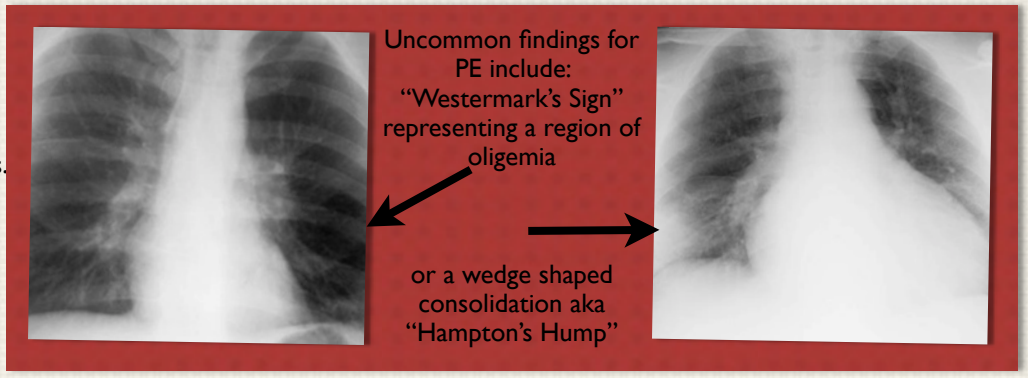
PERC RULE: "HAD CLOTS"

Hormones (estrogen),
Age >50,
DVT or PE history,
Coughing up blood (hemoptysis),
Lower extremity swelling,
O2 <95%,
Tachycardia,
Surgery or trauma in past 4 weeks.

THE PERC RULE IS ONLY ACCURATE WHEN APPLIED TO *LOW* RISK PATIENTS

What are the Chest X-Ray Findings for PE? Although the CXR may appear unremarkable, about 75% of patients with PE have findings resulting from the clot, such as an **elevated hemi-diaphragm**, a unilateral **pleural effusion**, **enlarged pulmonary arteries,** and even **infiltrates**. *In young patients with pleuritic chest pain, a pleural effusion increases the likelihood of PE.*

Uncommon findings of PE (see below) have low sensitivity for detecting PE.



Pulmonary Embolism work-up in pregnant patients & elderly patients.....and what about thrombolytics?

Is D-dimer useful in pregnancy? The *American Thoracic Society Guidelines* (4) state D-dimer should *not* be used to rule out PE in pregnancy. D-dimer rises in the 2nd and 3rd trimester, and stays high post-partum.

Cutoffs of 1.5x, 2x and 2.2x the local threshold per trimester have been suggested. **However, our experts suggest that only in the first trimester a negative D-dimer may be useful to rule out PE.**

Guidelines for investigating for PE in pregnancy start with evaluation for signs & symptoms of DVT. If these are found, a leg doppler is done.

If no DVT is suspected or found, order a CXR:

CXR normal? ->V/Q scan*

CXR abnormal? ->CT scan

*V/Q scan exposes pregnant women to less radiation than a CT scan for PE (V/Q and CT expose the fetus to *similar* radiation dosages; both dosages are low and well below background levels.)

What about the elderly? (5) Consider adjusting the upper limit cutoff for negative D-dimer in patients older than 50: Adjusted upper limit = age x 10

What about a patient on Warfarin? D-dimer can be falsely negative due to anticoagulation.

Do all PE patients need admission? Aujesky and colleagues (6) reported outpatient management for PE was not inferior to management in hospital, for hemodynamically stable patients with no significant comorbidity, who could be safely anticoagulated, and closely followed as outpatients.

Once diagnosed, PE therapy begins with **anticoagulation**.

LMWH (Fragmin or Enoxaparin) or Fondaparinux for at least 5 days *and* the INR=2.0-3.0, plus **Warfarin**

What about "Massive" PE?

Massive PE: acute PE with *sustained* hypotension (systolic blood pressure <90 for >15 minutes or requiring inotropic support, not due to another cause), pulselessness, or profound bradycardia. **Thrombolysis is indicated in massive PE** (7).

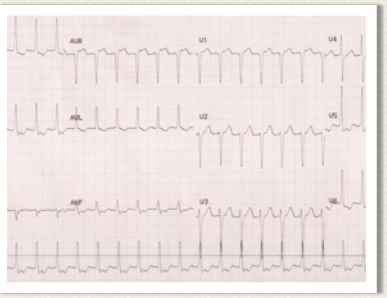
Submassive PE: no *sustained* hypotension, but either RV dysfunction (based on echocardiography, CT, BNP, Tropinin or ECG evidence) and/or myocardial necrosis (based on troponin elevation).
Our experts *do not* recommend thrombolysis in submassive PE. However, some experts believe that lytics are indicated if there is evidence of **present or developing circulatory or respiratory insufficiency**; or **moderate to severe RV injury**.

Finally: Fluid resuscitation in PE with shock is indicated as first line support, but *resuscitate judiciously* as volume expansion may impair RV function.

References:

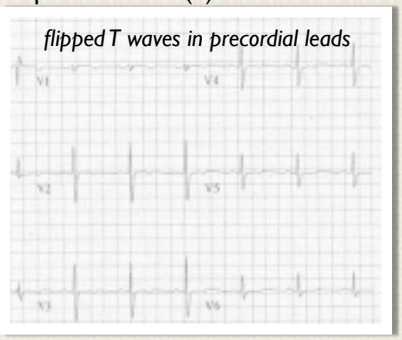
1) Rizkallah et al. Chest. 2009;135:786.
2) Tillie-Leblond et al. Ann Intern Med. 2006;144:390.
3) Wells et al. Thromb Haemos. 2000; 83:416.
4) Leung et al. Am J Respir Crit Care. 2010;184:1200.
5) Douma et al. BMJ. 2010; 340: c1475.
6) Aujesky et al. Lancet. 2011;378: 21.
7) Jaff et al. Circulation. 2011; 123; 1788.

ECG FINDINGS IN PE



ECG is useful to *rule out* other diseases, and~30% will be normal. ECG findings that may suggest PE include:

- sinus tachycardia
- RV strain pattern
- incomplete RBBB
- flipped T waves in anterior leads
- S1Q3T3 (poor sensitivity & specificity)
- flipped T waves in anterior *and* inferior leads, a rare finding which has been shown to be highly specific for PE (8)



flipped T waves in precordial leads

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