66-year-old male with shortness of breath and chest discomfort

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Patient Presentation

- **HPI:** Patient with known COPD presents with progressive SOB for 2 weeks and was treated for COPD exacerbation with antibiotics, steroids and 2L oxygen supplement with no improvement
- **PMHx:** COPD
- **SHx:** Current smoker (40 pack year)
- **Vitals:** Afebrile, 147/88, HR 112, RR 26, SpO2 on 2L 78%
- **Labs:** COVID and RSV negative, leukocytosis, BNP 2338, troponin negative
- **EKG:** Sinus tachycardia with occasional premature ventricular complexes. Complete RBBB

What imaging should we order?
ACR Appropriateness Criteria

Clinical Condition: Acute Chest Pain — Suspected Pulmonary Embolism

<table>
<thead>
<tr>
<th>Variant 1:</th>
<th>Adult.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Radiologic Procedure</td>
<td>Rating</td>
</tr>
<tr>
<td>X-ray chest</td>
<td>9</td>
</tr>
<tr>
<td>CTA chest with contrast</td>
<td>9</td>
</tr>
<tr>
<td>Tc-99m V/Q scan lung</td>
<td>8</td>
</tr>
<tr>
<td>US lower extremity with Doppler</td>
<td>7</td>
</tr>
<tr>
<td>CTA chest with contrast with CT venography lower extremities</td>
<td>6</td>
</tr>
<tr>
<td>Arteriography pulmonary with right heart catheterization</td>
<td>5</td>
</tr>
<tr>
<td>MRA pulmonary arteries without and with contrast</td>
<td>4</td>
</tr>
<tr>
<td>MRA pulmonary arteries without contrast</td>
<td>3</td>
</tr>
<tr>
<td>US echocardiography transesophageal</td>
<td>2</td>
</tr>
<tr>
<td>US echocardiography transthoracic resting</td>
<td>2</td>
</tr>
</tbody>
</table>

Rating Scale: 1,2,3 Usually not appropriate; 4,5,6 May be appropriate; 7,8,9 Usually appropriate

*Relative Radiation Level
Findings (unlabeled)
Axial view of occlusive thrombus in the right main pulmonary artery with thrombus extension into interlobar and right lower lobe pulmonary artery

Coronal view of bilateral pulmonary emboli

Axial view of straightening of interventricular septum s/o right heart strain; R/L ventricular ratio >0.9
Given the lack of hypotension, patient was diagnosed as submassive pulmonary embolism and started on anticoagulation. Due to worsening oxygen requirement during admission, a shared decision between the PERT team and interventional radiology was made to proceed with catheter directed thrombolysis/aspiration thrombectomy.
Findings: (unlabeled)

Main pulmonary artery pressure: 77/17 mmHg with a mean of 38 mmHg
Findings: (labeled)

Attempt at catheterizing right pulmonary artery, contrast injected to determine location, revealed unexpected contrast filling of left ventricle and aorta (blue arrows), consistent with PFO.

Right pulmonary artery was successfully targeted, images from right to left showing filling defects (green arrows) during contrast injection consistent with PE.
Final Dx:
Submassive, occlusive pulmonary embolism and incidental large PFO

Case progression:
Aspirated small amount of subacute clot in IR suite→
TTE with agitated saline contrast confirming PFO→
TPA with no improvement→
Balloon occlusion of PFO with no improvement→
Bilateral pulmonary thromboendarterectomy and PFO closure with ECMO
Post Thrombectomy Chest CT

Axial view demonstrates resolution of previous thrombus

Coronal view demonstrates resolution of previous thrombus
Case Discussion: Classification and Tx of PE

• Classification of PE: massive and submassive
  • Massive: hemodynamically unstable (systolic pressure <90 mmHg for at least 15 minutes, pulselessness, HR <40 bpm with signs of shock)
  • Submassive: hemodynamically stable with Right ventricular dysfunction (via echo, RV/LV diameter ratio >0.9 or EKG findings) or elevated cardiac biomarkers

• Tx approach:
  • Massive→ thrombolysis via TPA ideally within 48 hours
  • Submassive: controversial, thrombolysis indicated in PE with low risk of bleeding and poor prognosis (ie RV dysfunction, severe respiratory failure)

• Embolectomy is recommended for patients with absolute contraindications to thrombolytics, failed thrombolytic therapy or in cardiogenic shock
Case Discussion: Pulmonary Artery Pressure

- Pulmonary artery pressure (PAP) can be measured by a right heart catheterization; pulmonary artery hypertension is >25 mmHg
  - Mild: 31-45 mmHg
  - Moderate: 46-70 mmHg
  - Severe: >70 mmHg
- PAP increases if >30-50% occlusion of pulmonary vessel
  - some studies suggest a positive correlation between embolism area & pressure
- In addition to lack of visualization of pulmonary branches during contrast injection, discrepancy in expected PAP should raise suspicion for possible PFO that can be worked up with an echo and bubble study
References:


