

# AMSER Case of the Month: November 2019

59 year-old male presenting with sudden cardiac arrest

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# Patient Presentation

- **HPI:** 54 year-old male with PMH of HTN presents to OSH following sudden cardiac arrest. Patient was in normal state of health until the evening prior when he complained of mild diffuse abdominal pain. The next morning he had a witnessed sudden cardiac arrest and CPR was initiated immediately. EMS arrived and continued CPR with subsequent ROSC. Patient was transported to medical facility where he had another PEA arrest and ROSC was achieved again. Following stabilization he was life-flighted to a tertiary care facility.
- **PMH:** Hypertension
- **PSH:** None
- **Meds:** Lisinopril
- **Allergies:** NKDA
- **Social History:** tobacco, alcohol, and drug use history not on file
- **Physical Exam:** HEENT – b/l fixed dilated pupils. CV – tachycardic. Pulm – normal breath sounds, patient intubated. Neurological: unresponsive, GCS 3, absent gag & corneal reflexes

# Pertinent Labs

## ABG:

- pH **7.176**
- PaCO<sub>2</sub> **62.9**

## CMP:

- glucose **595**
- Cr **1.6**
- AG **27**
- AST **350**
- ALT **204**

## CBC:

- WBC **14**
- platelets **135**

## Other:

- Fibrin Degradation Product **> 160**
- Fibrinogen **102**
- LDH **896**
- Lactic acid **14.2**
- Troponin **0.25**

--- high value

--- low value

What Imaging Should We Order?

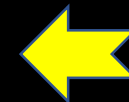
# Select the applicable ACR Appropriateness Criteria

## Suspected Pulmonary Embolism

### Variant 1:

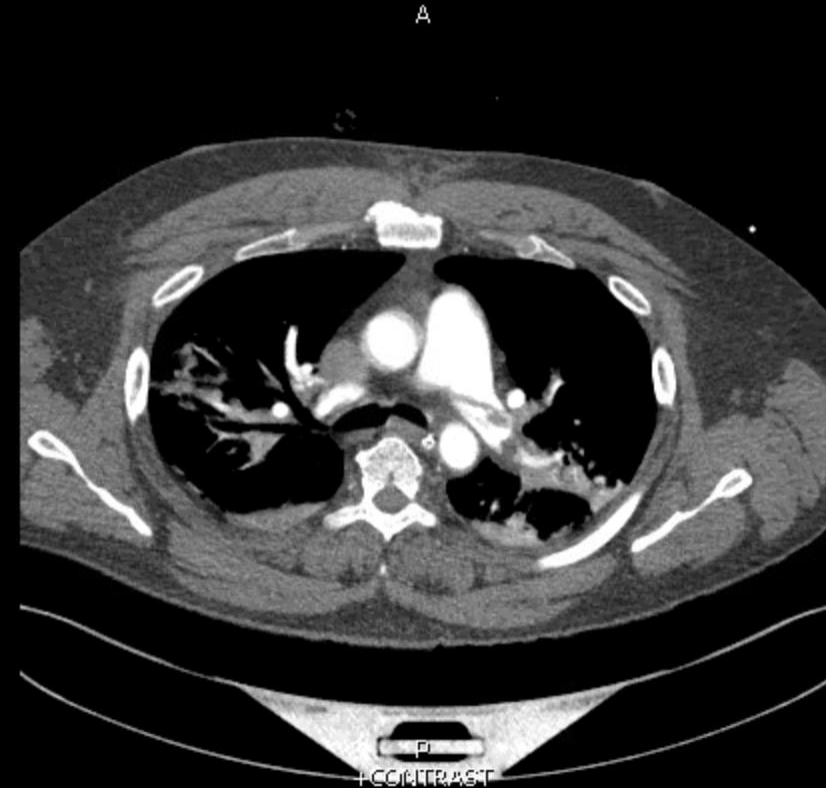
Suspected pulmonary embolism. Intermediate probability with a negative D-dimer or low pretest probability.

Radiologic Procedure	Rating	Comments	RRL*
X-ray chest	9		⊕
CTA chest with IV contrast	5	This procedure should be optimized for pulmonary arterial enhancement. This procedure may be appropriate but there was disagreement among panel members on the appropriateness rating as defined by the panel's median rating.	⊕⊕⊕
CT chest with IV contrast	3	This procedure should be optimized for pulmonary arterial enhancement.	⊕⊕⊕
US duplex Doppler lower extremity	3	This procedure has a low yield in the absence of symptoms of DVT.	○
CT chest without IV contrast	2		⊕⊕⊕
Tc-99m V/Q scan lung	2		⊕⊕⊕
CTA chest with IV contrast with CT venography lower extremities	2		⊕⊕⊕
MRA chest without and with IV contrast	2		○
US echocardiography transthoracic resting	2		○
CT chest without and with IV contrast	1		⊕⊕⊕
Arteriography pulmonary with right heart catheterization	1		⊕⊕⊕⊕
MRA chest without IV contrast	1		○
US echocardiography transesophageal	1		○
<b>Rating Scale:</b> 1,2,3 Usually not appropriate; 4,5,6 May be appropriate; 7,8,9 Usually appropriate			<b>*Relative Radiation Level</b>

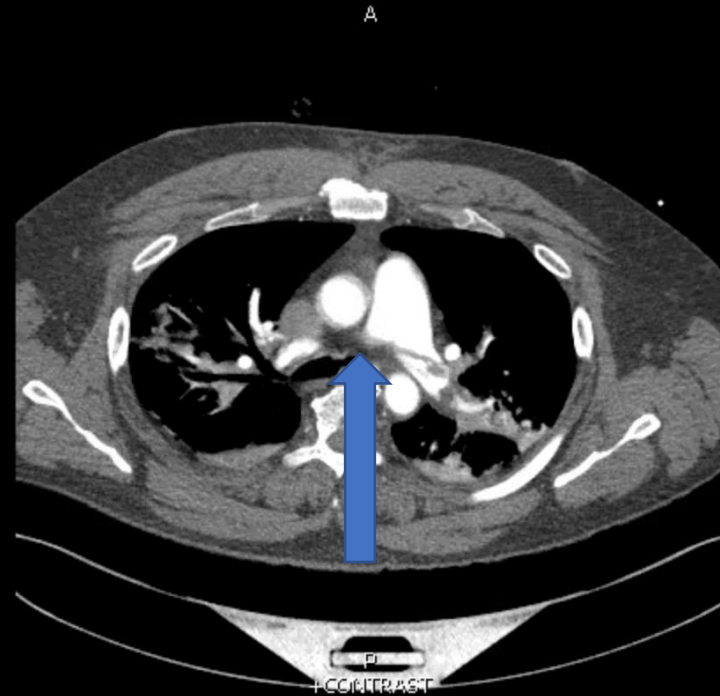
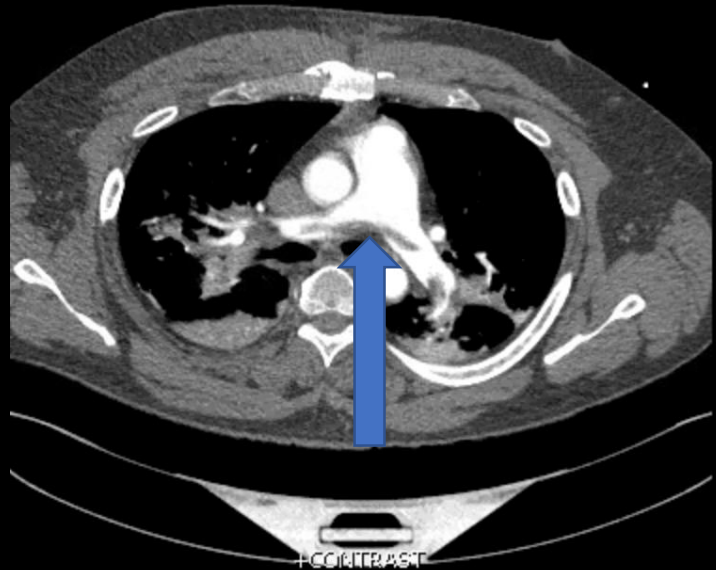


This imaging modality was ordered by the ER physician

# Findings (unlabeled)



# Findings (labeled)



Saddle PE (extends to proximal lobar, segmental & subsegmental branches of all lobes)

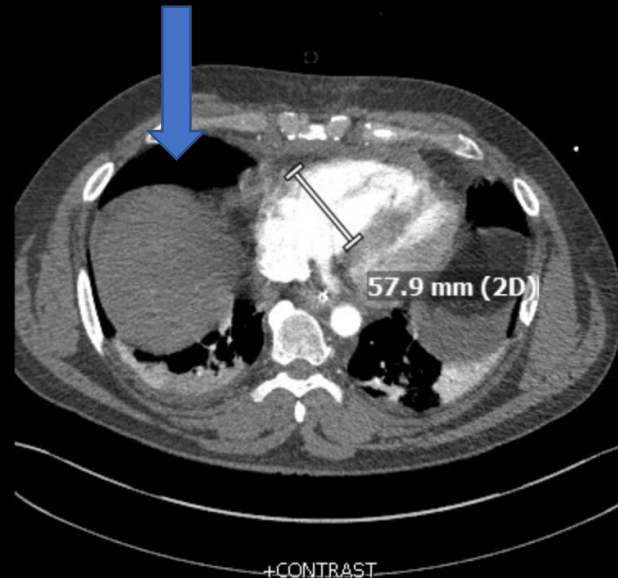
# Findings (unlabeled)





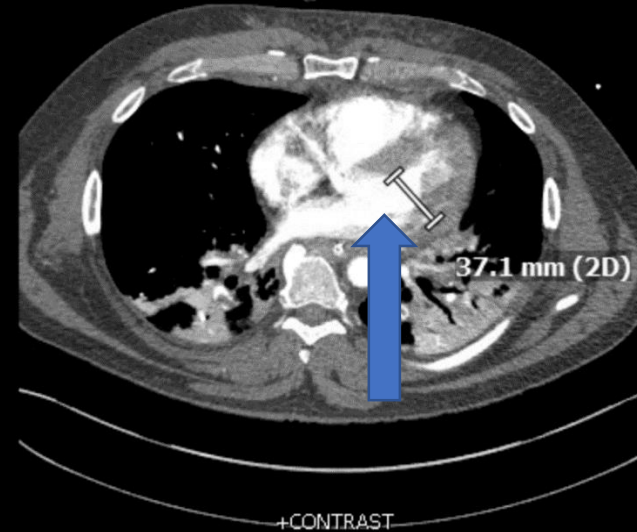
# Findings (labeled)

Evidence of acute R heart strain: RV chamber measures 5.8 cm in diameter



Evidence of RV dysfunction:  $RV/LV = 5.8/3.7 = 1.57^*$

\*RV dysfunction defined as  $RV/LV > 1$



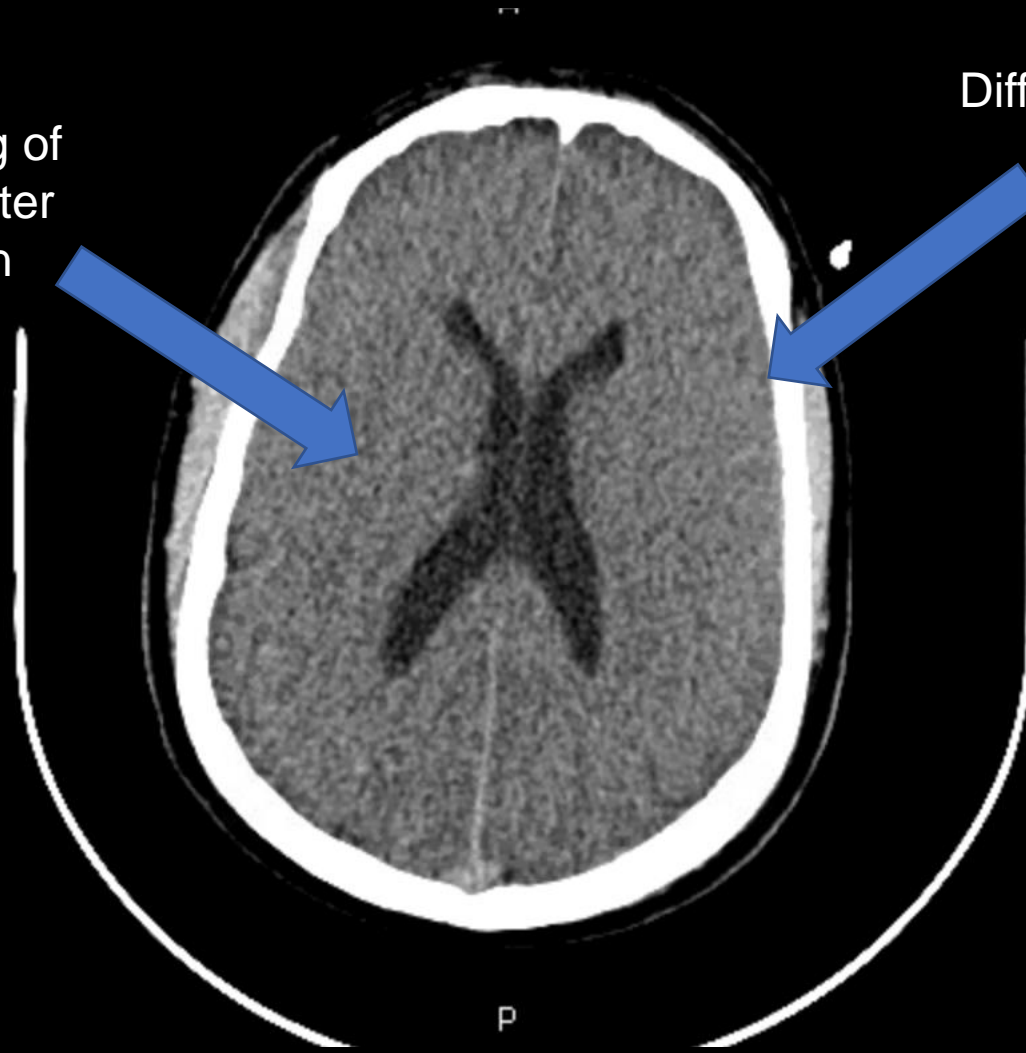
LV chamber measures 3.7 cm in diameter

# Follow-Up Imaging: Findings (unlabeled)



# Follow-Up Imaging: Findings (labeled)

Marked blurring of  
gray-white matter  
differentiation



Diffuse effacement of  
sulci

Final Dx:

Saddle Pulmonary Embolus:  
leading to sudden cardiac arrest & severe hypoxic  
ischemic brain injury

# Case Discussion

- Presentation of PE can vary from asymptomatic to sudden hemodynamic compromise depending on the severity of the embolus.
- Hemodynamically unstable pulmonary embolisms result in hypotension (SBP < 90 or drop in SBP of  $\geq 40$  from baseline for > 15 min), hypotension requiring vasopressor support or evidence of shock.
- Hemodynamically unstable presentations are more likely to result in death due to RV heart failure. Death often will occur in the first 2 hours, but risk is increased for 72 hours after presentation. Risk of death is 30-50%.
- The pulmonary vascular resistance increases due to obstructing clot, which can lead to RV dilation and bowing of the interventricular septum. This can all cause decreased cardiac output, resulting in hypotension.
- End organ damage can occur due to decreased systemic blood flow (ischemic brain injury seen in this case).

# Case Discussion

- Saddle PE is located at the bifurcation of the main pulmonary artery trunk and often extends into R/L pulmonary arteries.
- Of all saddle pulmonary embolisms, 22% result in significant hemodynamic compromise and there is an overall 5% mortality rate.
- Risk factors for any pulmonary embolism include malignancy, recent surgery/trauma, pregnancy, OCP use, immobilization, hypercoagulation.

# Case Discussion

- Diagnosis is made primarily with CT pulmonary angiography which is highly sensitive and specific (83% and 96%, respectively), with positive predictive values as high as 96% in the setting of high clinical probability (PIOPED II trial). CTPA can also identify right ventricular dysfunction which can help determine prognosis and guide treatment.
- V/Q scanning can be obtained if there are contraindications to CTPA.
- An initial chest x-ray can help exclude other causes of acute symptoms.
- A bedside echocardiogram may be used to make a presumptive diagnosis in some cases and to further assess right heart strain.
- Treatment focuses on anticoagulation but may also include thrombolysis and embolectomy (especially in the setting of hemodynamic instability).

# Case Conclusion

- The patient was initially started on a heparin drip.
- As a result of the patient's severe anoxic brain injury, surrogate decision makers refused systemic tPA administration given the high risk of intracranial bleeding.
- The patient was not a candidate for embolectomy.
- Surrogate decision makers eventually elected for comfort measures only.



# References:

American College of Radiology. ACR Appropriateness Criteria Suspected Pulmonary Embolism. Retrieved from: <https://acsearch.acr.org/docs/69404/Narrative/achsmann>

Moore, A. J. E., Wachsmann, J., Chamarthy, M. R., Panjikara, L., Tanabe, Y., Rajiah, P. (2018) Imaging of acute pulmonary embolism: an update. Cardiovasc Diagn Ther, 8(3): 225-243.

Thompson, B. T., Kabrhel, C. (2018, August 21) Overview of acute pulmonary embolism in adults. Retrieved from: <https://www.uptodate.com/contents/overview-of-acute-pulmonary-embolism-in-adults>

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Sekhri, V., Mehta, N., Rawat, N., Lehrman, S.G. and Aronow, W.S. (2012) Management of massive and nonmassive pulmonary embolism. Archives of Medical Science, 8(6): 957-969.