

***Penetrating aortic ulceration with pseudoaneurysm and intramural hematoma: Emergency department management and point-of-care ultrasound diagnosis***

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# Penetrating aortic ulceration with pseudoaneurysm and intramural hematoma: Emergency department management and point-of-care ultrasound diagnosis



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## Background

- Penetrating Aortic Ulcer (PAU) is a rare emergency department pathology with estimated prevalence among patients presenting w/ acute aortic syndromes (AAS) of 2.3%-7.6% [1-2]
- PAU is defined by progressive ulceration of the inner lamina into the tunica media of the aorta. [1]
- Related pathologies in AAS: Dissection 80%, Intramural Hematoma (IMH), 15% [1]
- Risk factors: Advanced age, atherosclerosis, hypertension, and smoking. [1]
- Complications of PAU: Progression to IMH, Dissection, pseudoaneurysm, and aortic rupture [1]
- PAU is an important differential to include in the differential of dangerous differentials in abdominal pain, including AAS, ACS, gastrointestinal perforation and ischemia.
- Diagnosis can be guided by assessment of Cardiovascular risk factors, augmented by point of care ultrasound

## Case Description

- An 81 year old woman with history of smoking, atrial fibrillation anticoagulated w/ apixaban, PAD s/p femoral endarterectomy, SBO, and family history of AAA with rupture presented for 2 days of progressively worsening diffuse abdominal pain.
- **Exam** was notable for HR of 110, BP of 137/82, RR of 16, SpO2 of 97% mild distress, tenderness to palpation without guarding, palpable DP pulse on right, DP pulse on doppler on left, and midline abdominal and left inguinal scars.
- **Labs** were notable for Hb of 11 g/dl, WBC of 16x10<sup>3</sup>/μL, INR 1.69, and a lactic acid level of 2.4 mmol/L.
- **POCUS** was remarkable for an asymmetric outpouching of the aortic wall without an intimal flap (Figure 1), prompting the order of confirmatory CT-angiography and consult to vascular surgery, confirming aortic ulceration with pseudoaneurysm and IMH through the aortic wall (Figures 2 and 3).
- **Treatment** included rapid initiation of pain control and anti-impulse therapy with labetalol, and anticoagulation reversal with the available agent, 4-factor PCC. Following ICU admission, she underwent endovascular repair, and was discharged without complication.

## Images

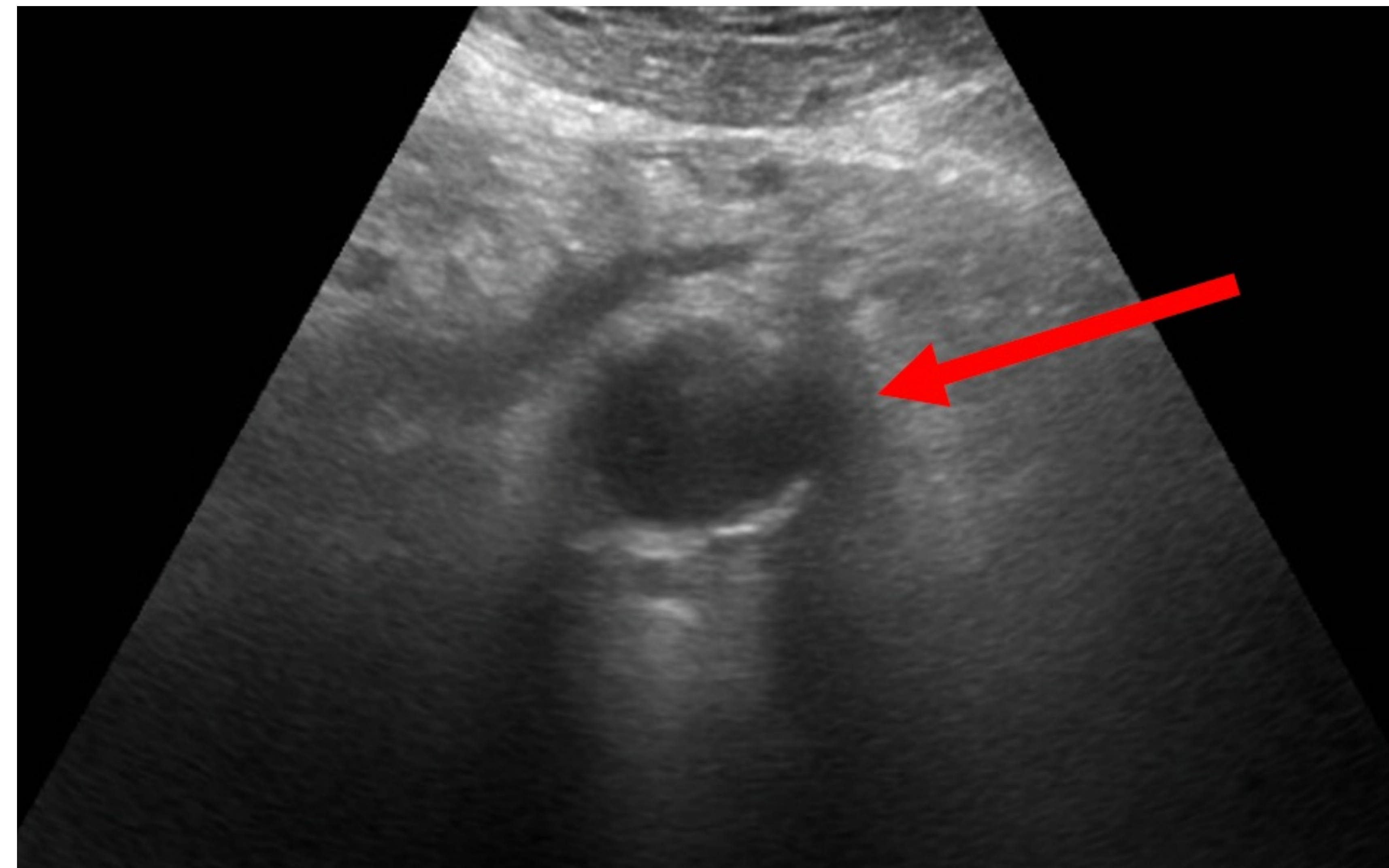


Figure 1. Bedside point-of-care ultrasound image with a low-frequency curvilinear probe showing a 4 cm infrarenal aorta with an asymmetric outpouching of the aortic wall (red arrow) without an intimal flap.

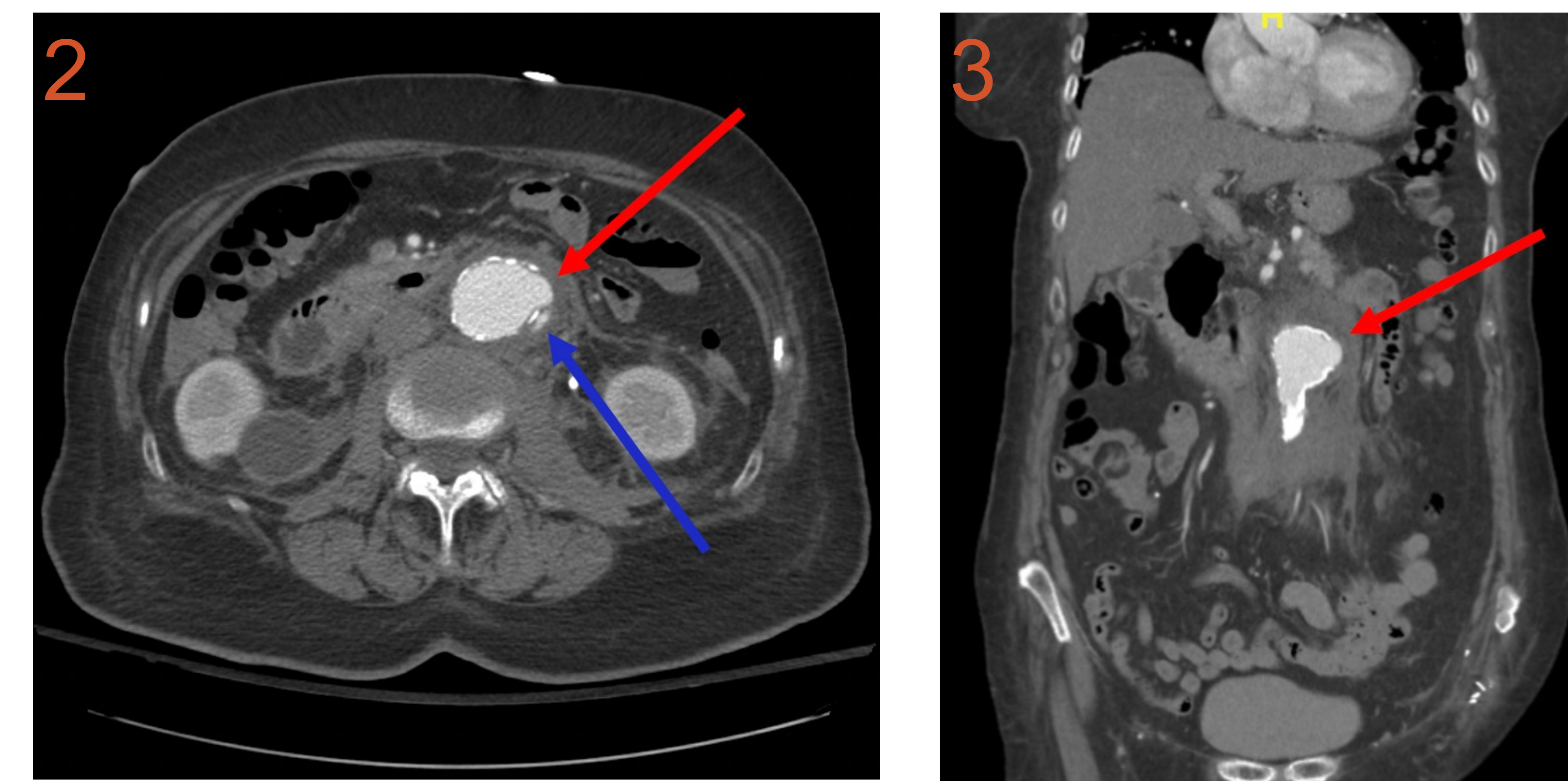


Figure 2. Computed tomography with angiography with an axial image showing a 41 mm infrarenal abdominal aortic aneurysm with ulceration and pseudoaneurysm extending through the aortic wall anterolaterally on the left (red arrow). There is an intramural hematoma with characteristic intramural blood pooling (blue arrow).

Figure 3. Computed tomography with angiography with a coronal image showing a 41 mm infrarenal abdominal aortic aneurysm with ulceration and pseudoaneurysm extending through the aortic wall anterolaterally on the left (red arrow).

## Discussion

- PAU is an uncommon subtype of acute aortic syndrome with potential for catastrophic outcomes, but manageable when identified
- PAU lesions typically develop in mid to distal descending thoracic aorta, however, may occur in the infrarenal aorta as in this patient, presenting with abdominal pain
- Assessment of cardiovascular risk factors and POCUS can guide definitive imaging, timely reversal of anticoagulation, initiation of anti-impulse therapy, and vascular surgery consult for definitive diagnosis and treatment.
- As with aortic dissection, PAU's are divided into Type A and B based on involvement of ascending aorta, a surgical emergency, or descending aorta only, treated by immediate medical management in the ED with esmolol, labetalol, or diltiazem. [3]

## Conclusion

PAU with pseudoaneurysm and IMH is a rare and potentially life-threatening ED pathology. Given the varied presentation and high risk of aortic rupture both early and late in the disease course, the emergency provider should maintain a high index of suspicion in patients with risk factors for aortic pathology and utilize POCUS to facilitate diagnosis and mobilization of CT imaging and the vascular team for definitive diagnosis and intervention, respectively.

## References

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