

# AMSER Case of the Month: August 2020

72-year-old male with acute onset left lower chest  
pain/left upper abdominal pain

Michael Evans, MD/PhD Student

Tyrell Gardner, MD

Peter Haar, MD/PhD

VCU School of Medicine, Department of Radiology



**VCU**Health™

**AMSER**

# Patient Presentation

- **HPI:** 72-year-old male presents to the ED with severe, aching left lower chest pain/left upper abdominal pain upon awakening. States that the pain is exacerbated by movement. Endorses nausea but denies vomiting. Denies SOB, recent fever, recent trauma, or other associated symptoms.
- **PMHx:** CAD s/p CABG (2003), HTN, HLD
- **Medications:** aspirin, atorvastatin, lisinopril, metoprolol
- **SocialHx:** active smoker, medication non-compliance
- **Vitals:** BP 73/47, HR 73, RR 20, SpO2 95% on RA, T 36 C
- **Relevant Labs:**
  - **BMP:** Cr 1.25
  - **CBC:** WBC 14.2, Hgb 11.0, Plt 174
  - **Coags:** PT 22.8, PTT 53, Fibrinogen 166
  - **EKG and Troponins:** unremarkable

What Imaging Should We Order?

# ACR Appropriateness Criteria

The ER physician suspected Aortic Dissection



Date of origin: 1995  
Last review date: 2014

## American College of Radiology ACR Appropriateness Criteria®

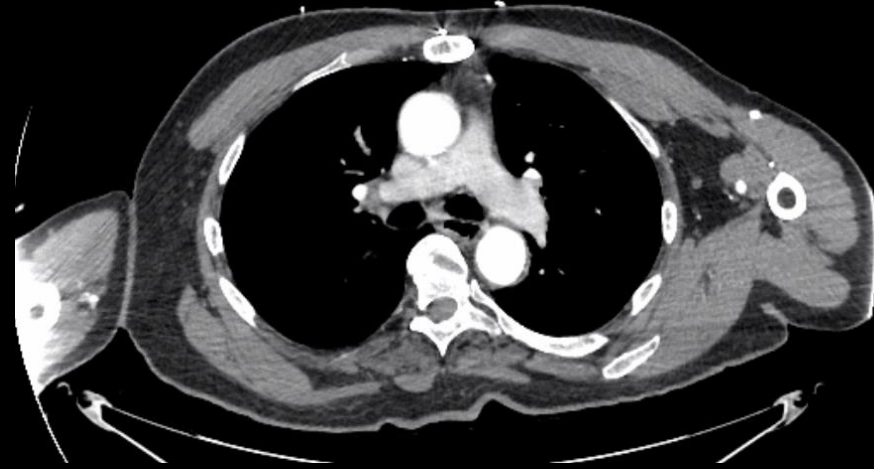
**Clinical Condition:** Acute Chest Pain — Suspected Aortic Dissection

Radiologic Procedure	Rating	Comments	RRL*
X-ray chest	9	This procedure should be performed if readily available at the bedside and if it does not cause delay in obtaining a CT or MRI scan. Alternative causes of chest pain may be discovered. This is not the definitive test for aortic dissection.	☼
CTA chest and abdomen with IV contrast	9	This procedure is recommended as the definitive test in most patients with suspicion of aortic dissection.	☼☼☼☼
MRA chest and abdomen without and with IV contrast	8	This procedure is an alternative to CTA for contraindication to CT (iodinated contrast), multiple prior chest CTA for similar symptoms, and in patients showing no signs of hemodynamic instability. Scanner availability and local expertise limit widespread use, as there is potential for delay in diagnosis.	0
US echocardiography transesophageal	8	Consider this procedure if a skilled operator is readily available.	0
MRA chest and abdomen without IV contrast	7	This procedure is an alternative to CTA for patients with contraindication to both iodinated and gadolinium contrast agents, such as in patients with renal failure, patients with multiple prior chest CTA for similar symptoms, and in patients showing no signs of hemodynamic instability. Scanner availability and local expertise limit widespread use, as there is potential for delay in diagnosis.	0
Aortography chest and abdomen	5		☼☼☼☼
US echocardiography transthoracic resting	4		0
FDG-PET/CT skull base to mid-thigh	3	This procedure is not recommended as the initial test. It may be useful for prognostication and for distinguishing acute from chronic dissection.	☼☼☼☼
<p><b>Rating Scale:</b> 1,2,3 Usually not appropriate; 4,5,6 May be appropriate; 7,8,9 Usually appropriate</p>			<p>*Relative Radiation Level</p>

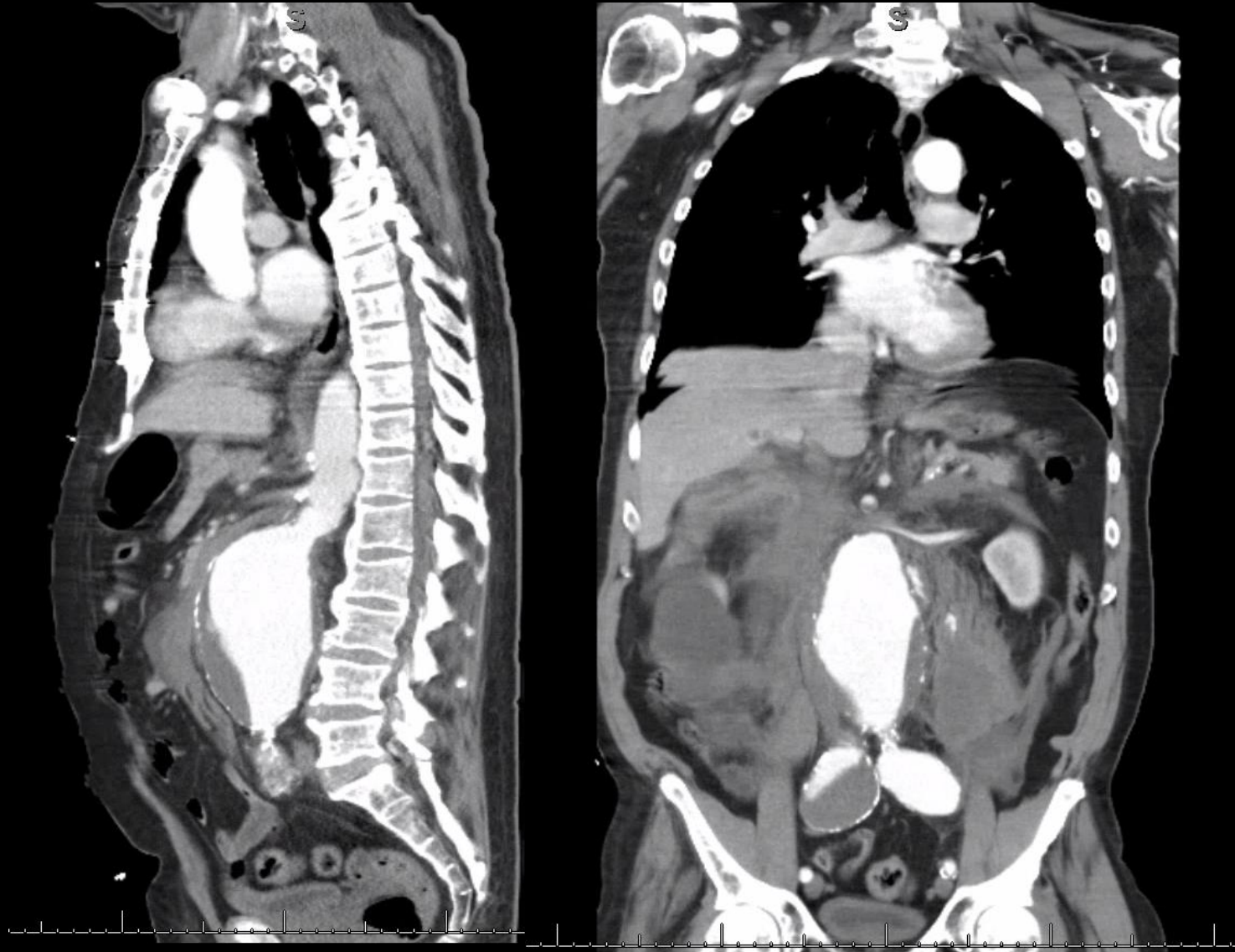


This imaging modality was ordered by the ER physician

# Findings: (unlabeled)



# Findings: (unlabeled)



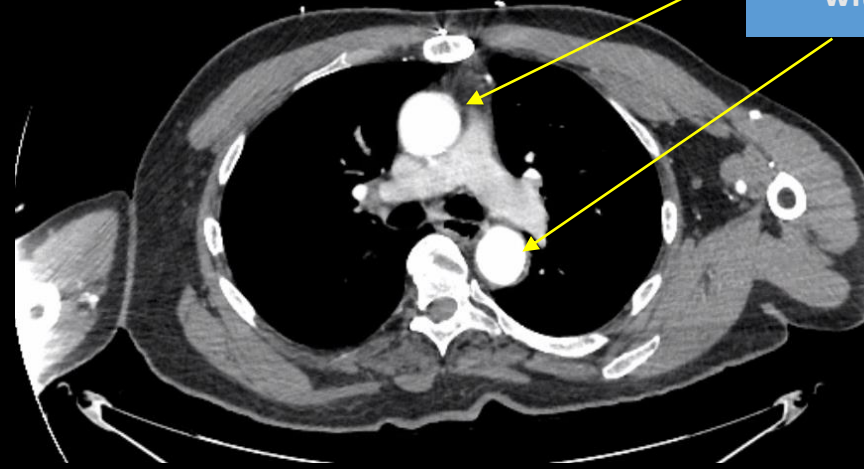


# Findings: (labeled)

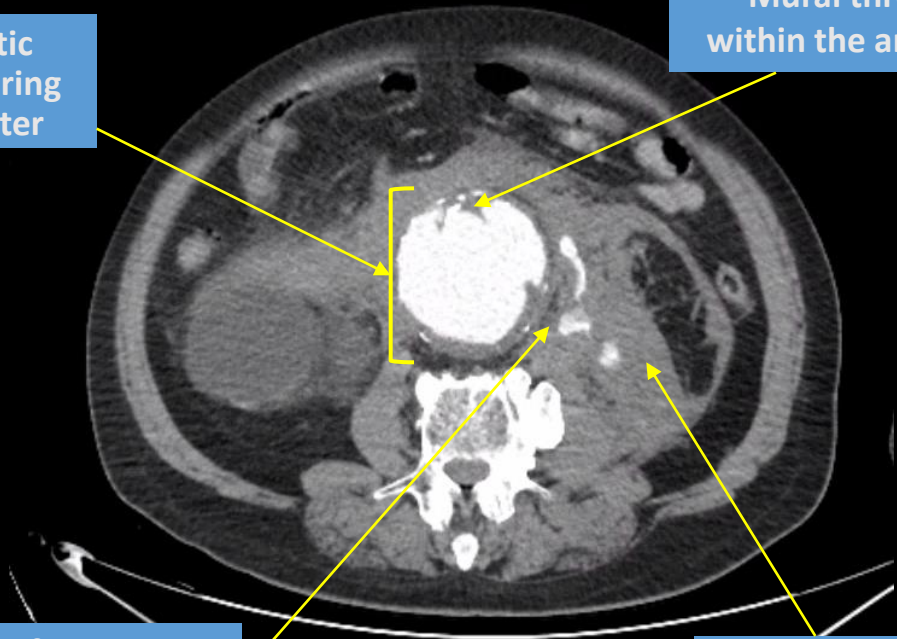
Normal takeoff and filling of brachiocephalic, left common carotid, and left subclavian arteries from aortic arch



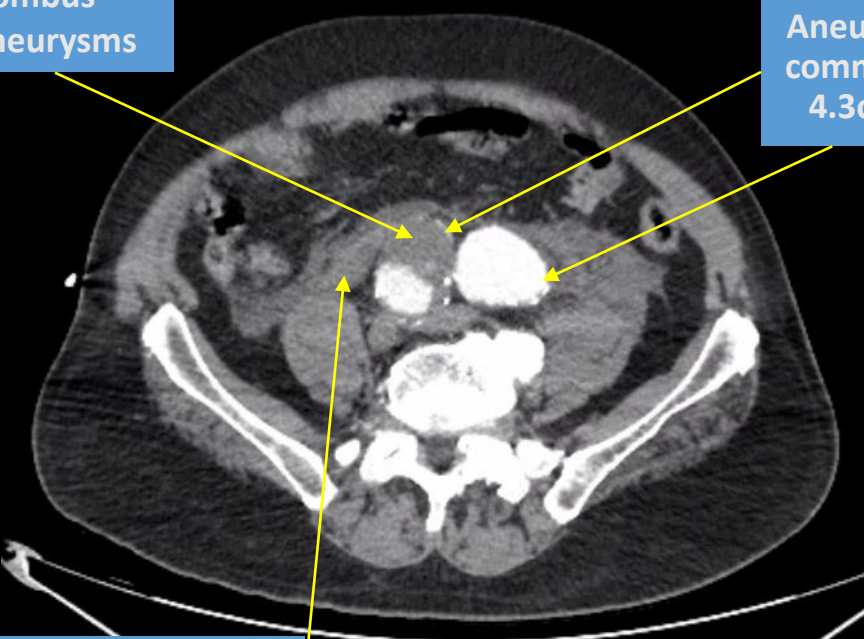
Normal diameter of ascending and descending thoracic aorta with no sign of dissection



Abdominal aortic aneurysm measuring 7.7 cm in diameter



Mural thrombus within the aneurysms



Aneurysmal dilatation of R and L common iliac arteries measuring 4.3cm and 3.4cm respectively

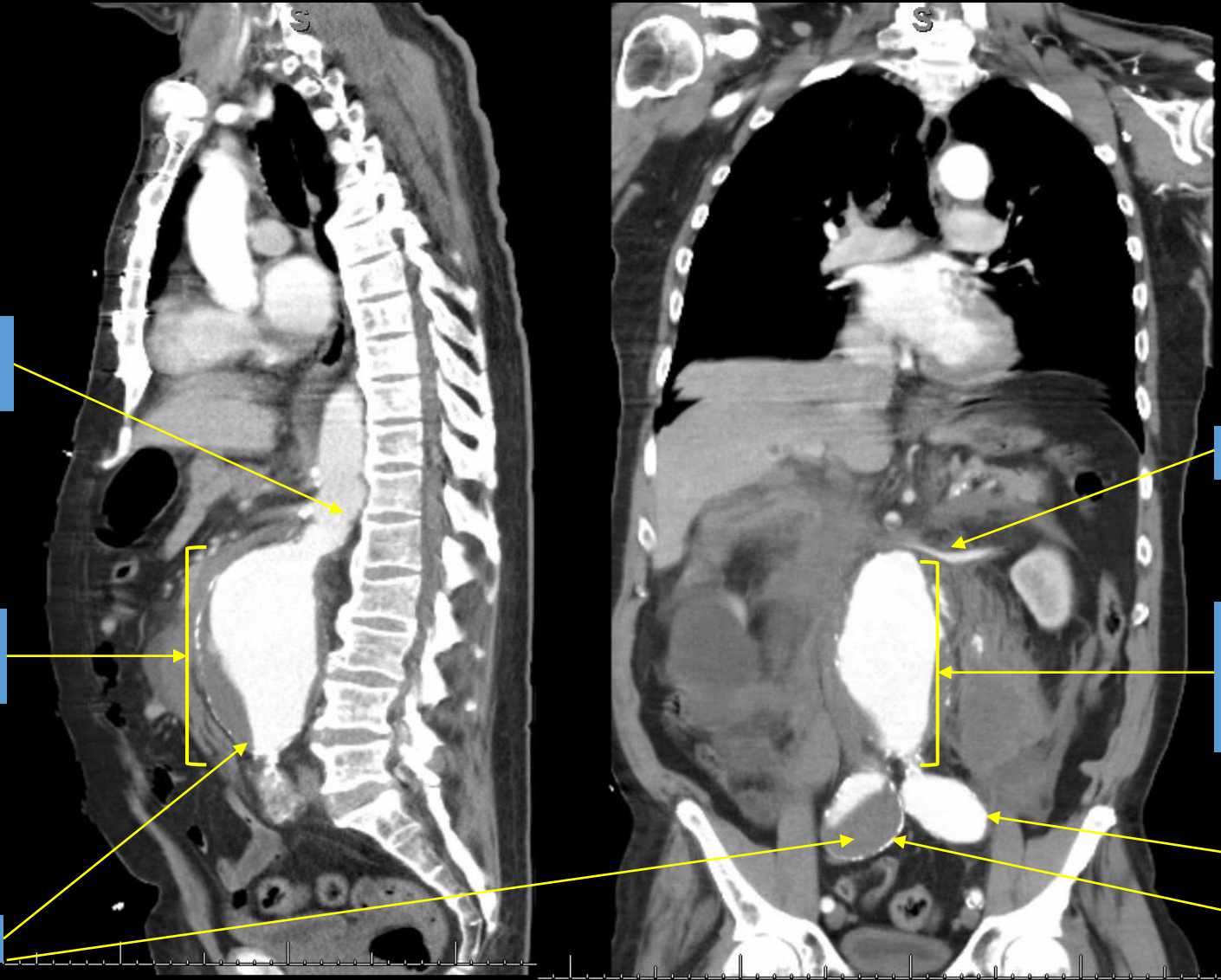
Extravasation of contrast indicating active bleeding



Evidence of hemorrhage prior to contrast administration



# Findings: (labeled)



Normal caliber of abdominal aorta above renal arteries

Abdominal aortic aneurysm with length of 12.8cm

Mural thrombus

Left renal artery

Coronal image demonstrating extent of aneurysmal dilatation from just below the renal arteries to the aortic bifurcation

Aneurysmal dilatation of L and R common iliac arteries

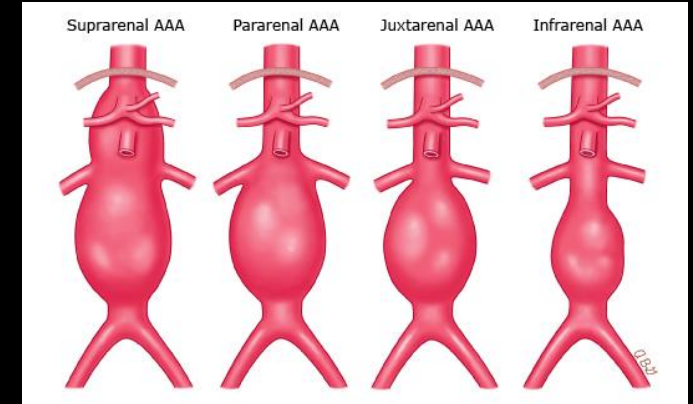


Final Dx:

After initial concern for aortic dissection, a ruptured abdominal aortic aneurysm (AAA) was found on CTA: Abdomen

# Case Discussion: Abdominal Aortic Aneurysm

- **Definition:** AAA is defined as localized dilatation of the abdominal aorta that is  $\geq 50\%$  of its normal diameter.
  - Normal infrarenal aorta = 2 cm. **(Any diameter  $\geq 3$  cm is considered aneurysmal)**
  - AAA are described based on their relation to the renal arteries as suprarenal, pararenal, juxtarenal or infrarenal with up to 40% extending to involve the iliac arteries (as in this case)
- **Epidemiology and Risk Factors:**
  - Age > 50, male gender, hypertension, cardiovascular/atherosclerotic disease, family history and Caucasian race are important risk factors with smoking being the most important modifiable risk factor
  - The estimated prevalence of AAA 2-8% with an annual incidence of 0.4-0.67%
- **Clinical Presentation:**
  - Most patients with AAA present asymptotically with diagnosis by screening or as an incidental finding on imaging
  - Symptomatic AAA presents as a pulsatile abdominal mass or as new onset abdominal, back or flank pain
  - Ruptured AAA presents with severe back or abdominal pain, hypotension and a pulsatile abdominal mass in only 50% of patients
    - Only 20-30% of patients who present with ruptured AAA have a known history of AAA
    - Other diagnoses such as aortic dissection (as in this case), renal colic, diverticulitis, or bowel perforation may be initially suspected



# Case Discussion: Abdominal Aortic Aneurysm

- **Screening and Diagnosis:**

- The USPSTF recommends 1-time screening for AAA with ultrasonography in men aged 65-75 years with any smoking history
- ACR Appropriateness Criteria® for suspected AAA and surgical planning for treatment of AAA:

**American College of Radiology  
ACR Appropriateness Criteria®  
Pulsatile Abdominal Mass, Suspected Abdominal Aortic Aneurysm**

**Variant 1:** Pulsatile abdominal mass, suspected abdominal aortic aneurysm.

Radiologic Procedure	Rating	Comments	RRL*
US aorta abdomen	9		O
CTA abdomen with IV contrast	8		☼☼☼
MRA abdomen without and with IV contrast	8		O
CT abdomen without IV contrast	7		☼☼☼
CT abdomen with IV contrast	7		☼☼☼
CT abdomen without and with IV contrast	7		☼☼☼☼
MRA abdomen without IV contrast	7		O
Aortography abdomen	4		☼☼☼
FDG-PET/CT abdomen	2		☼☼☼☼
<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>

**American College of Radiology  
ACR Appropriateness Criteria®  
Abdominal Aortic Aneurysm: Interventional Planning and Follow-up**

**Variant 1:** Planning for pre-endovascular repair (EVAR) or open repair of AAA.

Procedure	Appropriateness Category	Relative Radiation Level
CTA abdomen and pelvis with IV contrast	Usually Appropriate	☼☼☼☼
MRA abdomen and pelvis without and with IV contrast	Usually Appropriate	O
MRA abdomen and pelvis without IV contrast	May Be Appropriate	O
CT abdomen and pelvis with IV contrast	May Be Appropriate	☼☼☼
CT abdomen and pelvis without IV contrast	May Be Appropriate	☼☼☼
Aortography abdomen	May Be Appropriate	☼☼☼
CT abdomen and pelvis without and with IV contrast	May Be Appropriate	☼☼☼☼
US aorta abdomen with duplex Doppler	Usually Not Appropriate	O
X-ray abdomen and pelvis	Usually Not Appropriate	☼☼☼
CT abdomen and pelvis without IV contrast and US aorta abdomen with duplex Doppler	Usually Not Appropriate	☼☼☼

- **Management:** AAAs are managed according to diameter and the presence of symptoms

- **Asymptomatic:**

- Patients with AAA < 5.5 cm are monitored with yearly ultrasound
- If aneurysm reaches size  $\geq$  5.5 cm or is expanding at a rate >1 cm/year elective repair (endovascular vs. open) is indicated
- No medical therapy has been proven to reduce the rate of aneurysmal enlargement

- **Symptomatic/Ruptured:**

- Aneurysm repair is indicated in symptomatic patients (endovascular vs. open)
- Hemodynamically unstable patients presenting with rupture are taken for immediate resuscitation and open repair (as in this case)

# References:

- Chaikof EL, Dalman RL, Eskandari MK, et al. The Society for Vascular Surgery practice guidelines on the care of patients with abdominal aortic aneurysm. *J Vasc Surg.* 2018; 67:2.
- Dalman RL and Mell M. Overview of abdominal aortic aneurysm. In: UpToDate, Post TW (Ed), UpToDate, Waltham, MA.
- Francois CJ, Skulborstad EP, Majdalany BS, et al. ACR Appropriateness Criteria® AAA: Interventional Planning and Follow-up. Available at <https://acsearch.acr.org/docs/70548/Narrative/>. American College of Radiology. Accessed July 16, 2020.
- Jacobs JE, Latson Jr. LA, Abbara S, et al. ACR Appropriateness Criteria® Acute Chest Pain – Suspected Aortic Dissection. Available at <https://acsearch.acr.org/docs/69402/Narrative/>. American College of Radiology. Accessed July 16, 2020.
- Johnston KW, Rutherford RB, Tilson MD et al. Suggested standards for reporting on arterial aneurysms. Subcommittee on Reporting Standards for Arterial Aneurysms. Society for Vascular Surgery and North American Chapter, International Society for Cardiovascular Surgery. *J Vasc Surg.* 1991; 13:452.
- Kent KC, Zwolak RM, Egorova NN, et al. Analysis of risk factors for abdominal aortic aneurysm in a cohort of more than 3 million individuals. *J Vasc Surg.* 2010; 52(3):539.
- Reis SP, Majdalany BS, AbuRhama AF, et al. Appropriateness Criteria® AAA: Pulsatile Abdominal Mass, Suspected AAA. Available at <https://acsearch.acr.org/docs/69414/Narrative/>. American College of Radiology. Accessed July 16, 2020.
- Screening for Abdominal Aortic Aneurysm. US Preventative Services Task Force Recommendation Statement. *JAMA.* 2019; 322(22):2211-2218.