AMSER Case of the Month November 2023

54-year-old female with anomalous origin of the right coronary artery

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Patient Presentation

- HPI: a 54-year-old woman presented to the emergency room with chest and jaw pain. She reports an eight-month history of intermittent fatigue and flushing with no dyspnea on exertion. Her troponin was elevated; she was diagnosed with NSTEMI and underwent cardiac catheterization and RCA stent placement. During PCI, it was discovered that she had an abnormal RCA origin and course.
- PMx: Coronary artery disease, obesity (BMI=38), hypertension, hyperlipidemia, type 2 diabetes mellitus, 10 pack year smoking history

What Imaging Should We Order?

Select the applicable ACR Appropriateness Criteria

Scenario	Scenario Id	Procedure	Adult RRL	Peds RRL	Appropriateness Category	
Congenital coronary artery abnormality suspected, TTE inadequate assessment of coronary morphology, next imaging study	3196448	MRA chest without IV contrast	0 mSv O	0 mSv [ped] O	Usually appropriate	
		MRA chest without and with IV contrast	0 mSv O	0 mSv [ped] O	Usually appropriate	
		MRI heart function and morphology without IV contrast	0 mSv O	0 mSv [ped] O	Usually appropriate	
		CTA coronary arteries with IV contrast	1-10 mSv ☢☢☢	3-10 mSv [ped]..	Usually appropriate	
		MRI heart function and morphology without and with IV contrast	0 mSv O	0 mSv [ped] O	Usually appropriate	
		Arteriography coronary with ventriculography	1-10 mSv ☢☢☢	3-10 mSv [ped]..	May be appropriate	
		MRA abdomen without and with IV contrast	0 mSv O	0 mSv [ped] O	May be appropriate	
		MRI heart function with stress without IV contrast	0 mSv O	0 mSv [ped] O	May be appropriate	
		CTA chest with IV contrast	1-10 mSv ☢☢☢	3-10 mSv [ped]..	May be appropriate	
		MRI heart function with stress without and with IV contrast	0 mSv O	0 mSv [ped] O	May be appropriate	

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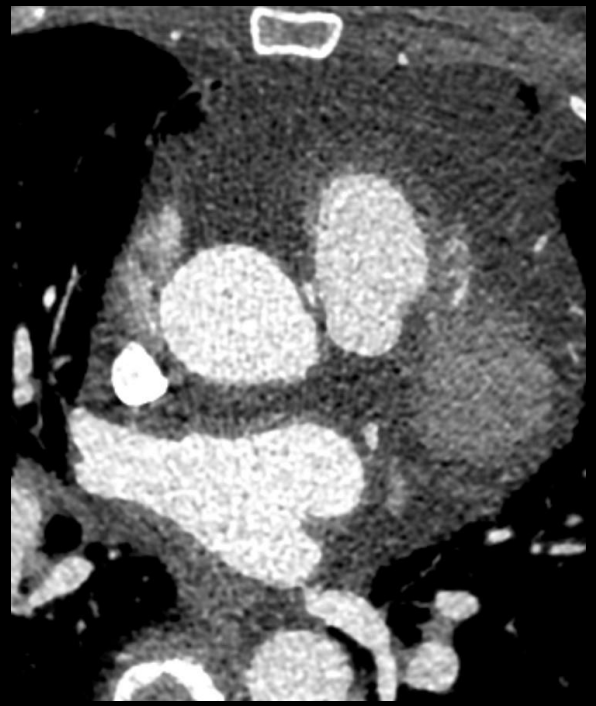
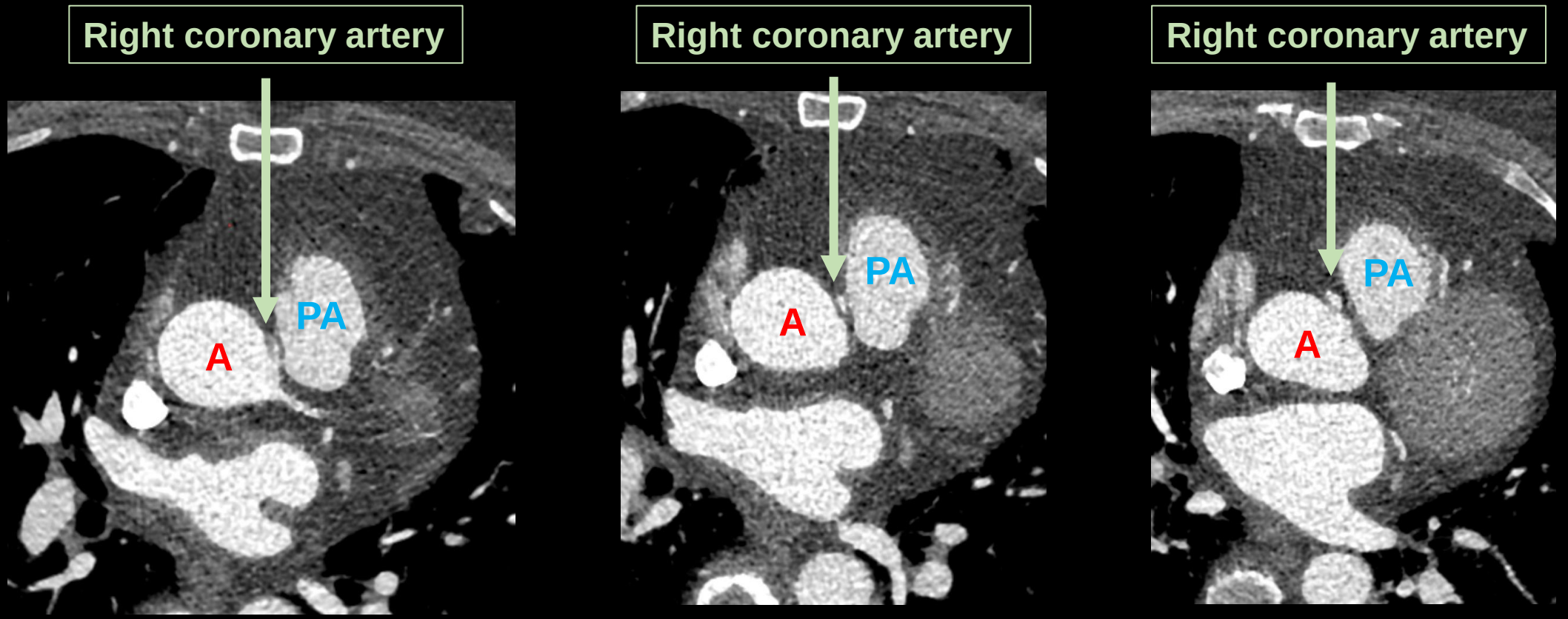
Coronary CTA Axial (unlabeled)



Coronary CTA Axial (labeled)



A = Aorta
PA = Pulmonary Artery

Final Dx:

Anomalous origin of the right coronary artery from the left coronary sinus with an interarterial course

Classifying RCA anomalies

- By origin
  - From pulmonary artery
  - From aorta ← our patient
- By course
  - Interarterial ← our patient
  - Subpulmonic
  - Prepulmonic
  - Retroaortic
  - Retrocardiac
- By anatomy
  - Duplication
- By termination
  - Hypoplasia
  - Fistula
- Congenital absence

Clinical Significance

- Prevalence of anomalous origin of RCA is 0.25%
- Most are asymptomatic, but may be symptomatic and present with:
  - Angina
  - Myocardial infarction
  - Sudden cardiac death
- Our patient is at risk for ischemia due to the interarterial course of her RCA
- What is the mechanism of ischemia due to an interarterial course?
  - Acute angle of RCA from aorta, along with acute angle leaving aorta, and pathway between aorta and pulmonary artery means the RCA gets compressed during exercise

References

- American College of Radiology. ACR Appropriateness Criteria®. Available at https://www.acr.org/Clinical-Resources/ACR-Appropriateness-Criteria. Accessed August 25, 2023.
- Greet B, Quinones A, Srichai M, Bangalore S, Roswell RO. Anomalous right coronary artery and sudden cardiac death. Circulation: Arrhythmia and Electrophysiology. 2012 Dec;5(6):e111-2.
- Mahajan D, Agnihotri G, Brar R. Anomalous origin of right coronary artery: an anatomico-clinical perspective of 2 cases. Acta Informatica Medica. 2012 Mar;20(1):56.
- Villa AD, Sammut E, Nair A, Rajani R, Bonamini R, Chiribiri A. Coronary artery anomalies overview: The normal and the abnormal. World journal of radiology. 2016 Jun 6;8(6):537.