AMSER Case of the Month: January 2024

Patient with history of abnormal stress test and subsequent cardiac catheterization presents for follow up imaging

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Patient Presentation

- PMH
  - 75-year-old female with history of abnormal stress test and subsequent cardiac catheterization > 10 years ago
  - Two months ago, patient presented to emergency department with generalized weakness
    - Symptoms at the time: palpitations, lightheadedness, chest pressure, low BP, bradycardia, shortness of breath, tingling in arms bilaterally
    - Found to have third-degree heart block
      - Pacemaker was placed without complication

Patient Presentation At Pacemaker Placement Follow Up Visit

- Vitals
  - BP: 121/56
  - HR: 80 BPM
  - BMI: 34.5 kg/m^2
- Physical Exam
  - Cardiovascular: normal pulses, normal heart sounds, no murmur
  - Pulmonary: normal breath sounds
  - Skin: Pacemaker site well healed

What Imaging Should We Order?

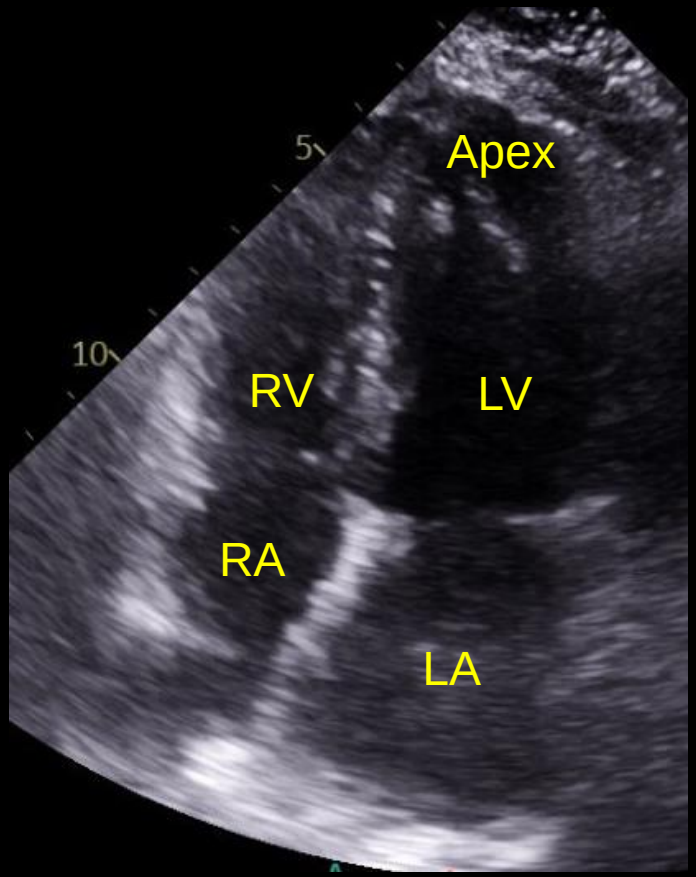
Select the applicable ACR Appropriateness Criteria

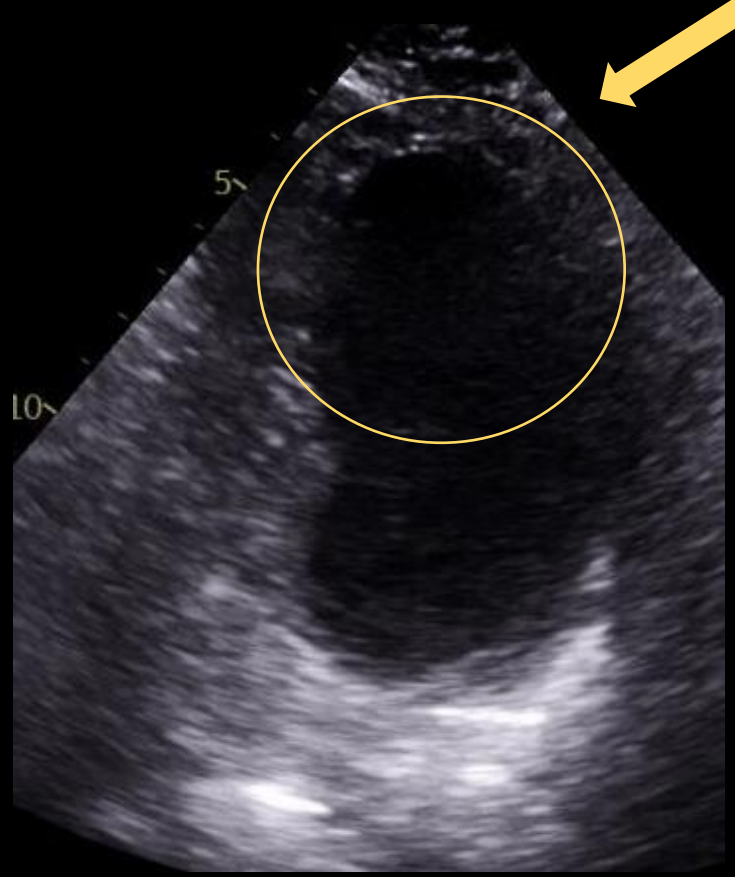
Variant 1: **Chronic chest pain; high probability of coronary artery disease. No known ischemic heart disease. Initial imaging.**

Procedure	Appropriateness Category	Relative Radiation Level
US echocardiography transthoracic stress	Usually Appropriate	O
Arteriography coronary	Usually Appropriate	☢☢☢
CTA coronary arteries with IV contrast	Usually Appropriate	☢☢☢
MRI heart function with stress without and with IV contrast	Usually Appropriate	O
MRI heart function with stress without IV contrast	Usually Appropriate	O
Rb-82 PET/CT heart	Usually Appropriate	☢☢☢☢
SPECT or SPECT/CT MPI rest and stress	Usually Appropriate	☢☢☢☢
US echocardiography transthoracic resting	May Be Appropriate	O
CT coronary calcium	May Be Appropriate	☢☢☢
MRI heart function and morphology without and with IV contrast	May Be Appropriate	O
US echocardiography transesophageal	Usually Not Appropriate	O
CTA chest with IV contrast	Usually Not Appropriate	☢☢☢
CTA triple rule out	Usually Not Appropriate	☢☢☢
CT heart function and morphology with IV contrast	Usually Not Appropriate	☢☢☢☢
MRA coronary arteries without and with IV		

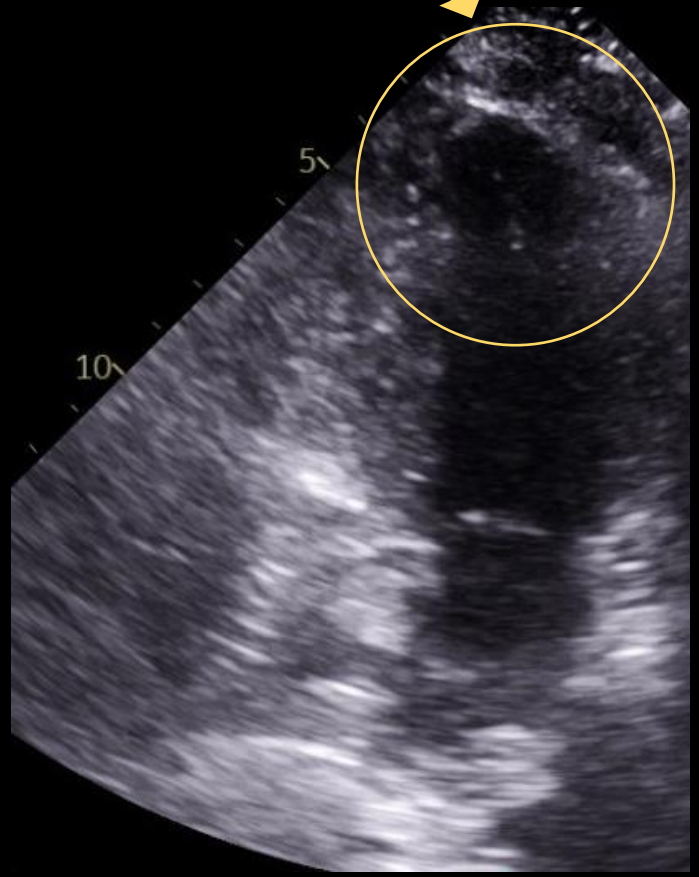
Findings (unlabeled)

Findings (labeled)





Potential dilation of the heart apex



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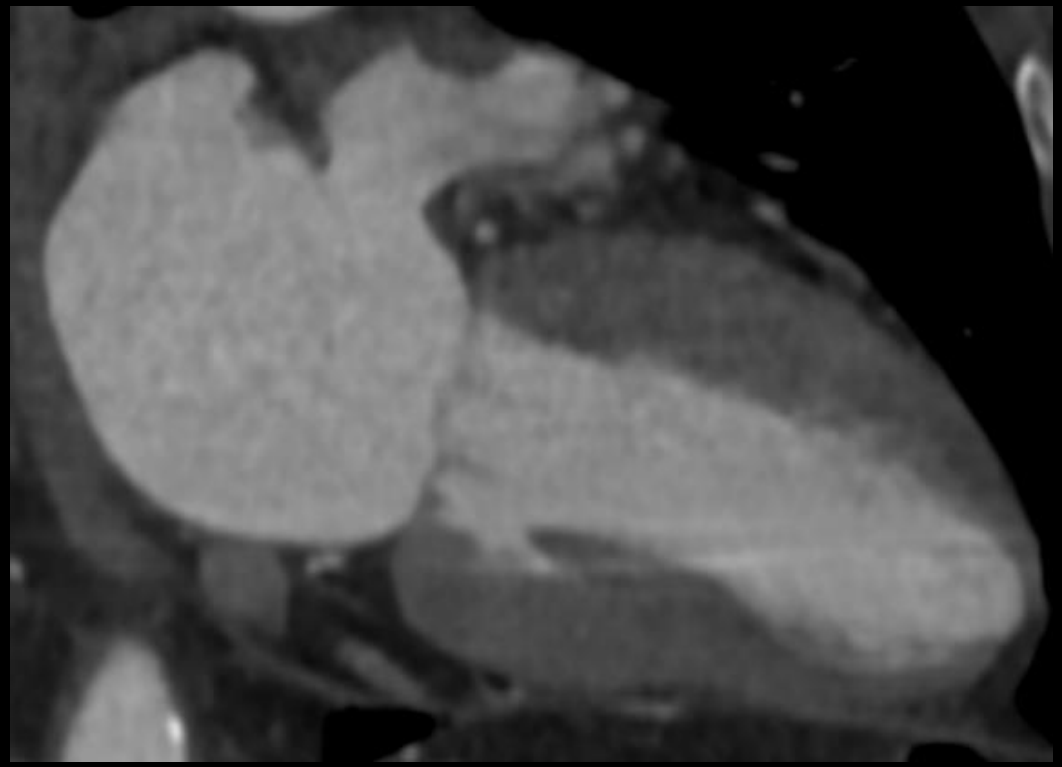
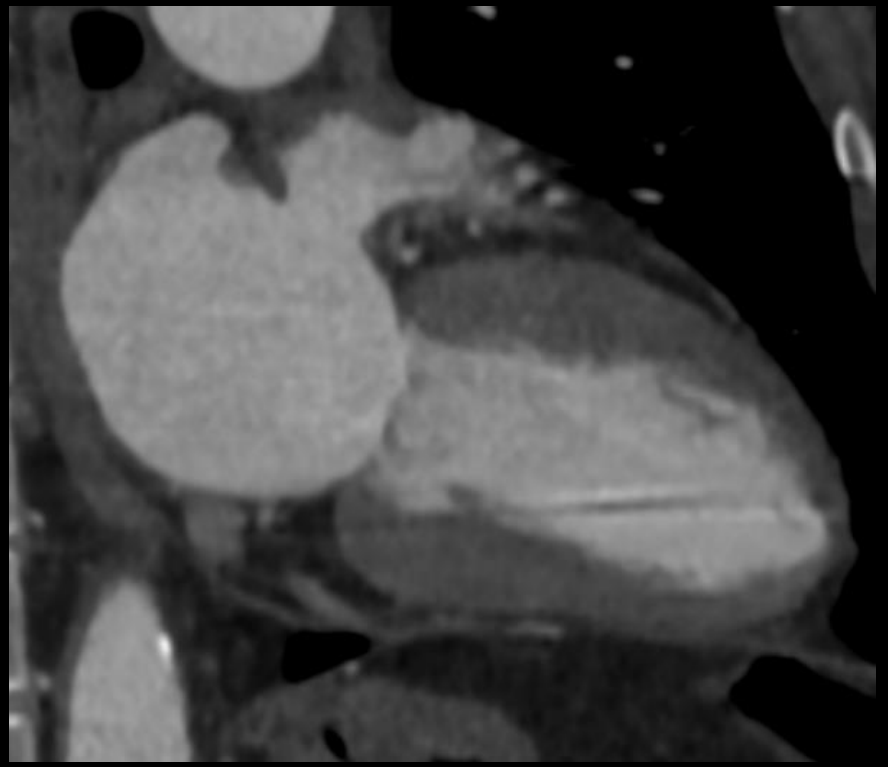
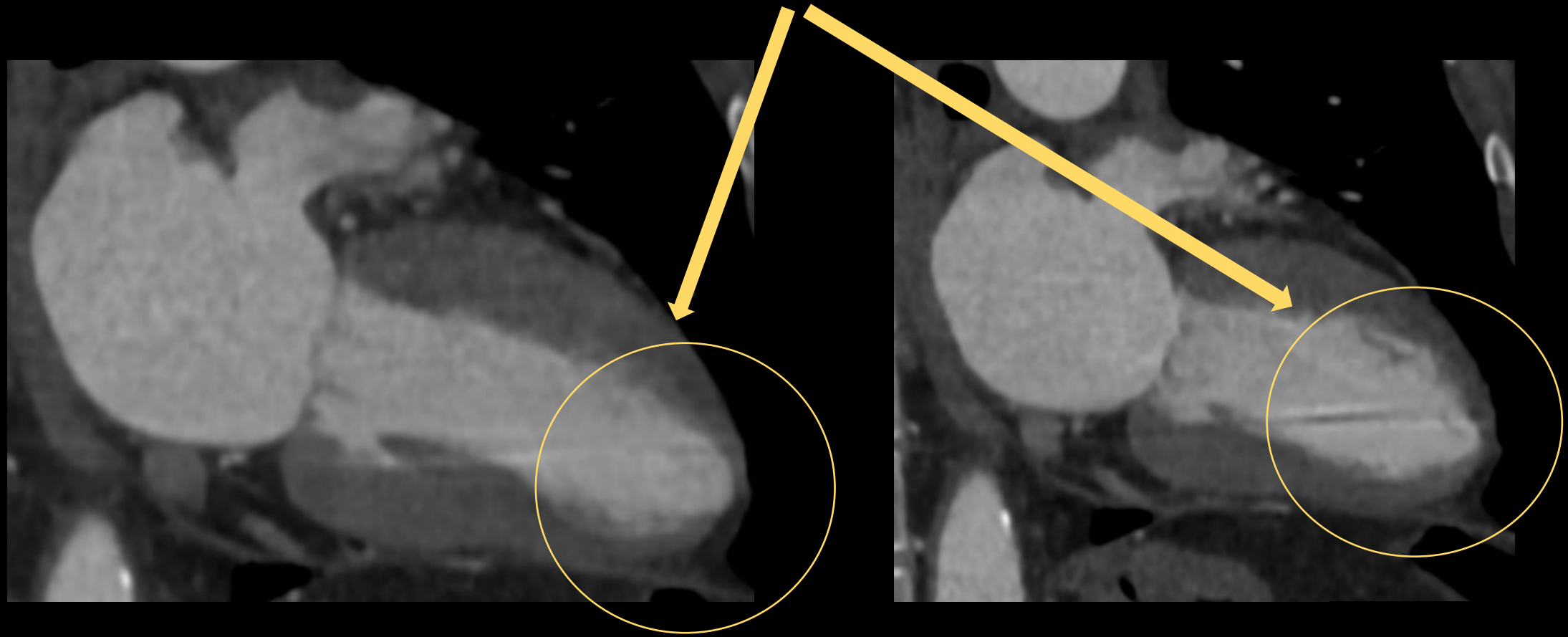




Findings (labeled)

Dilation of apex during systole



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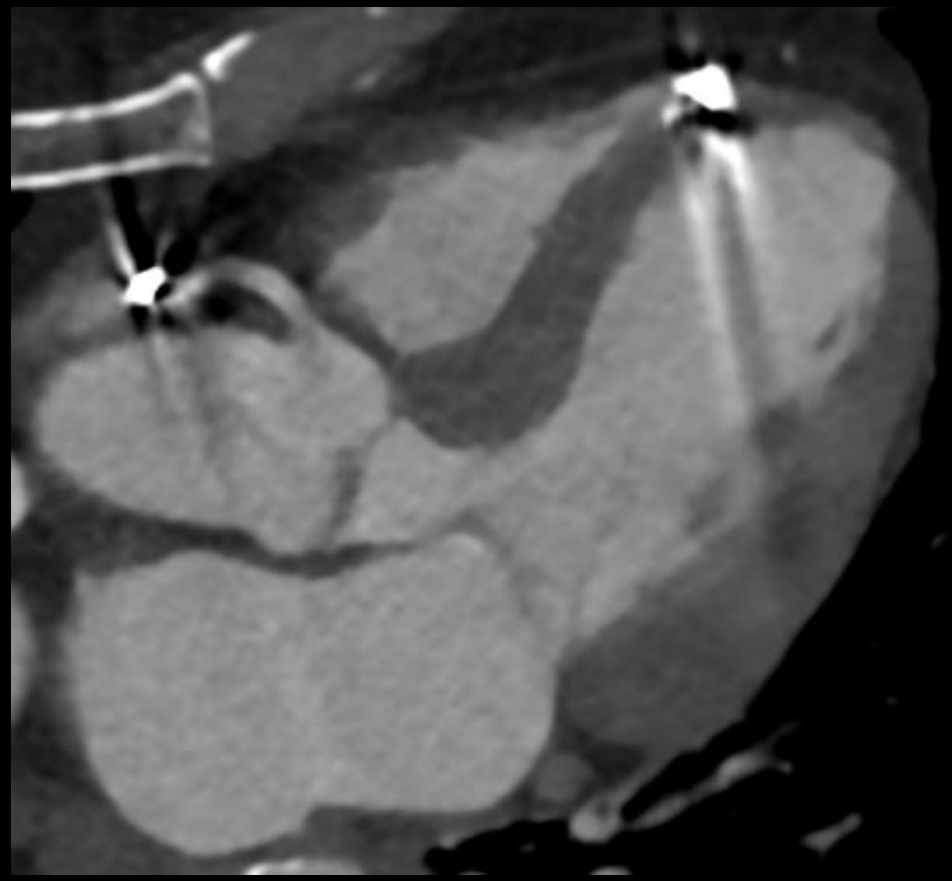

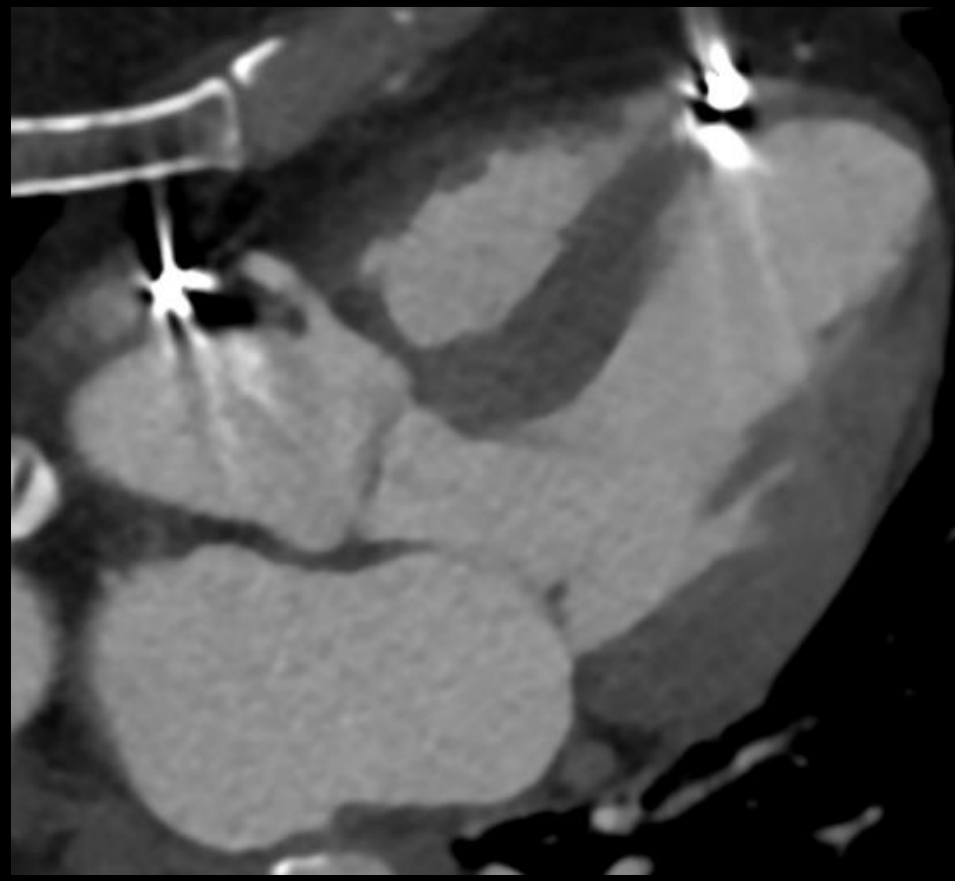

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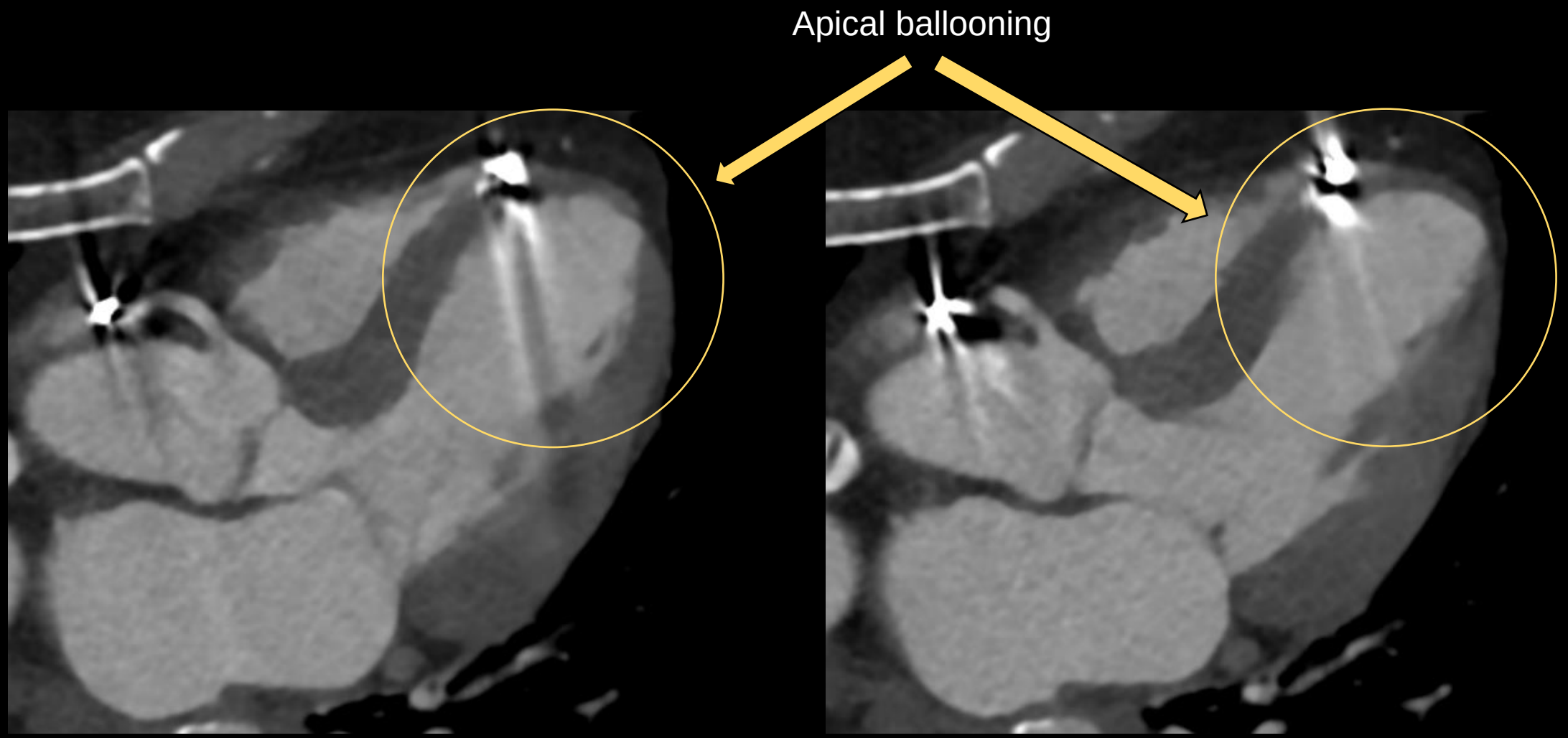

Final Diagnosis

Stress Induced (Takotsubo) Cardiomyopathy

Case Discussion: Takotsubo Cardiomyopathy

- Takotsubo cardiomyopathy, also called stress-induced cardiomyopathy or broken heart syndrome, is a type of non-ischemic cardiomyopathy
  - Characterized by regional systolic dysfunction of LV
  - Mimics acute MI but with mild release of cardiac enzymes
  - Little angiographic evidence of obstructive CAD or plaque rupture
- Pathophysiology hypotheses
  - Stress induced increase in circulating plasma catecholamines
    - This is the most accepted hypothesis
  - Epicardial coronary vessel spasm
  - Aborted MI

Case Discussion: Takotsubo Cardiomyopathy

- Diagnosis
  - Should be suspected in adults who present with ACS with electrocardiographic findings out of proportion to degree of cardiac biomarker elevation
  - Diagnosis of exclusion
  - Mayo Clinic diagnostic criteria
    - Transient hypokinesis, akinesis, or dyskinesis in LV
    - Single epicardial vascular distribution
    - Absence of obstructive CAD/plaque rupture
    - New ECG abnormalities or elevation in troponin
    - Absence of pheochromocytoma and myocarditis

Case Discussion: Takotsubo Cardiomyopathy

- Treatment
  - Initial management focused on close monitoring at risk for severe complications
    - At risk patients include patients with troponin greater than 10x upper reference limit and EF <45 %
  - Initial treatment is similar to ACS
    - aspirin
    - beta-blockers,
    - Ace-inhibitors,
    - lipid lowering agents,
    - coronary angiography to rule out obstructive CAD
  - Patients with unstable hemodynamics/cardiogenic shock
    - Inotropes typically used

Case Discussion: Takotsubo Cardiomyopathy

- Prognosis
  - Most patients recover
  - Reported mortality ranges from 0-8%
  - Often dependent on underlying trigger
    - Primary causes: emotional/psychological stimuli
    - Secondary causes: due to critical illness

References:

- Ahmad SA, Brito D, Khalid N, et al. Takotsubo Cardiomyopathy. [Updated 2023 May 22]. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2023 Jan-. Available from: https://www.ncbi.nlm.nih.gov/books/NBK430798/

- Scantlebury DC, Prasad A. Diagnosis of Takotsubo cardiomyopathy. Circ J. 2014;78(9):2129-39. doi: 10.1253/circj.cj-14-0859. Epub 2014 Aug 13. PMID: 25131525.

- Priya S, Nagpal P, Aggarwal T, Huynh J, Khandelwal K, Khandelwal A. Review of multi-modality imaging update and diagnostic work up of Takotsubo cardiomyopathy. Clin Imaging. 2021 Dec;80:334-347. doi: 10.1016/j.clinimag.2021.08.027. Epub 2021 Sep 3. PMID: 34500146.