AMSER Case of the Month March 2026

31 y/o M presenting with chest and shoulder pain

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Patient Presentation

- HPI
  - 31 y.o. male with hyperlipidemia presented to the ED with chest pain radiating to left shoulder and jaw. He endorsed an abnormal heart rate and low blood pressure per at-home monitoring. No recent illness, pulmonary, GI, MSK, or infectious symptoms.
- Physical Exam
  - Vitals on admission: Temp 38.6C, BP 140/74, HR 78, RR 16, SpO2 100%
  - Cardiovascular: Normal rate and rhythm, no gallop or friction rub, nonedematous
  - Pulmonary: Normal

Pertinent Labs and Imaging on Admission

- Labs
  - CBC: WBC 12.1, Hgb 15.3, Plt 355, Absolute neutrophil count 7.5
  - BMP: WNL
  - HS Troponin: 358 → 299 → 538 → 499
  - BNP: 9
  - CRP: 1
- Imaging
  - EKG: Normal sinus rhythm
  - TTE: Minimal pericardial effusion, but otherwise grossly normal

What Imaging Should We Order?

Select the applicable ACR Appropriateness Criteria

Scenario	Scenario ID	Procedure	Adult RRL	Peds RRL	Appropriateness Category
Chest pain, low to intermed prob acute coronary syndrome, initial imaging	3073873	US echocardiography transthoracic stress	0 mSv O	0 mSv [ped] O	Usually appropriate
		Radiography chest	<0.1 mSv ☢	<0.03 mSv [ped] ☢	Usually appropriate
		CTA coronary arteries with IV contrast	1-10 mSv ☢☢☢	3-10 mSv [ped] ☢☢☢☢	Usually appropriate
		SPECT or SPECT/CT MPI rest and stress	10-30 mSv ☢☢☢☢	10-30 mSv [ped] ☢☢☢☢☢	Usually appropriate
		US echocardiography transthoracic resting	0 mSv O	0 mSv [ped] O	May be appropriate
		MRI heart function and morphology without and with IV contrast	0 mSv O	0 mSv [ped] O	May be appropriate
		MRI heart with function and inotropic stress without and with IV contrast	0 mSv O	0 mSv [ped] O	May be appropriate
		MRI heart with function and inotropic stress without IV contrast	0 mSv O	0 mSv [ped] O	May be appropriate
		MRI heart with function and vasodilator stress perfusion without and with IV contrast	0 mSv O	0 mSv [ped] O	May be appropriate
		CT coronary calcium	1-10 mSv ☢☢☢		May be appropriate
		CTA chest with IV contrast	1-10 mSv ☢☢☢	3-10 mSv [ped] ☢☢☢☢	May be appropriate

This imaging modality was ordered by the ER physician

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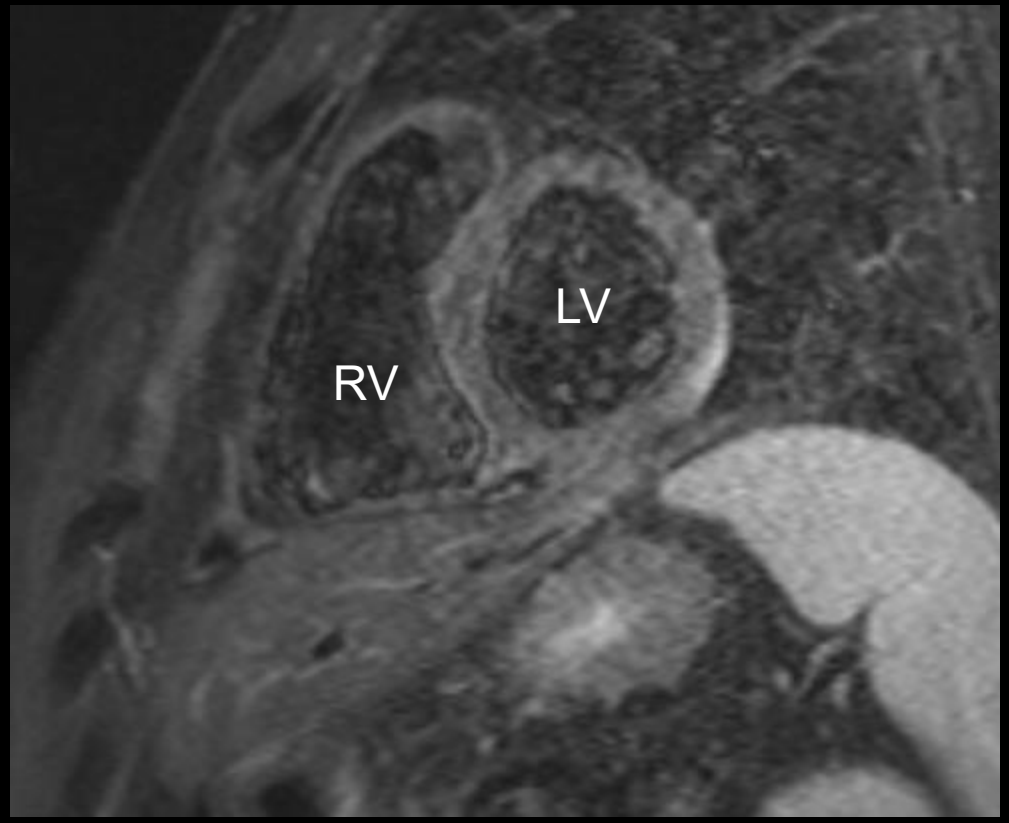
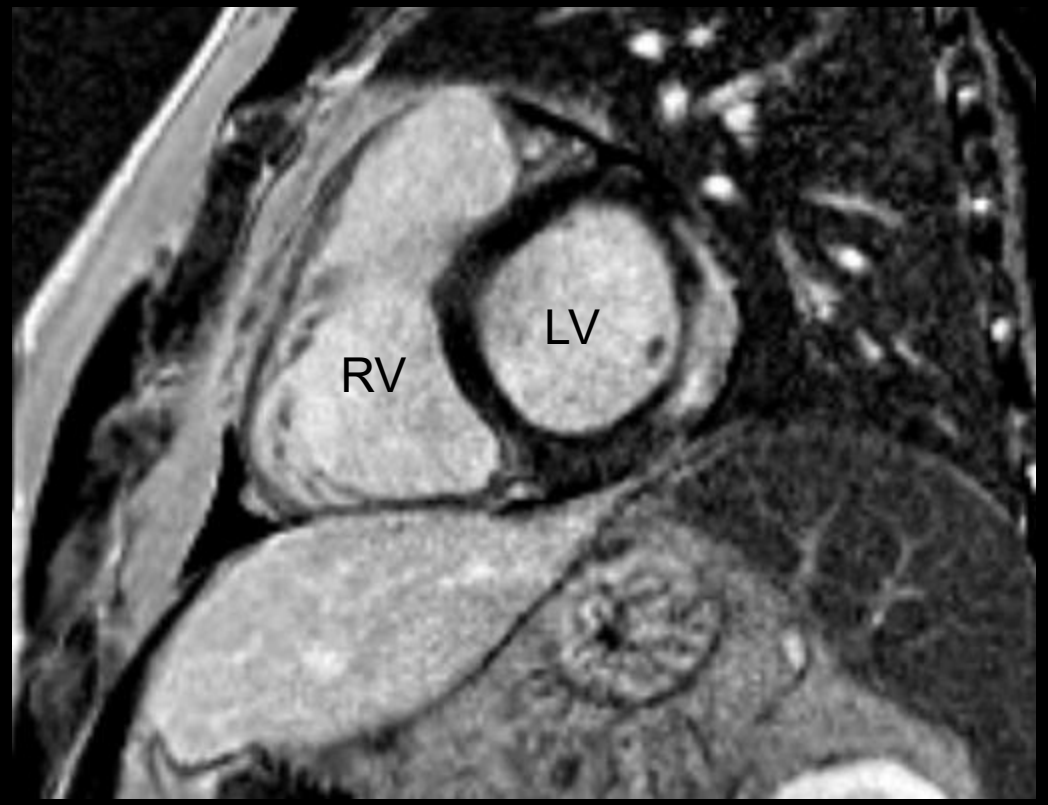
Findings (unlabeled)

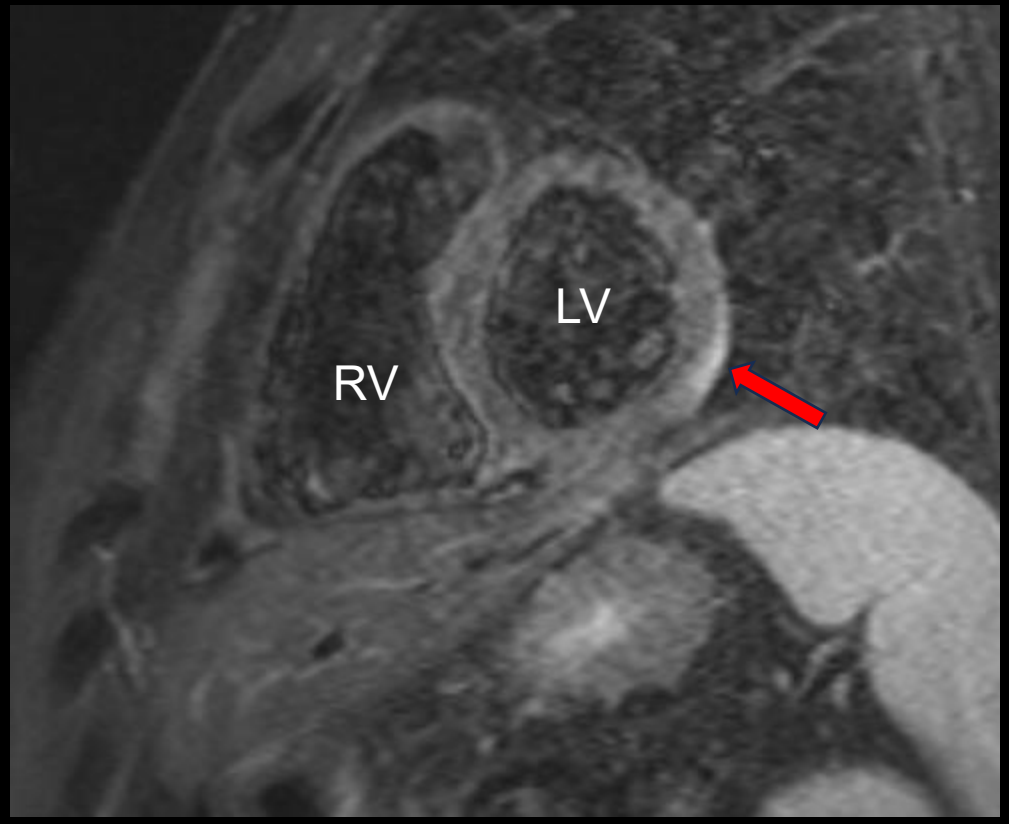


Short axis T2 STIR

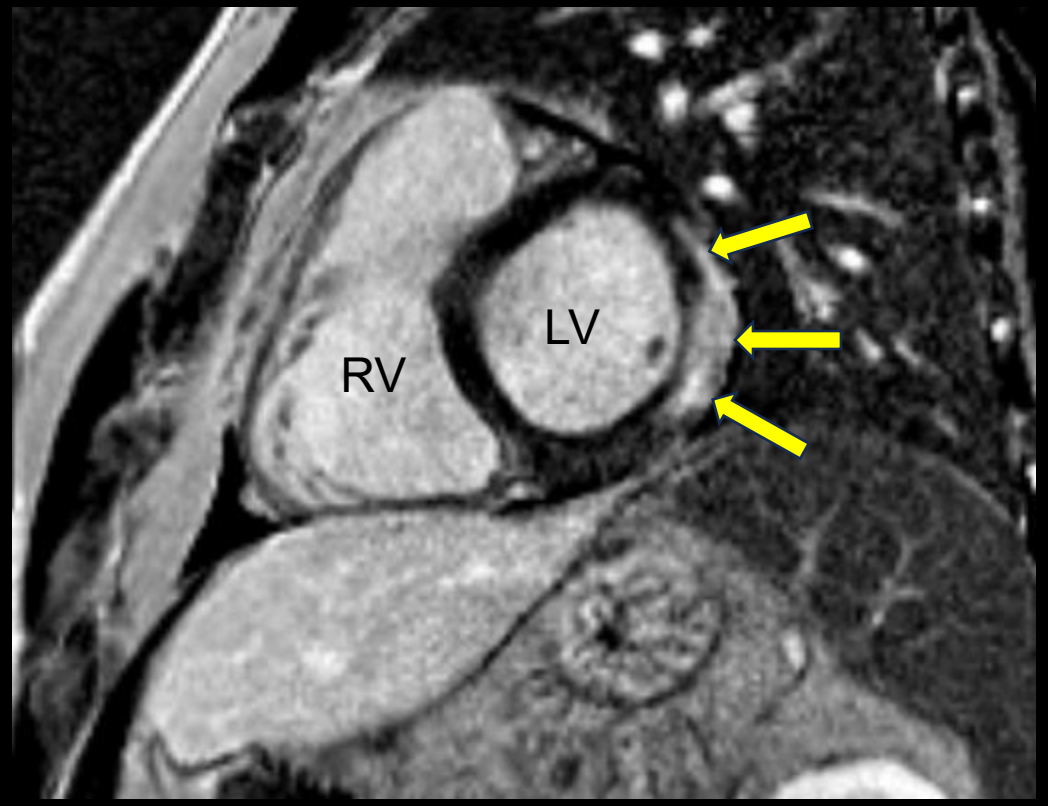


Short axis late gadolinium enhancement

Findings (labeled)



Short axis T2 STIR



Short axis late gadolinium enhancement

Increased T2 signal (red arrow) and enhancement (yellow arrows) along the subepicardium of the lateral and inferolateral wall of the left ventricle. Notice the distribution of findings (in the subepicardium) does NOT follow an ischemic pattern.

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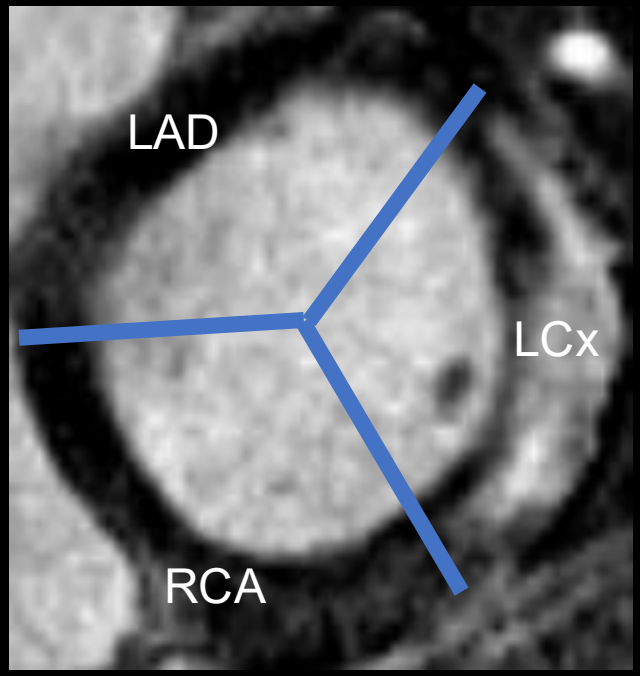
Final Dx:

Myocarditis

Myocarditis

- Cardiac MR is helpful in distinguishing nonischemic from ischemic causes of cardiac disease given overlap in presenting symptoms including chest pain and elevated troponins[1,2]
- Nonischemic causes of cardiac disease do NOT follow a vascular territory of the epicardial vessels and may lead to changes in the T1 and T2 relaxation as well as the enhancement of the myocardium
  - Although this case has enhancement in the left circumflex territory it does NOT involve the subendocardium (inner myocardium adjacent to the LV cavity) therefore cannot be ischemic[3]

Causes of Myocarditis
Infections (typically viral)
Medication
Autoimmune
Other



LAD: Left anterior descending

LCx: Left circumflex

RCA: Right coronary artery

Updated Lake Louise Criteria for Myocarditis Diagnosis

- A diagnosis of myocarditis is made when at least 1 finding of myocardial edema plus at least 1 finding of myocyte injury are present using the following cardiac MR criteria [4]

Myocardial edema	Myocyte injury
Local or global increase in native T2 using mapping	Local or global increase in native T1 using mapping
Local or global increase in T2 signal	Local or global increase in extracellular volume
	Late gadolinium enhancement in a non-ischemic distribution

- Imaging in this case met criteria since it displayed findings of both myocardial edema (increased T2 STIR; red arrow) and myocyte injury (late gadolinium enhancement; yellow arrow)

References

1. Ferreira, V. M., Piechnik, S. K., Dall'Armellina, E., Karamitsos, T. D., Francis, J. M., Ntusi, N., Holloway, C., Choudhury, R. P., Kardos, A., Robson, M. D., Friedrich, M. G., & Neubauer, S. (2013). T(1) mapping for the diagnosis of acute myocarditis using CMR: comparison to T2-weighted and late gadolinium enhanced imaging. JACC. Cardiovascular imaging, 6(10), 1048–1058. https://doi.org/10.1016/j.jcmg.2013.03.008
2. Messroghli, D. R., Moon, J. C., Ferreira, V. M., Grosse-Wortmann, L., He, T., Kellman, P., Mascherbauer, J., Nezafat, R., Salerno, M., Schelbert, E. B., Taylor, A. J., Thompson, R., Ugander, M., van Heeswijk, R. B., & Friedrich, M. G. (2017). Clinical recommendations for cardiovascular magnetic resonance mapping of T1, T2, T2* and extracellular volume: A consensus statement by the Society for Cardiovascular Magnetic Resonance (SCMR) endorsed by the European Association for Cardiovascular Imaging (EACVI). Journal of cardiovascular magnetic resonance : official journal of the Society for Cardiovascular Magnetic Resonance, 19(1), 75. https://doi.org/10.1186/s12968-017-0389-8
3. Cerqueira, M. D., Weissman, N. J., Dilsizian, V., & Jacobs, A. K. (2002). Standardized myocardial segmentation and nomenclature for tomographic imaging of the heart: a statement for healthcare professionals from the Cardiac Imaging Committee of the Council on Clinical Cardiology of the American Heart Association. Circulation, 105(4), 539-542.
4. Ferreira, V. M., Schulz-Menger, J., Holmvang, G., Kramer, C. M., Carbone, I., Sechtem, U., Kindermann, I., Gutberlet, M., Cooper, L. T., Liu, P., & Friedrich, M. G. (2018). Cardiovascular Magnetic Resonance in Nonischemic Myocardial Inflammation: Expert Recommendations. Journal of the American College of Cardiology, 72(24), 3158–3176. https://doi.org/10.1016/j.jacc.2018.09.072

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