




MEDICAL SCHOOL
UNIVERSITY OF MICHIGAN

CARDIOTHORACIC CASE

Raymond Sun, MS3
Dr. Elizabeth Lee, M.D.
University of Michigan Medical School
Department of Cardiothoracic Radiology

 Please consider the environment before printing this PowerPoint

61 y.o. female w/ stage IV leiomyosarcoma

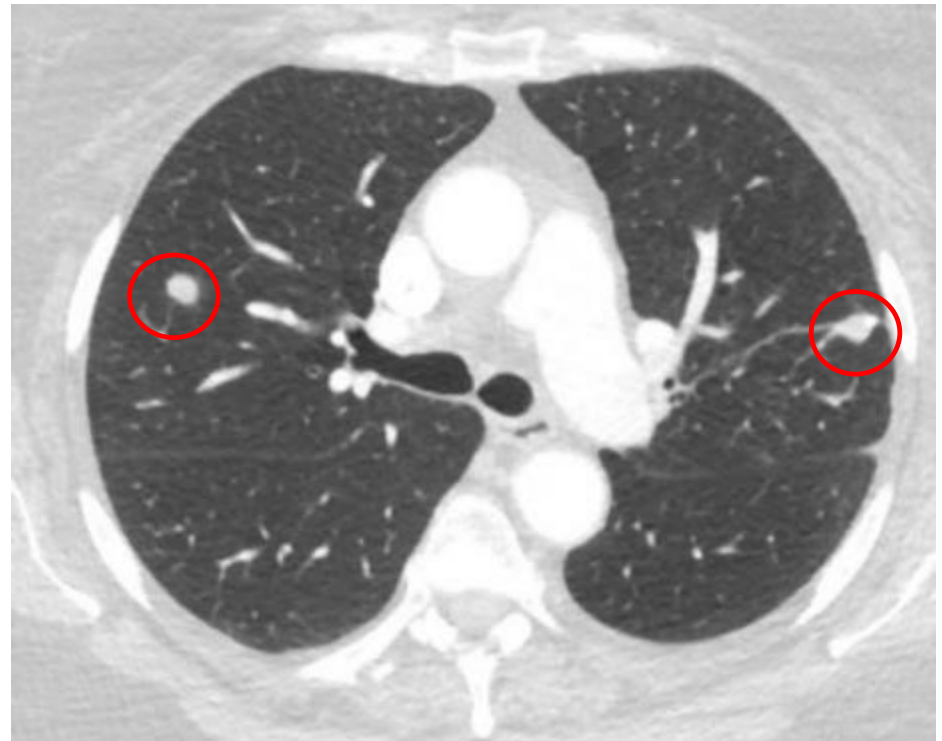
2015: Developed a quickly growing lump over the L shoulder

Biopsy revealed **high grade sarcoma** which was resected

2017: Surveillance chest radiograph demonstrated findings concerning for metastatic pulmonary nodules which was confirmed on CT

Treated with radiotherapy and surgical resections

2020: Began chemotherapy with doxorubicin and ifosfamide



1/2020 Axial CT chest w/ contrast with bilateral pulmonary nodules (circles) due to metastatic disease

5/2020: Swelling, DOE, and heart racing. No prior cardiac hx, but Cardiology suspected a case of cardiomyopathy.

Initial Pertinent Labs and Testing

Labs:

- Lipid panel was normal except mildly elevated triglycerides
- Comprehensive metabolic panel was unremarkable
- Complete blood count was stable
- **Brain natriuretic peptide (BNP) was normal at 68**

Electrocardiogram:

- Left bundle branch block (LBBB)

Echocardiography:

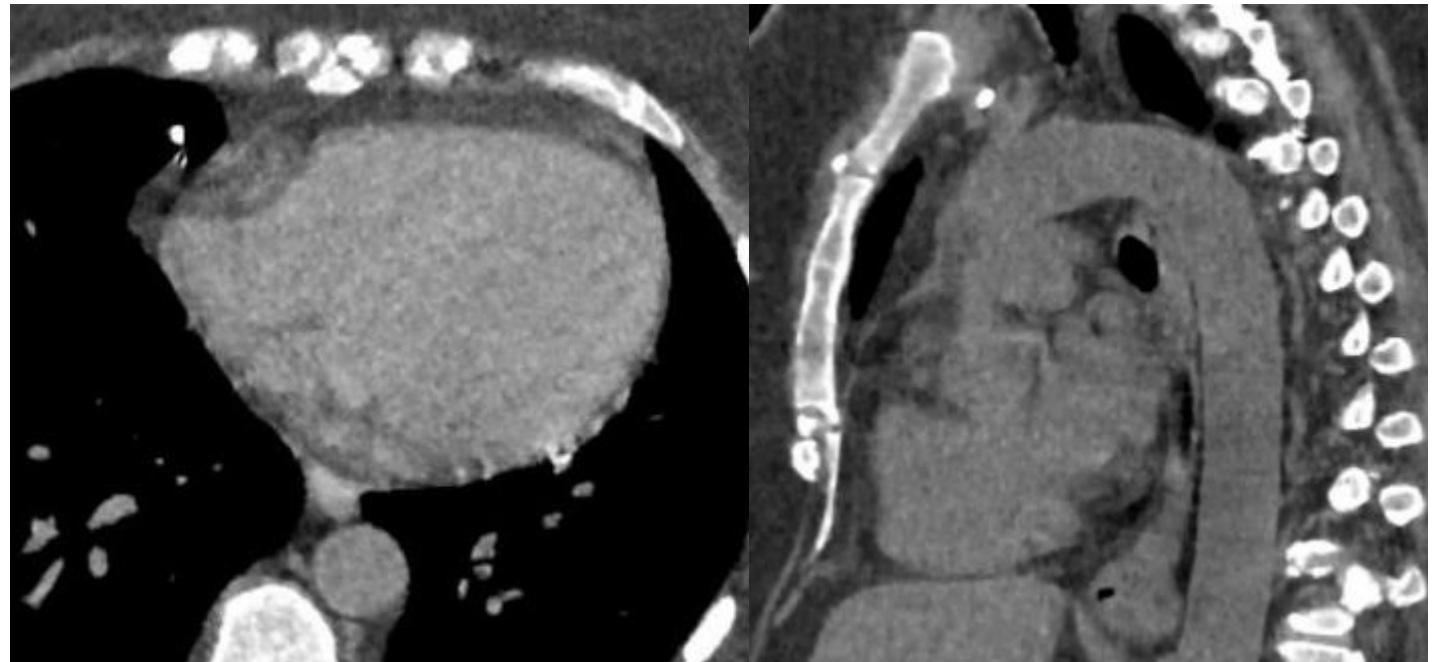
- Prior to starting **doxorubicin, Ejection fraction (EF) 44%**
- After, **EF 31%**

Doxorubicin cardiotoxicity?

Initial Imaging

CT Chest:

- No detectable coronary arterial calcification
- Unremarkable cardiac morphology and pericardium



Axial and sagittal noncontrast CT images of the heart without significant finding.

This test was done to survey her lung nodules (therefore done as a noncontrast CT).

What are some appropriate next tests?

American College of Radiology
ACR Appropriateness Criteria®
Dyspnea–Suspected Cardiac Origin

Variant 1: Dyspnea due to heart failure. Ischemia not excluded.

Radiologic Procedure	Rating	Comments	RRL*
X-ray chest	9		☼
US echocardiography transthoracic resting	9		○
US echocardiography transthoracic stress	9		○
SPECT or SPECT/CT MPI rest and stress	9		☼☼☼☼
Rb-82 PET/CT heart	8		☼☼☼
MRI heart function and morphology without and with IV contrast	8		○
MRI heart with function and vasodilator stress perfusion without and with IV contrast	8		○
CTA coronary arteries with IV contrast	8		☼☼☼
Arteriography coronary with ventriculography	8		☼☼☼
MRI heart with function and inotropic stress without and with IV contrast	7		○
US echocardiography transesophageal	5		○
MRI heart function and morphology without IV contrast	5	This procedure may be appropriate but there was disagreement among panel members on the appropriateness rating as defined by the panel's median rating.	○
MRI heart with function and inotropic stress without IV contrast	5	This procedure may be appropriate but there was disagreement among panel members on the appropriateness rating as defined by the panel's median rating.	○
CT heart function and morphology with IV contrast	5	This procedure may be appropriate but there was disagreement among panel members on the appropriateness rating as defined by the panel's median rating.	☼☼☼☼
CT coronary calcium	5		☼☼☼

Rating Scale: 1,2,3 Usually not appropriate; 4,5,6 May be appropriate; 7,8,9 Usually appropriate

*Relative Radiation Level

Nuclear Medicine Cardiac Stress Study

IMPRESSION:

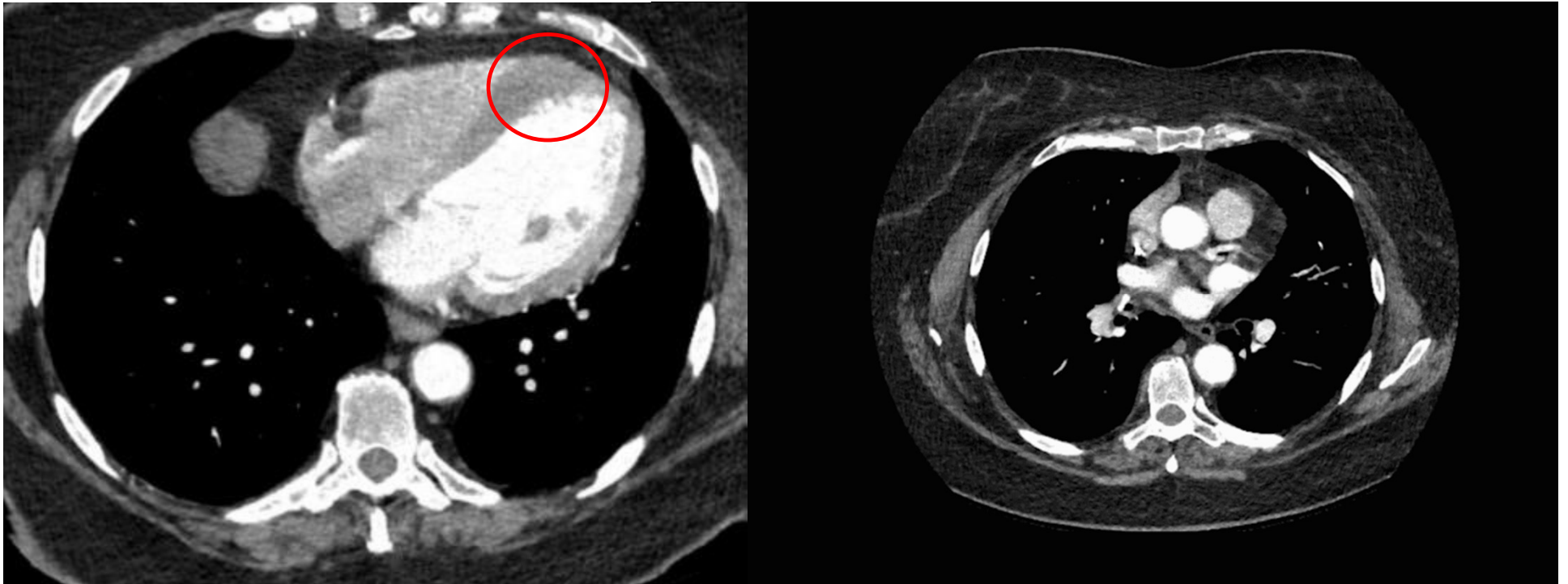
(1) Large sized, moderate severity, apical, anterior, anteroseptal, and septal, partially reversible defect consistent with impaired perfusion reserve, ischemia and infarction in the territory typical of the proximal to distal LAD. Based on defect tracer uptake in the rest images, defect reversibility, and regional wall function in the defect area, this defect is mostly viable.

Findings from the stress could reflect ischemic heart disease or be due to LBBB therefore....

- Left heart catheterization was performed and was NEGATIVE for coronary artery disease
- She was treated with medical management for heart failure (HF)
 - spironolactone, lisinopril, carvedilol

Next follow up CT

Axial contrast enhanced

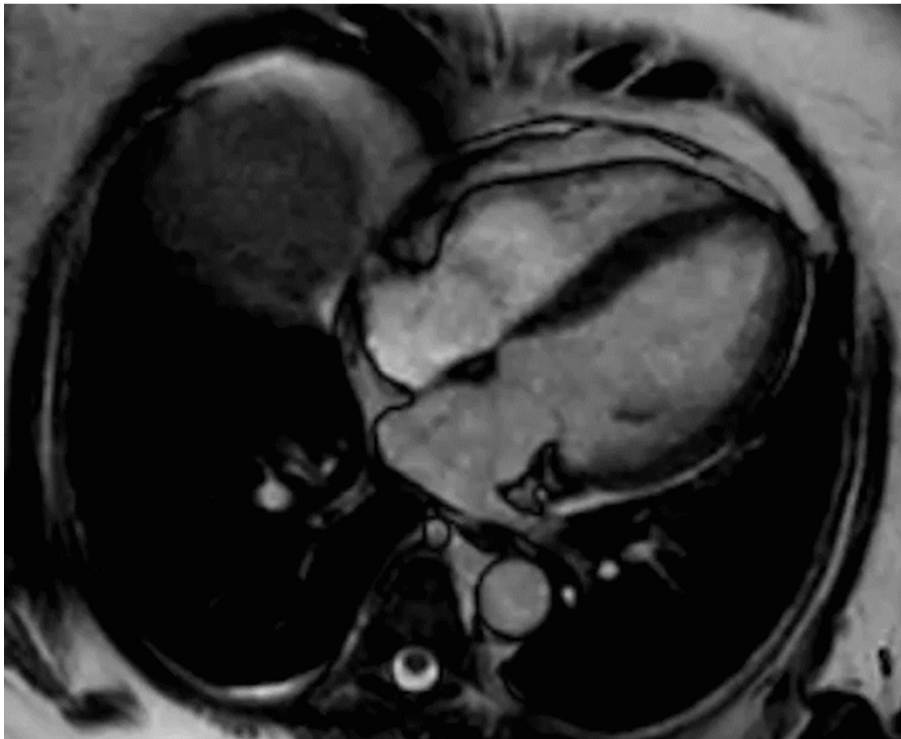


Possible focal thickening of the interventricular septum...although this is not well assessed secondary to unopacified blood in the right ventricle.

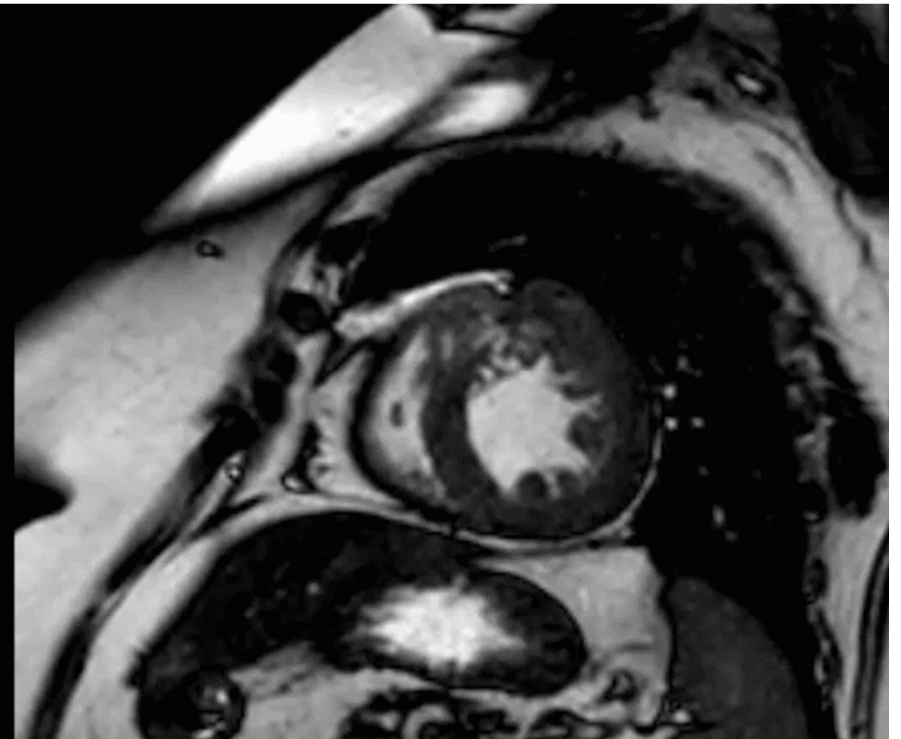
➔ Time for MRI!

Cardiac MRI Findings:

Cine, steady state free precession (SSFP)



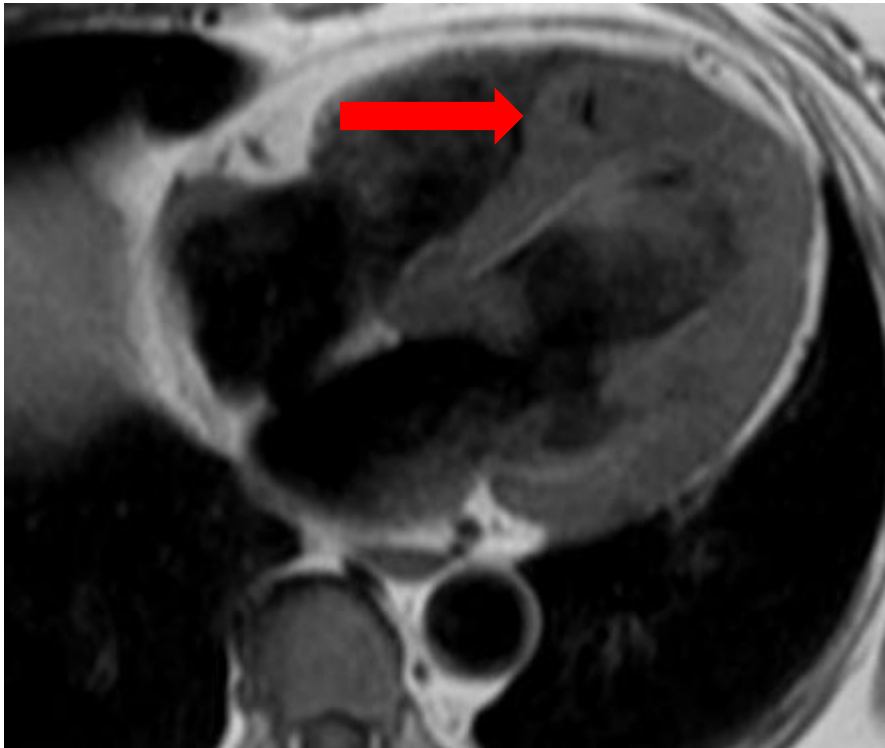
4 Chamber



Short axis

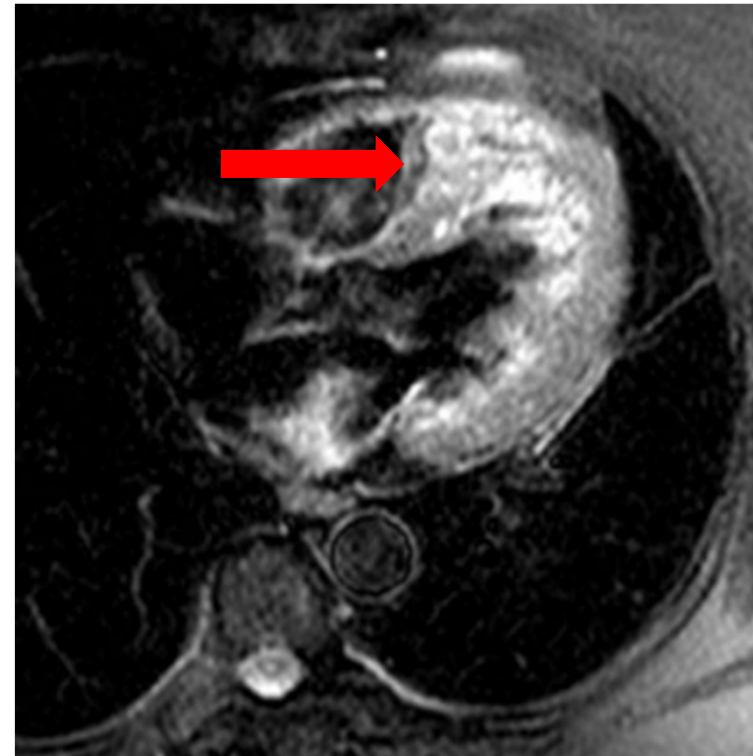
Cardiac MRI Findings:

Axial



T1 –heterogeneous, isointense

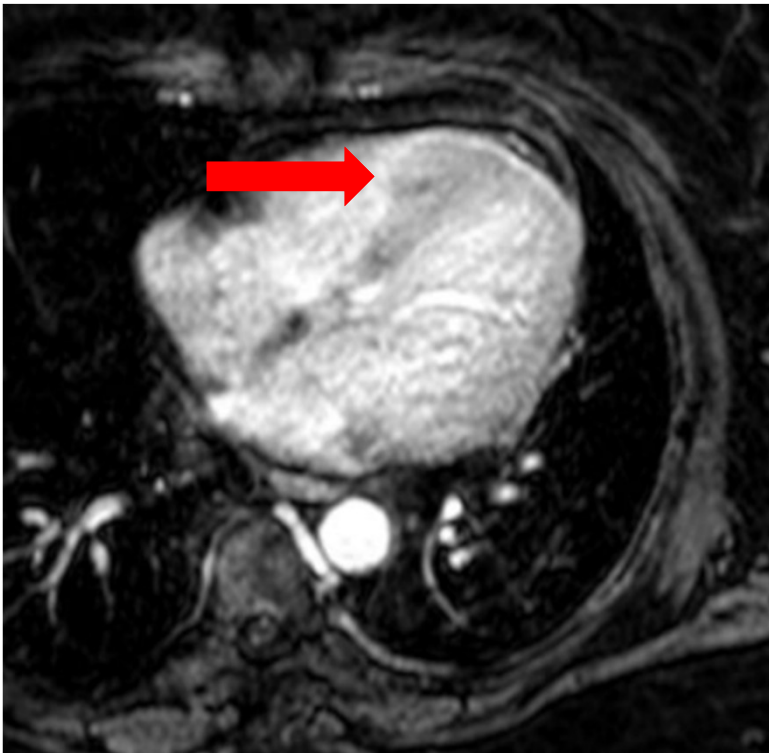
Axial



T2 – heterogeneous,
hyperintense

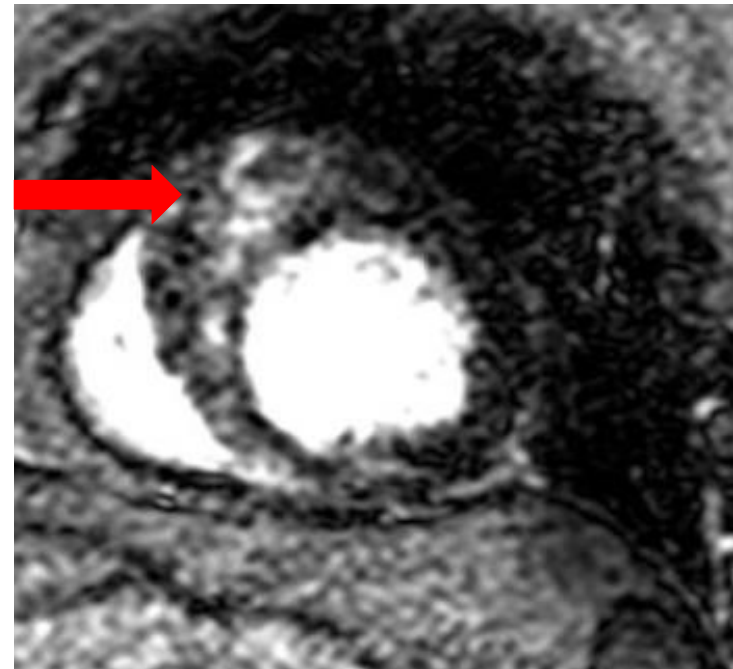
Cardiac MRI Findings: Metastatic disease

Axial



T1 fat saturation post contrast – heterogeneous, enhancement

Short axis



Inversion recovery post contrast –heterogeneous, enhancement

Lastly, what about doxorubicin?

Were the patient's symptoms due to cardiomyopathy or cardiac metastatic disease?

EF improved from 31% → 37% after stopping doxorubicin,
But also she was on medical management...

Usual Doxorubicin cardiomyopathy:

Clinically: mimics HF, can present w/ chest pain

Time: can be very acute (2-3d), or chronic

Dosage: dose-dependent, 4% incidence at 500-550 mg/m²

Diagnosis: signs of overt heart failure, cardiomegaly, pulmonary venous congestion, elevated BNP.

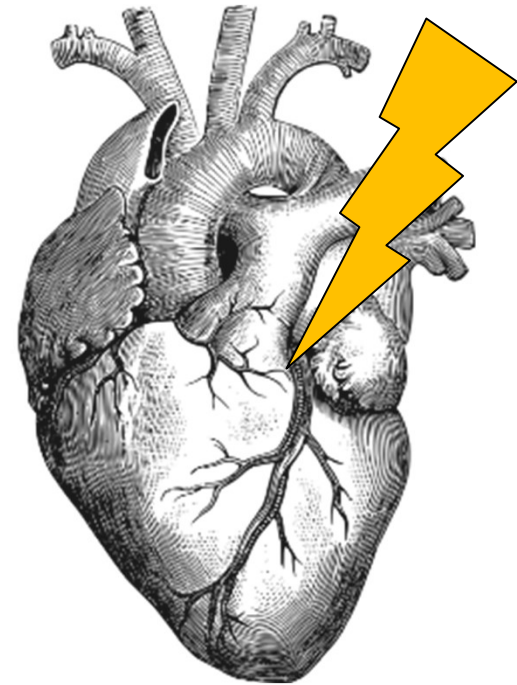
This case:

Clinically: HF symptoms, no chest pain

Time: 3 months

Dosage: 300 mg/m² total dose at time of hold

Diagnosis: signs of heart failure, no cardiomegaly or pulmonary venous congestion. Normal labs.



Doxorubicin

References

- Casavecchia G., et al. Cardiac Tumors. *J Cardiovasc Echogr.* 2020;30S45-S53.
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Thank you!