IMAGING IN COMPLEX CONGENITAL HEART DISEASE

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Disclosures

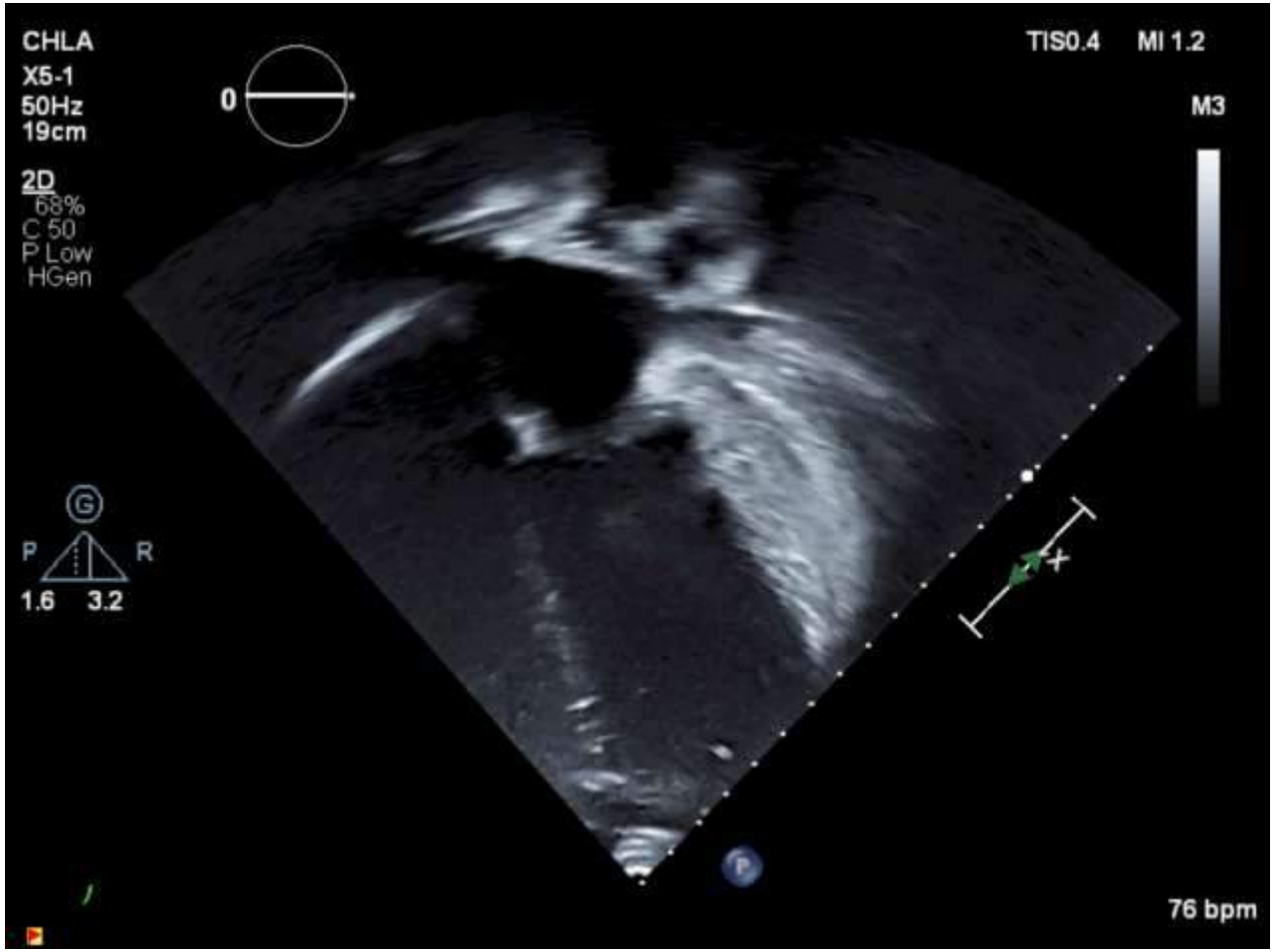
- None

CASE 1

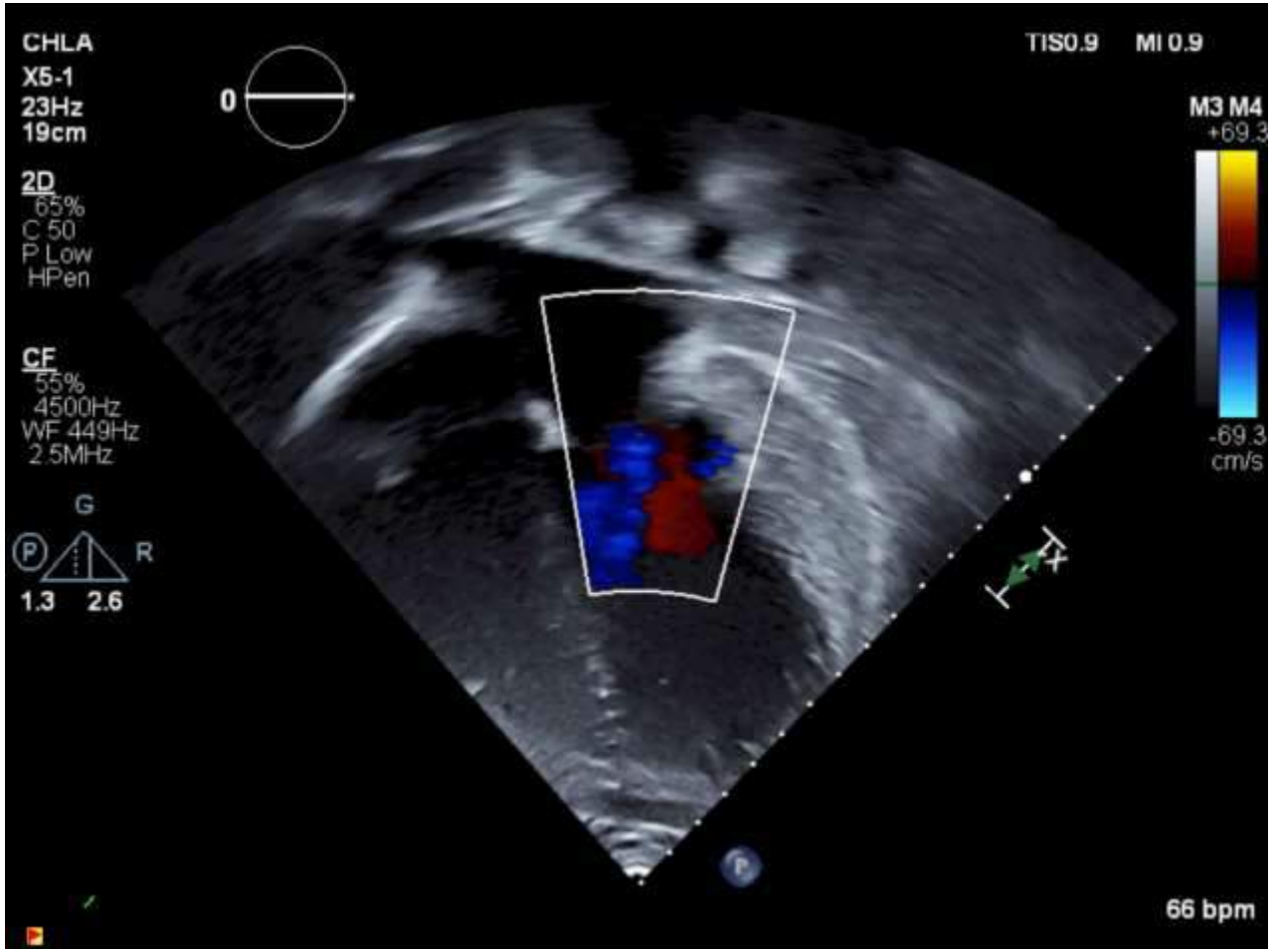
Clinical Presentation

- HPI
  - 13 yo previously healthy M c/o chest pain, dizziness, and nausea while playing basketball at school.
  - Taken to OSH ED. Diagnosed with ventricular tachycardia.
  - Treated with synchronized cardioversion and amiodarone.
  - TTE at OSH: 3x8 cm mass on LV inferior wall.
- PMH
  - Intermittent chest pain and palpitations 3 years prior. Workup by outside cardiologist (echo and Holter) was reportedly normal.
- Physical exam
  - Unremarkable (in sinus rhythm)

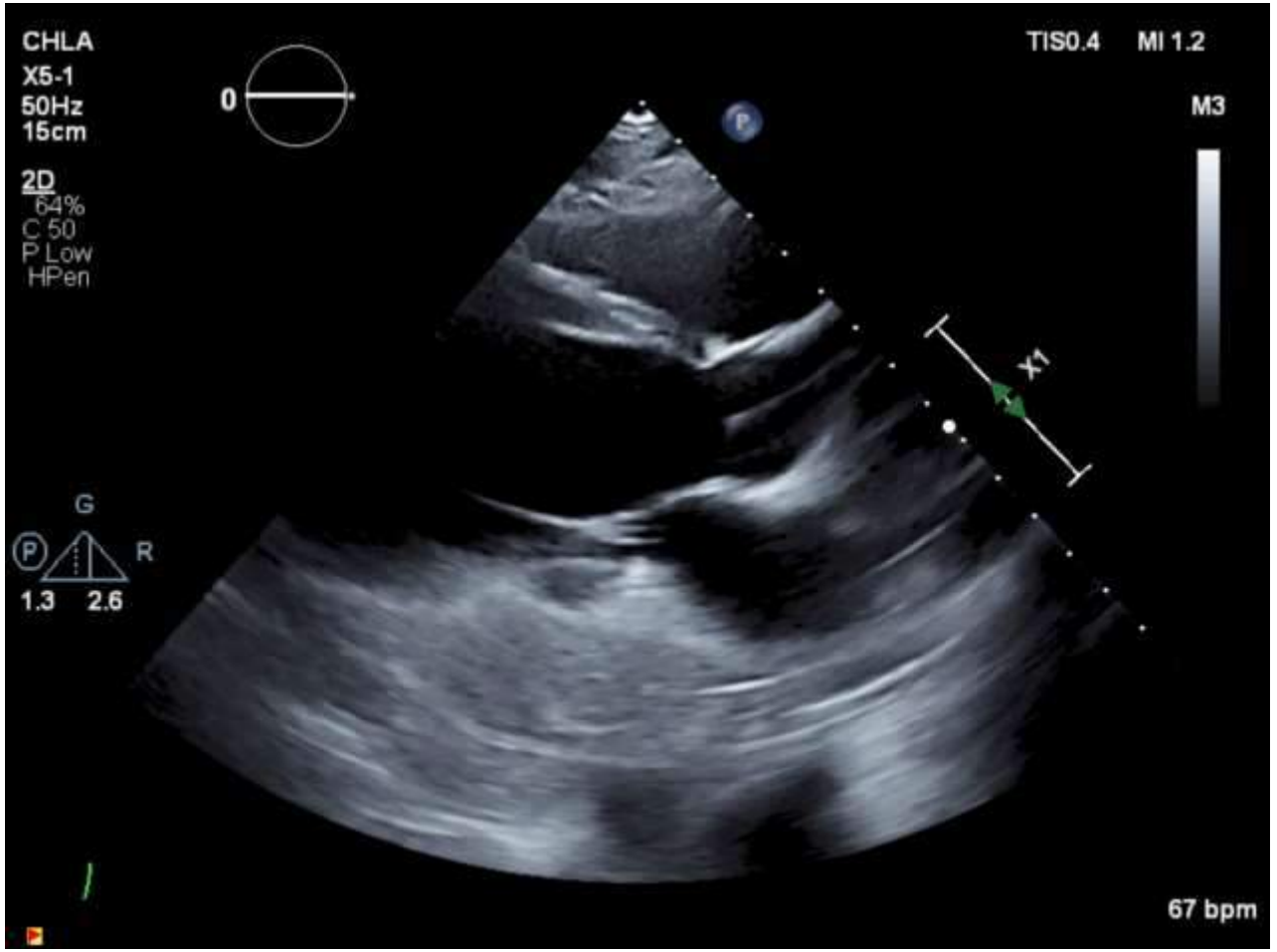
Transthoracic Echocardiogram: 4CH



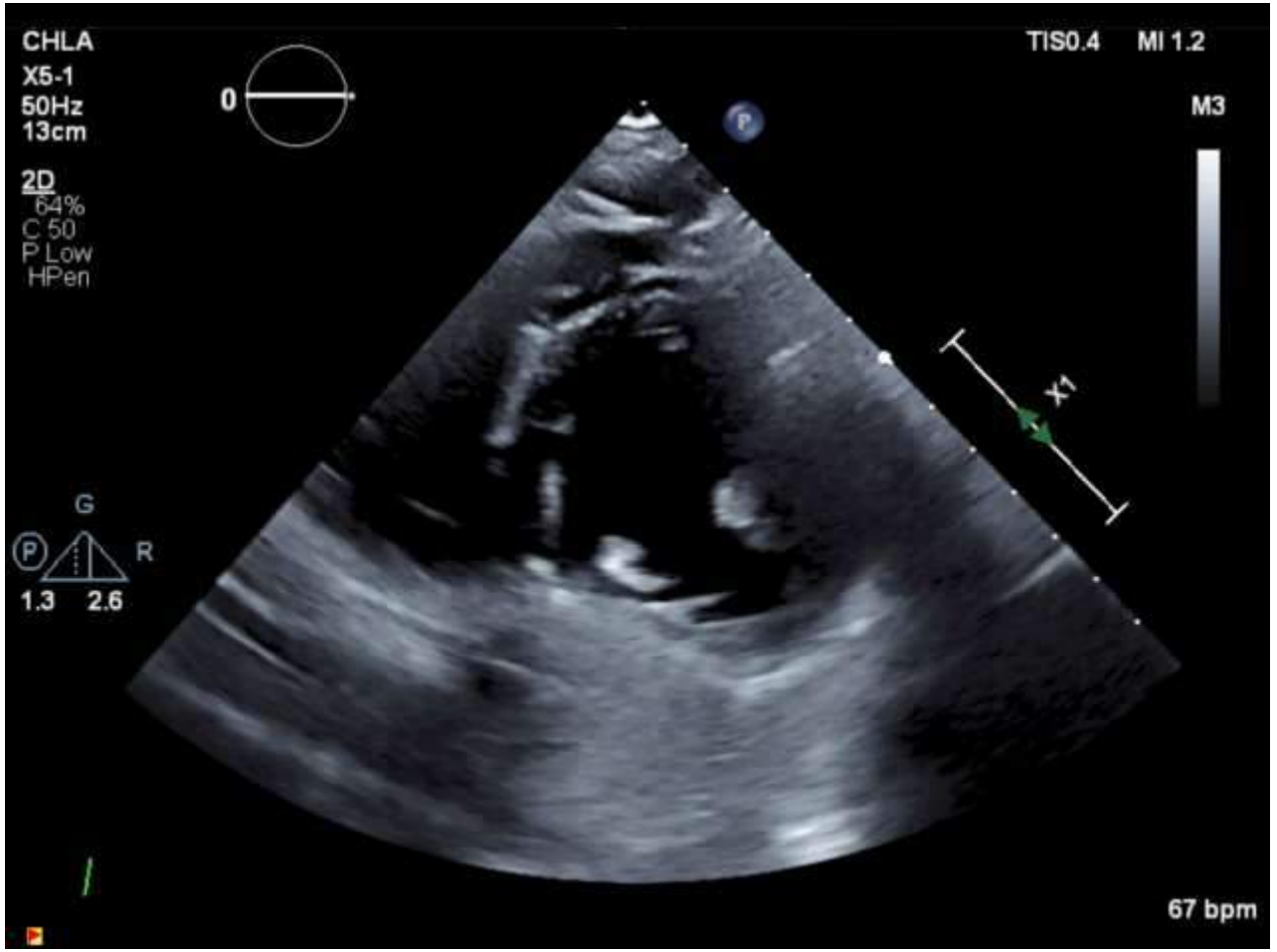
Transthoracic Echocardiogram: 4CH



Transthoracic Echocardiogram: PLAX



Transthoracic Echocardiogram: PSAX

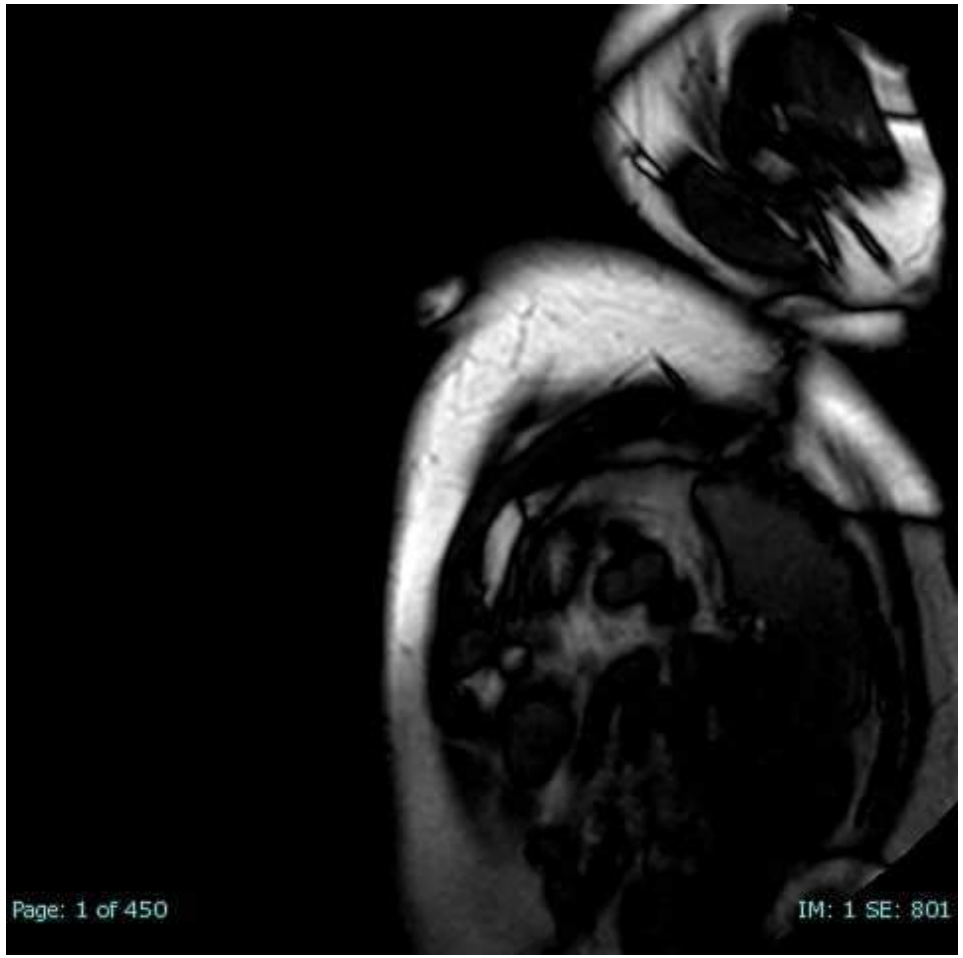


Poll the Audience

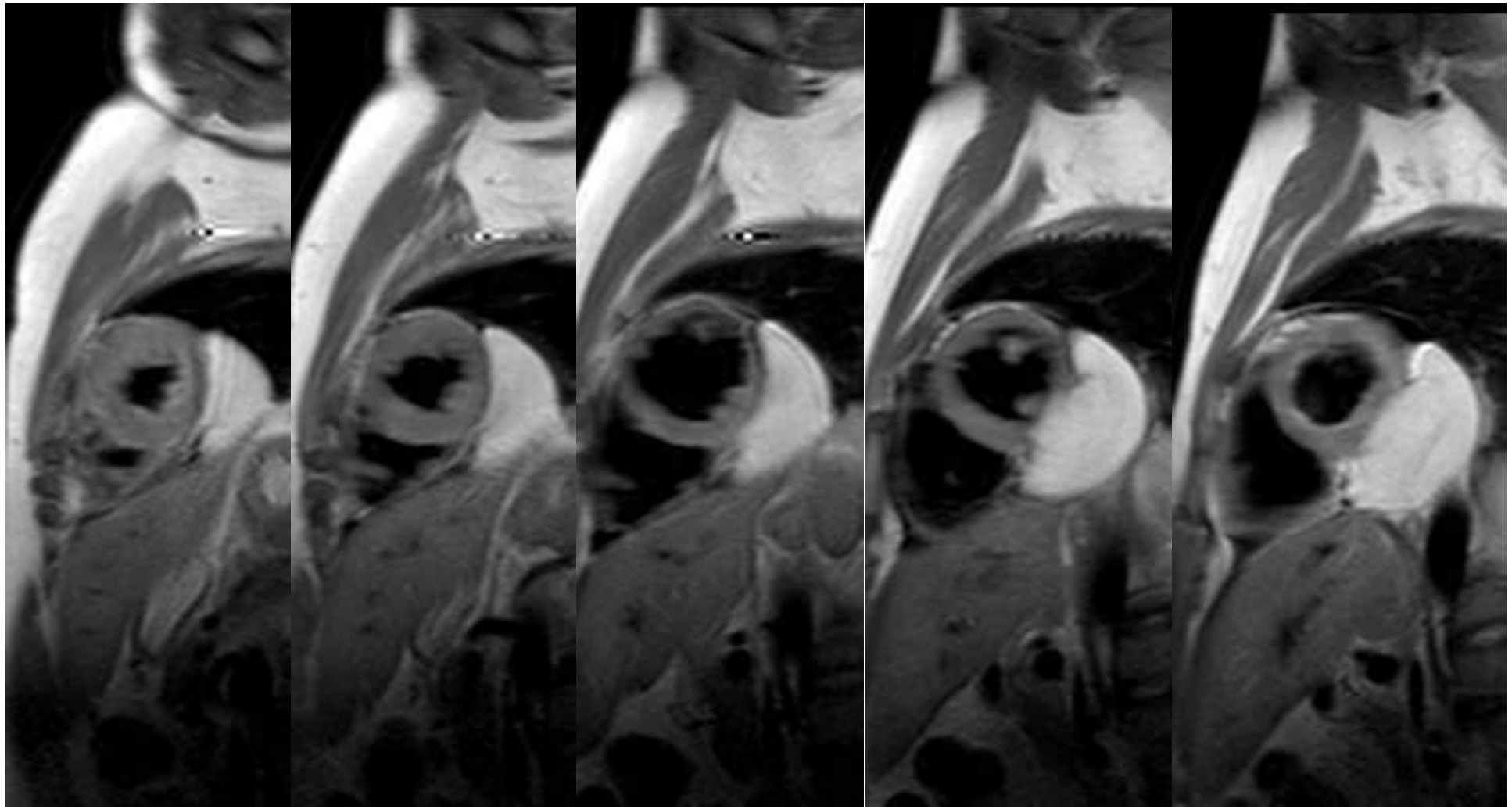
- What kind of tumor is this?
  - Fibroma
  - Rhabdomyoma
  - Teratoma
  - Malignant NOS
  - Thrombus
  - Other

Cardiac MRI: Axial Cine

Cardiac MRI: SAX Cine



Cardiac MRI: T1



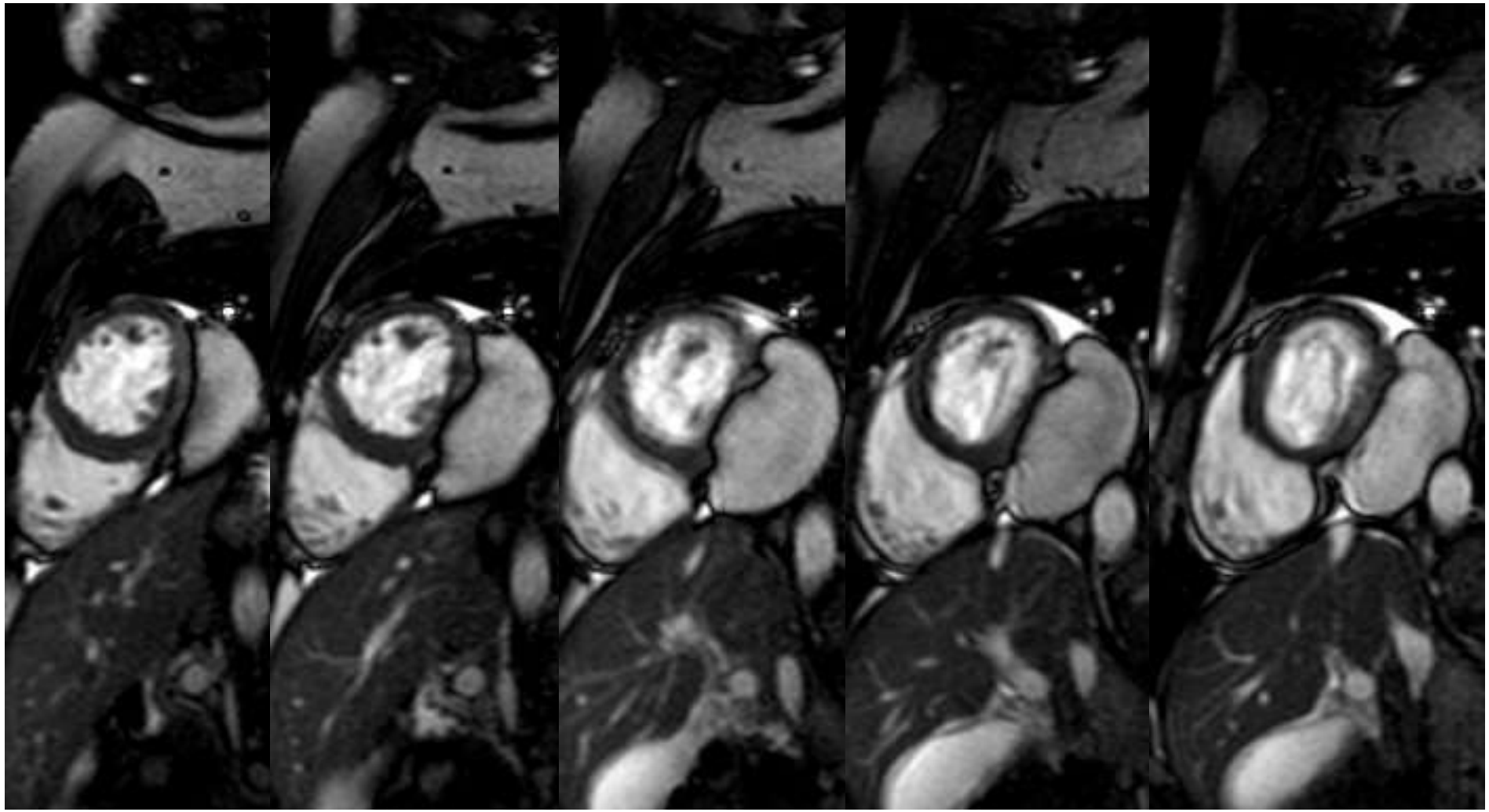
Tumor T1: 275 ms
Myocardium T1: 1048 ms

Normal 1018 ± 25 ms
(Philips 1.5T scanner)

Tissue	T1 (msec)
Water/CSF	4000
Gray matter	900
Muscle	900
Liver	500
Fat	250
Tendon	400

https://mri-q.com/why-is-t1--t2.html

Cardiac MRI: T2



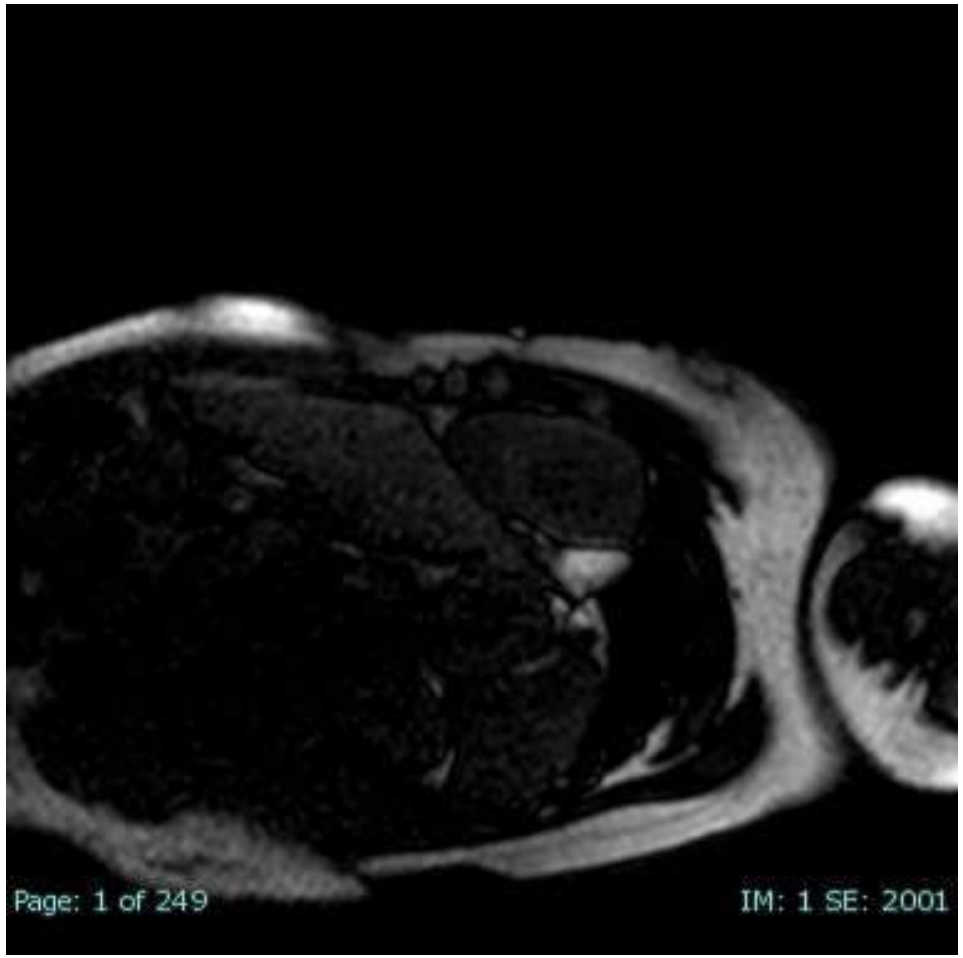
Tumor T2: 107 ms
Myocardium T1: 52 ms

Normal 53 ± 3 ms
(Philips 1.5T scanner)

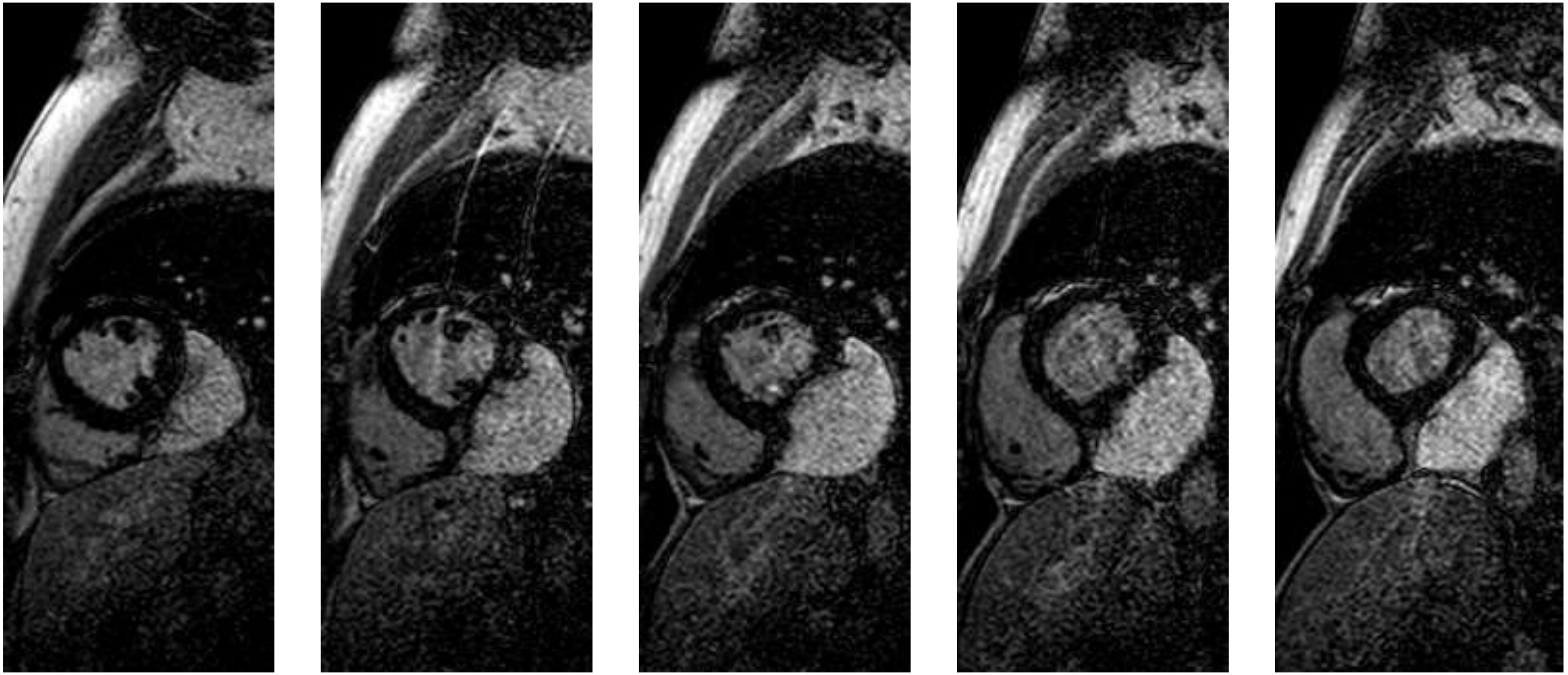
Tissue	T2 (msec)
Water/CSF	2000
Gray matter	90
Muscle	50
Liver	40
Fat	70
Tendon	5

https://mri-q.com/why-is-t1--t2.html

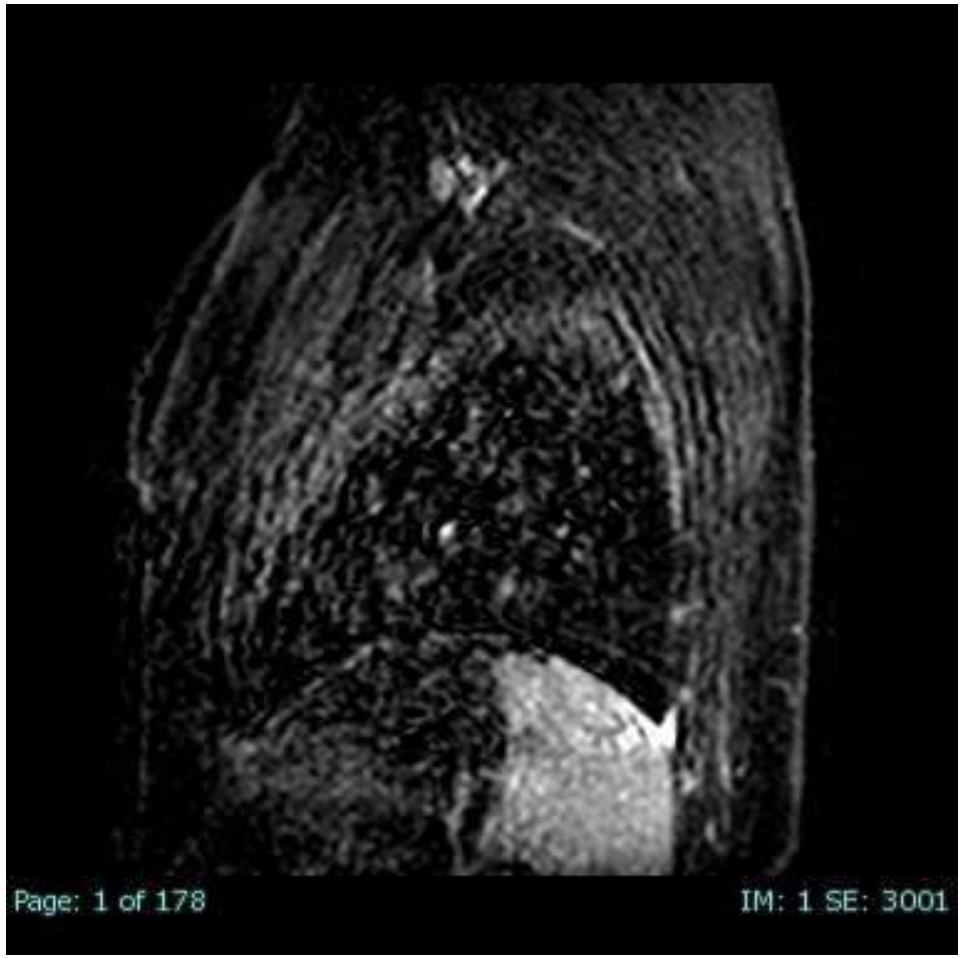
Cardiac MRI: Perfusion



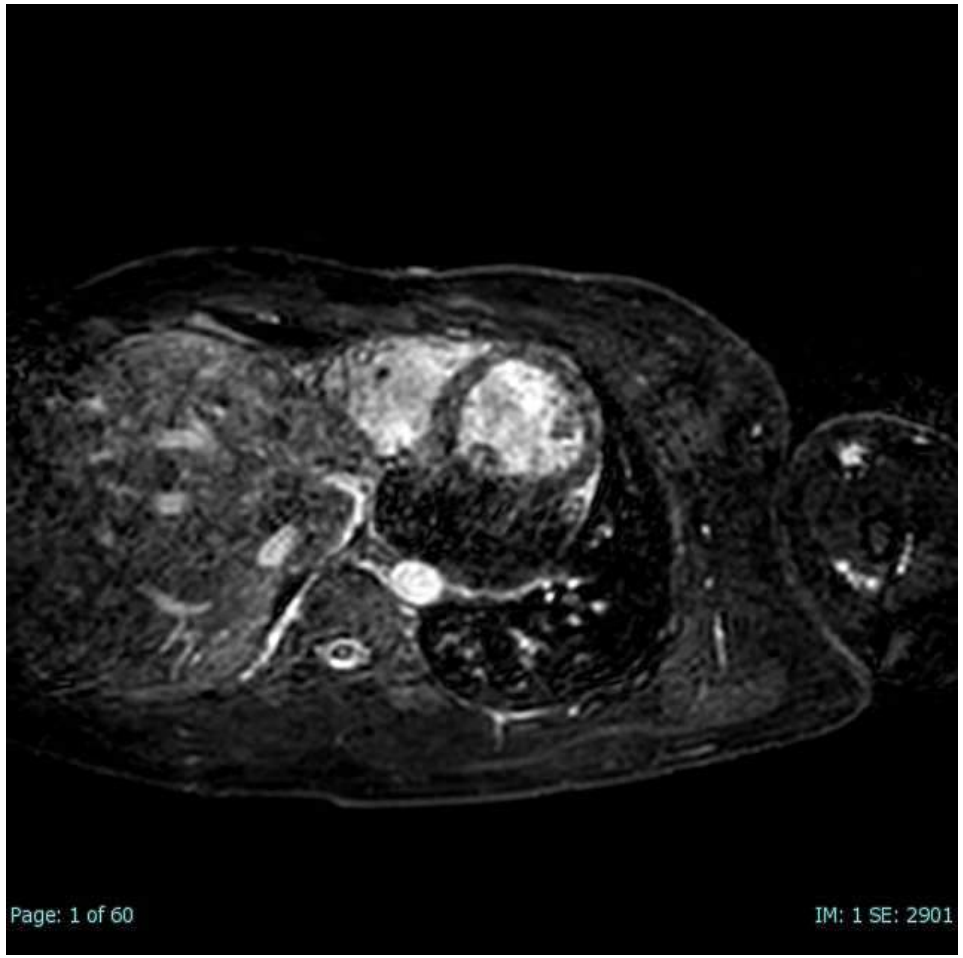
Cardiac MRI: LGE



Cardiac MRI: Fat Suppression



Cardiac MRI: Coronaries



Poll the Audience

- What kind of tumor is this?
  - Fibroma
  - Rhabdomyoma
  - Teratoma
  - Malignant NOS
  - Thrombus
  - Other

Differential Diagnosis

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Cardiac Imaging

Characterization of Cardiac Tumors in Children by Cardiovascular Magnetic Resonance Imaging

A Multicenter Experience

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NEW RESEARCH PAPER

Accuracy of Cardiac Magnetic Resonance Imaging Diagnosis of Pediatric Cardiac Masses

A Multicenter Study

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Differential Diagnosis

Table 1 Tumor Diagnosis Prediction Table

Tumor Type	Location	SSFP	T1	T1 + Fat Sat	T2	FPP	MDE	Other
Fibroma	Intramyocardial, ventricular septum or free wall*	–	±	±	±	No*	++ (well-defined border ± dark core)*	Can be in an atypical location
Rhabdomyoma	Intramyocardial or intracavitary, attached to myocardium	±	±	±	+	No*	—	
Malignant	Infiltrative†		±		±	Variable	± (if + then heterogenous appearance)	History of malignancy
Vascular‡	Variable	±	–	–	+ (variable)	Strong*	+ (variable and heterogenous)	Consider malignant tumor
Thrombus	Mural or intraluminal*	–	–	–	–	No*	—*	MDE sequence, long inversion time
Myxoma	Typically left atrium but can be in any chamber	±	±	±	+	No	±*	Irregular, pedunculated, mobile*
Fibroelastoma	Pedunculated, mobile endocardial or valvular mass	–	–	–	–	No		
Pleuropericardial cyst	Right cardiophrenic angle	++*	–	–	++*	No	–	Smooth-walled and well-defined
Purkinje cell tumor	Ventricular myocardium		++*	—*	–	No		Ventricular arrhythmia*
Teratoma	Intrapericardial (usually compressing SVC and/or RA)	±				No		Multilocular bosselated mass with solid and cystic areas
Lipoma§	Any chamber	–	++*	—*	±	No	–	

Clinical Course

- Tumor was surgically resected
  - Tumor was attached to inferior wall near the interventricular septum, but freely mobile along AV groove
- Final pathologic diagnosis was lipoblastoma
- No further ventricular tachycardia after tumor resection
- No signs of regrowth during 2 years of follow-up

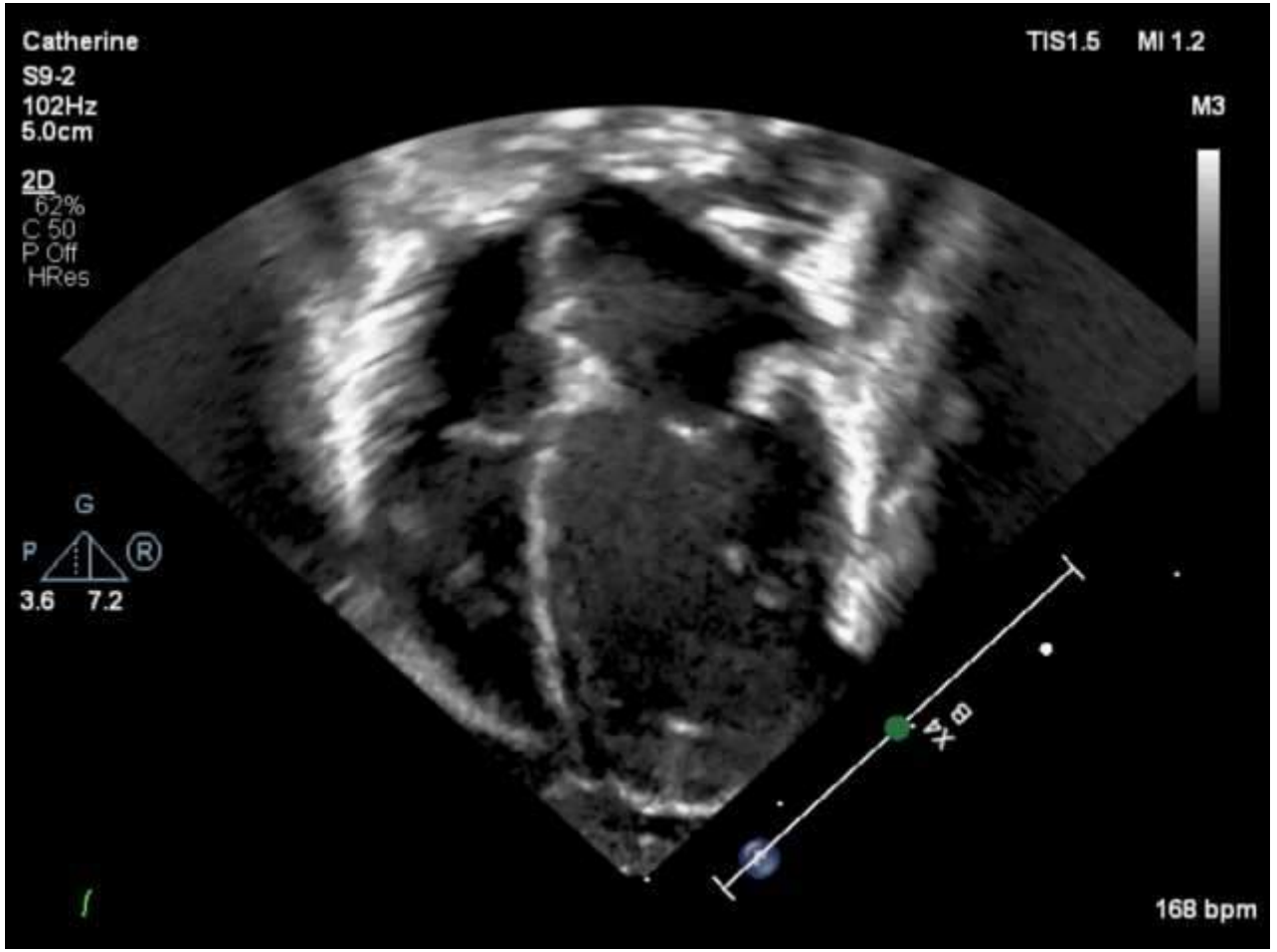
Discussion

CASE 2

Clinical Presentation

- HPI
  - 11 mo M referred for murmur.
  - Asymptomatic. Growing and developing normally per parents.
- PMH
  - FT NSVD. No chronic medical problems.
- Physical exam
  - Weight 11%, Length 50%, normal vital signs
  - 2/6 high-pitched continuous murmur at LUSB and left scapula
  - Normal work of breathing

Transthoracic Echocardiogram: 4CH



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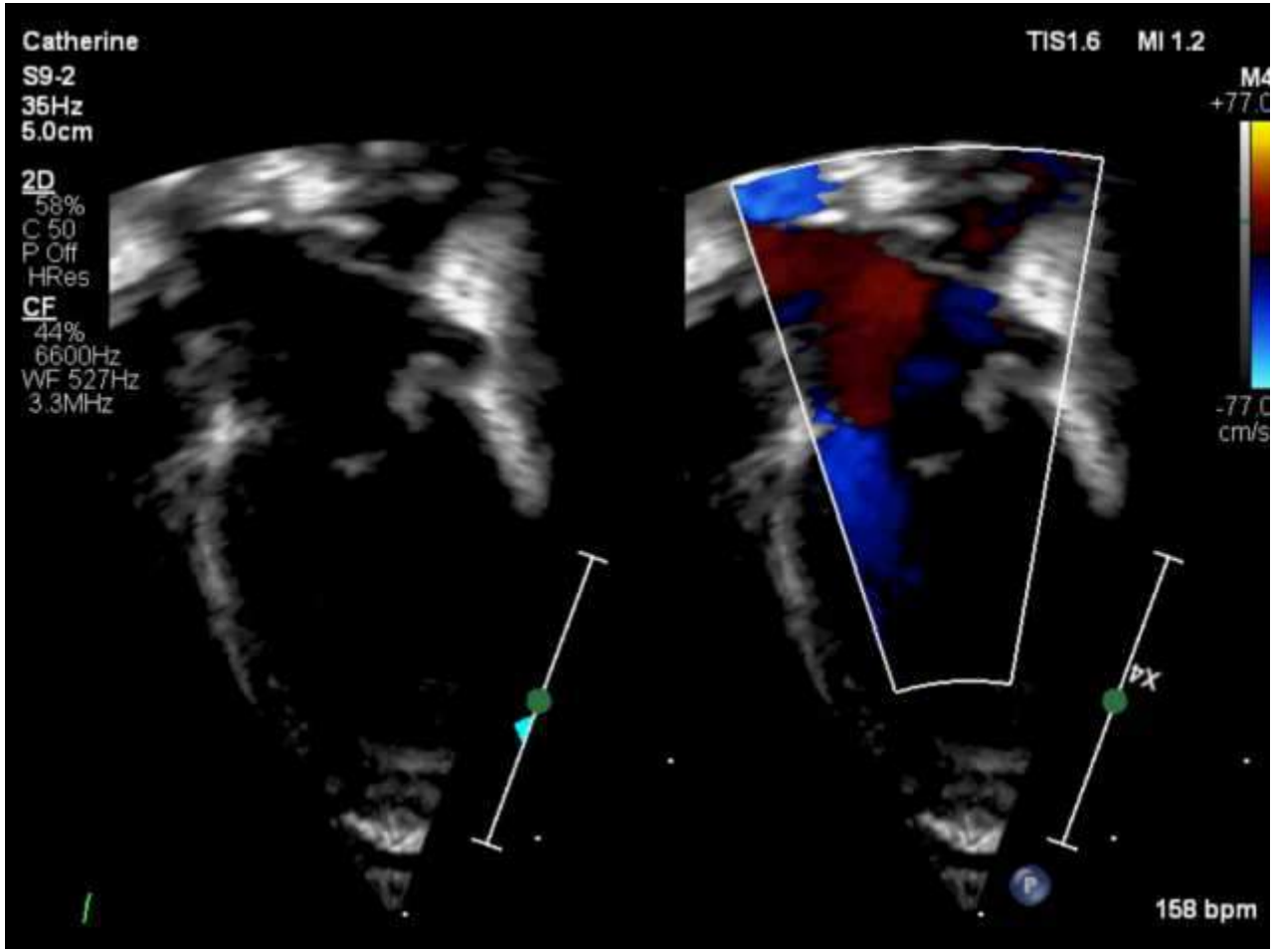
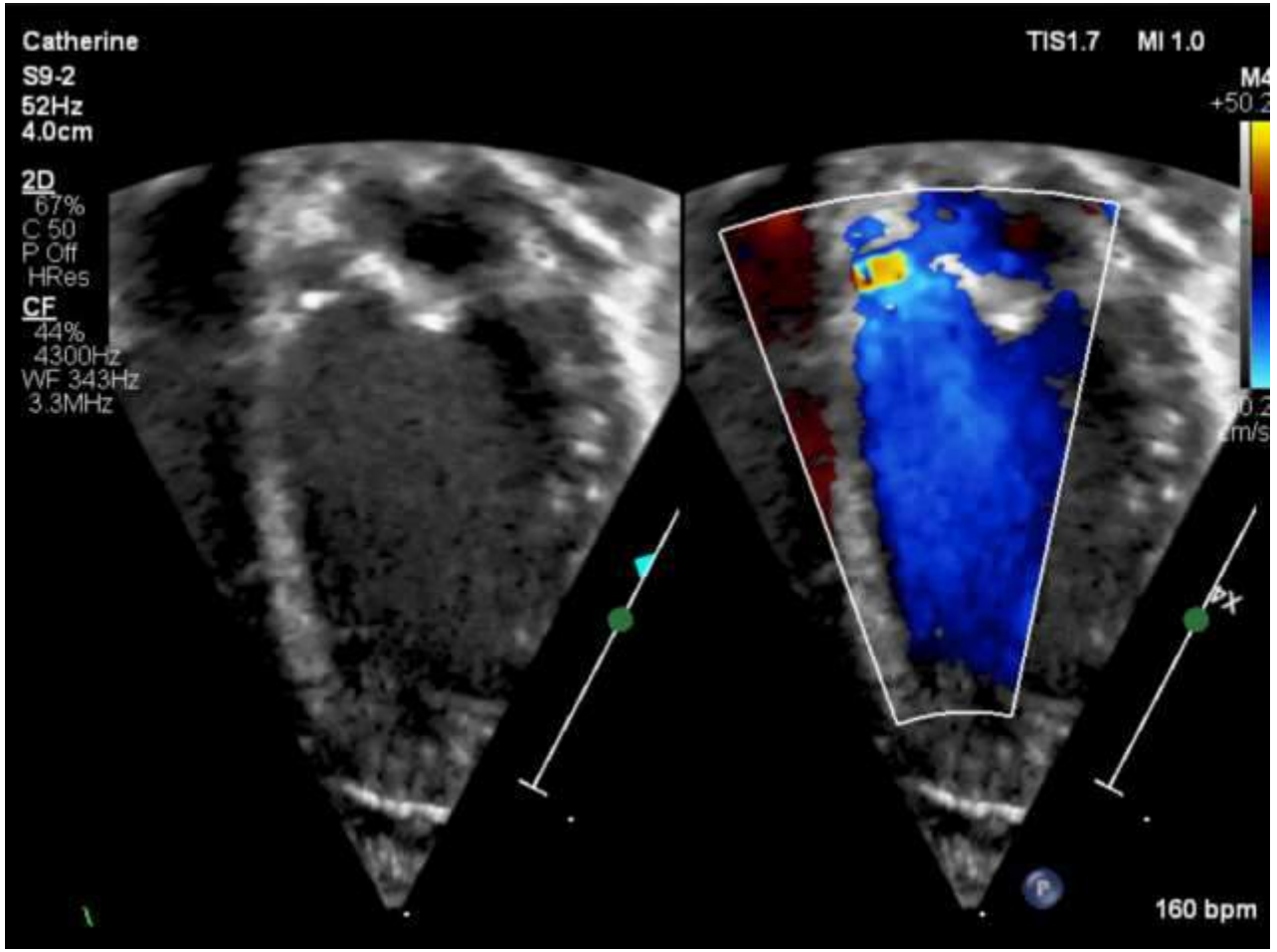
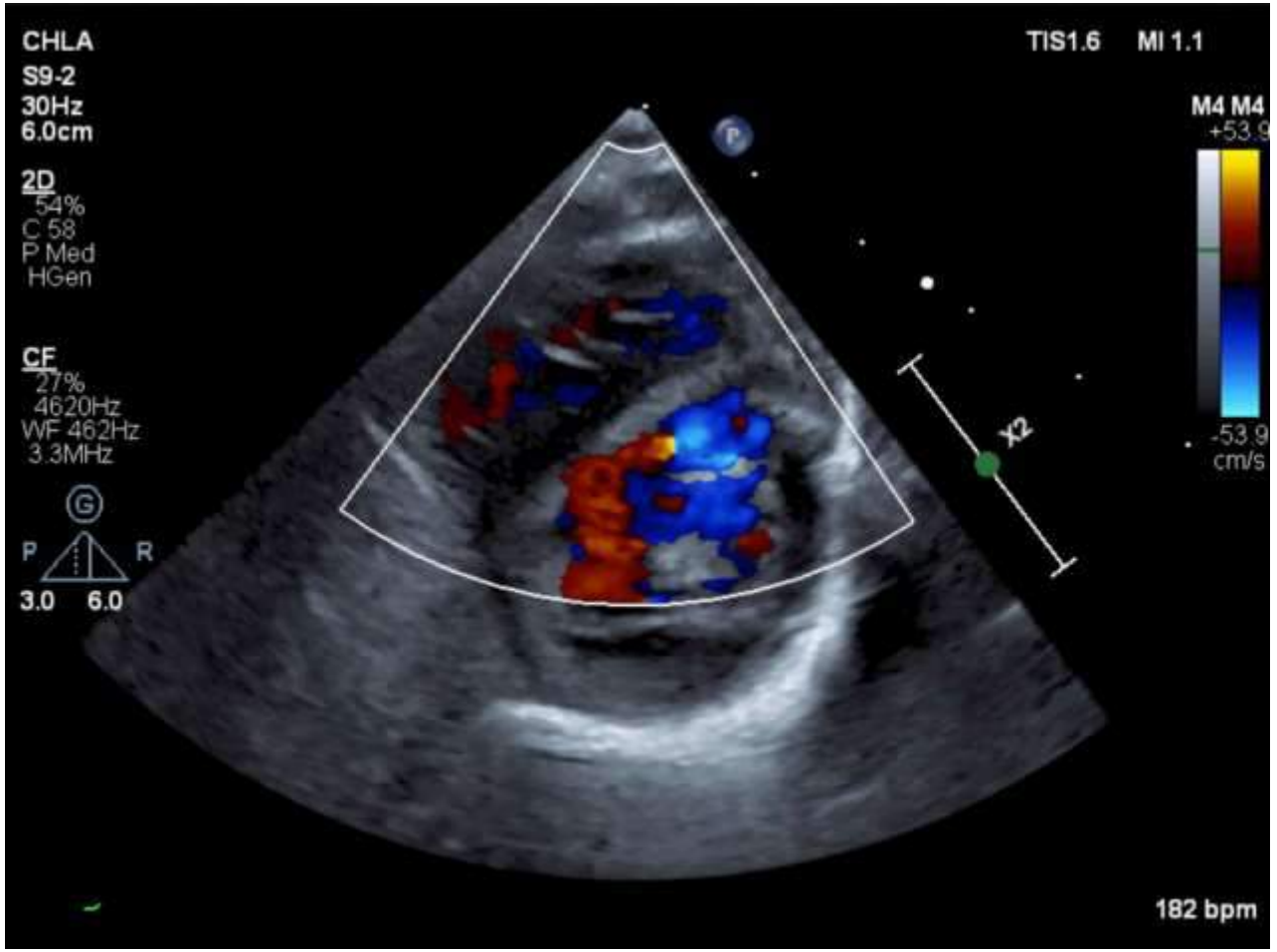


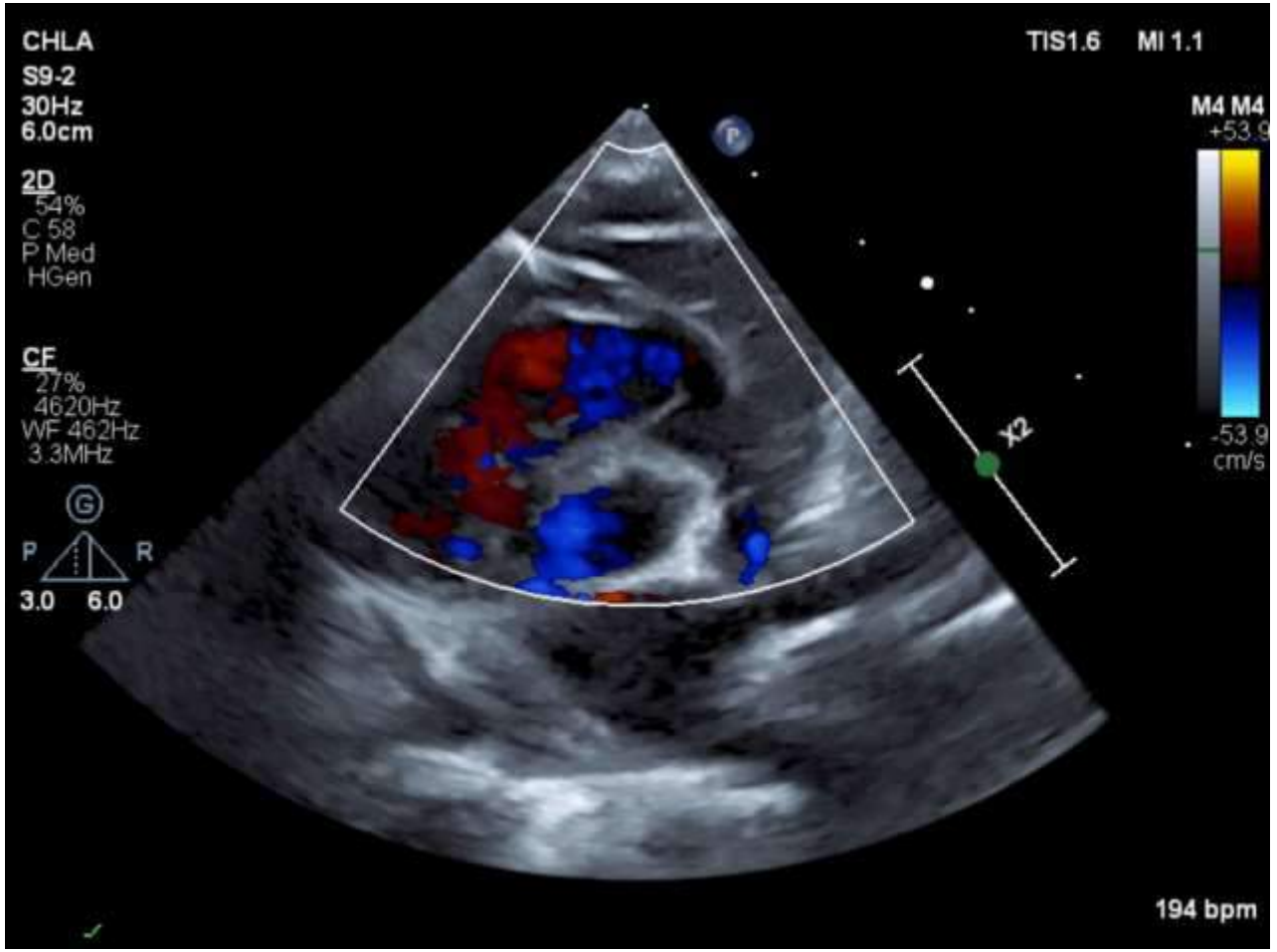
Transthoracic Echocardiogram: 3CH



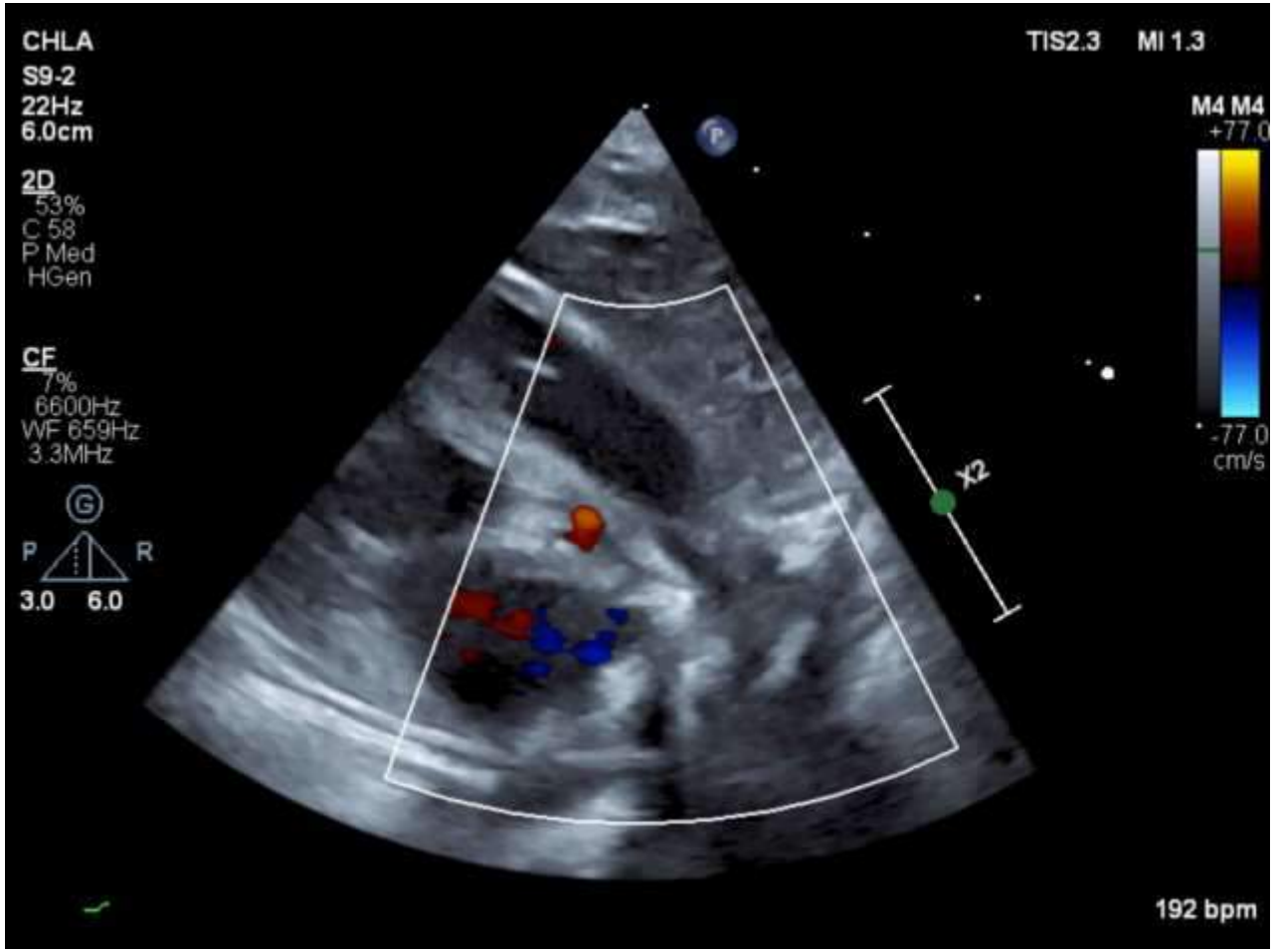
Transthoracic Echocardiogram: PSAX



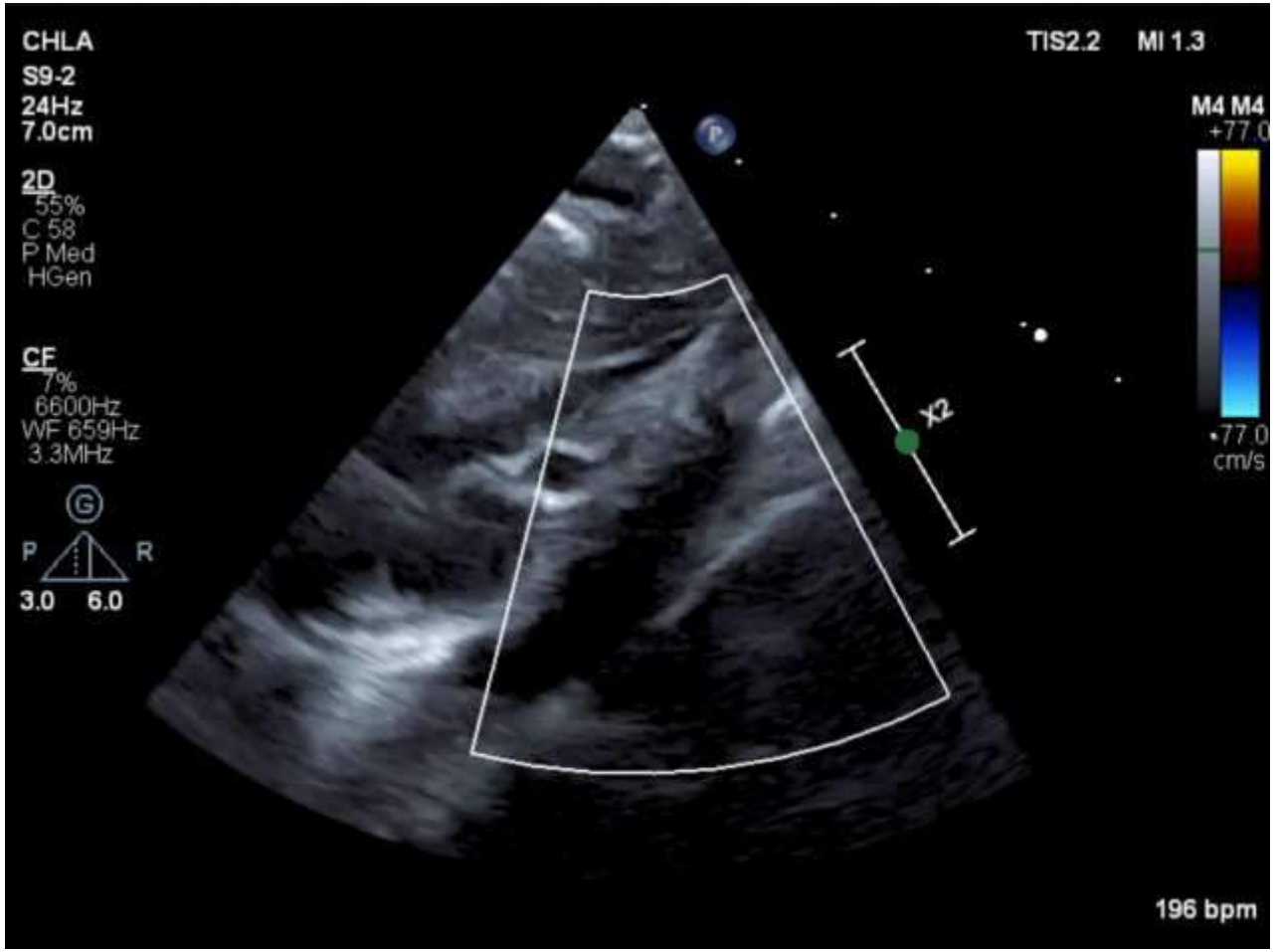
Transthoracic Echocardiogram: PSAX



Transthoracic Echocardiogram: Arch



Transthoracic Echocardiogram: Arch

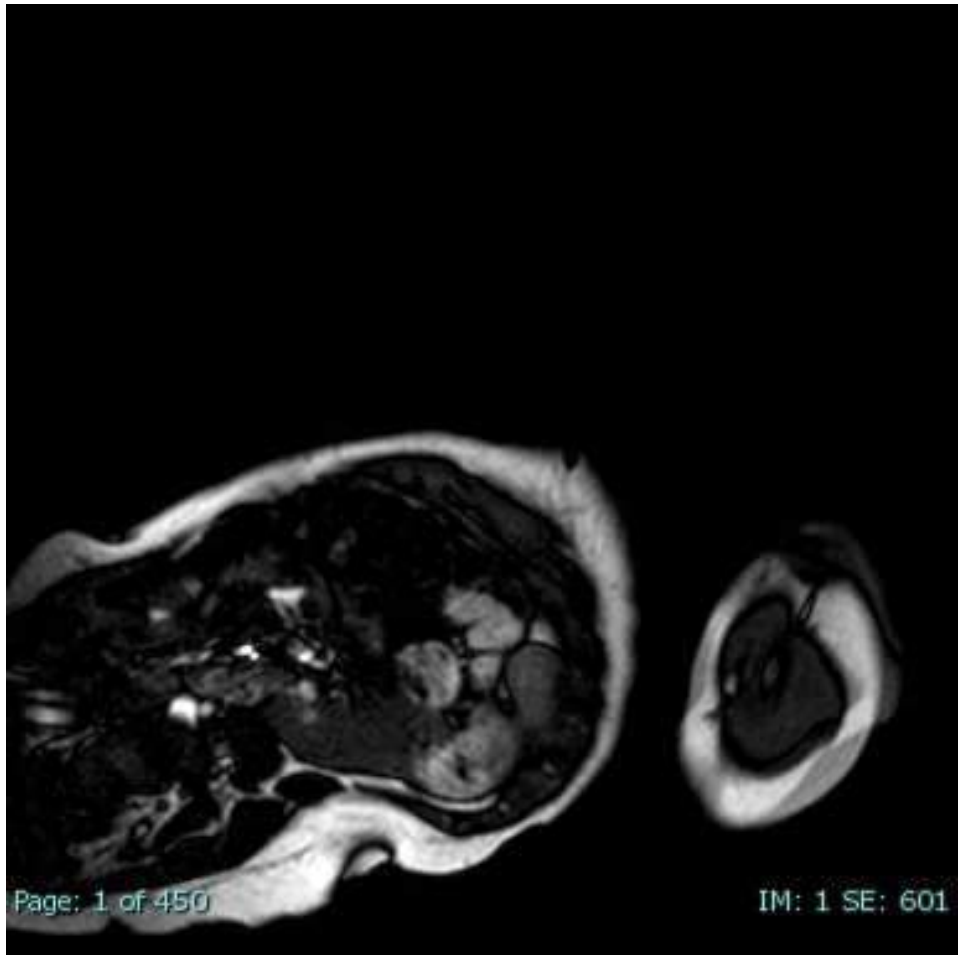


Poll the Audience

- What would you do next?
  - Discharge from clinic
  - Nothing now, but continue to follow
  - Repeat TTE with sedation
  - Obtain cross-sectional imaging

Cardiac MRI: 4CH Cine

Cardiac MRI: SAX Cine



Cardiac MRI: Flows

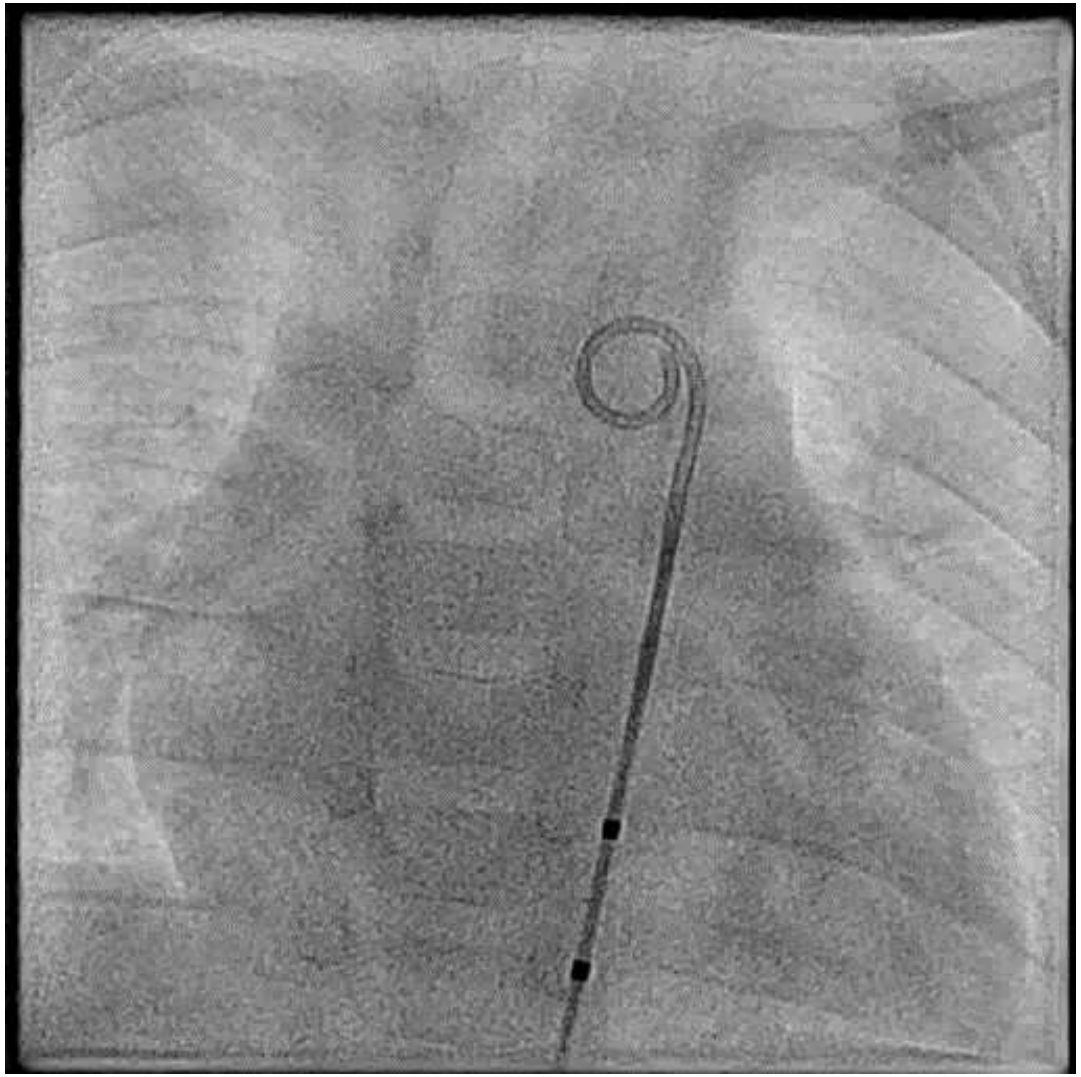
Cardiac MRI: Angiogram

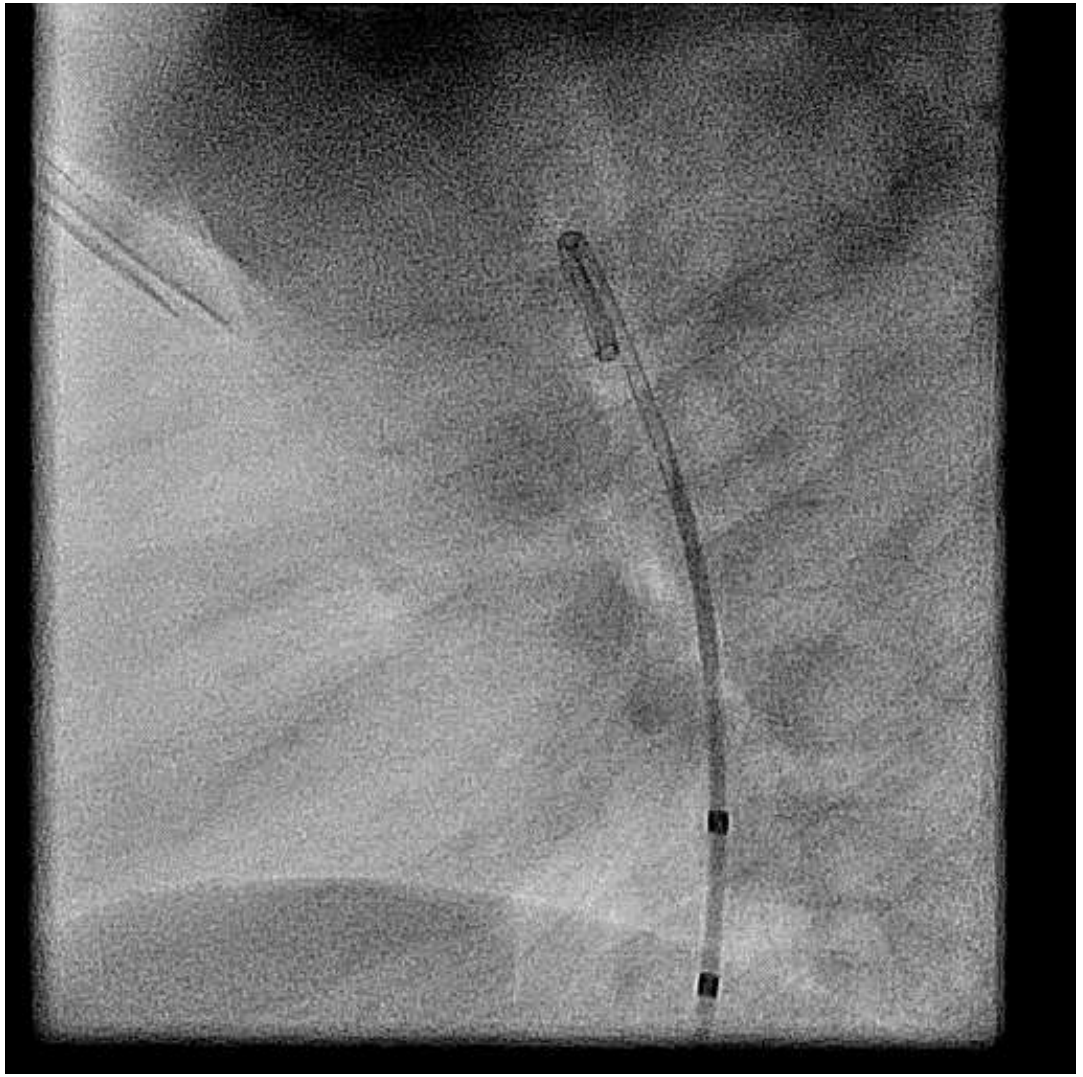
Cardiac MRI: Angiogram

Clinical Presentation

- Referred for transcatheter device closure of AV fistula

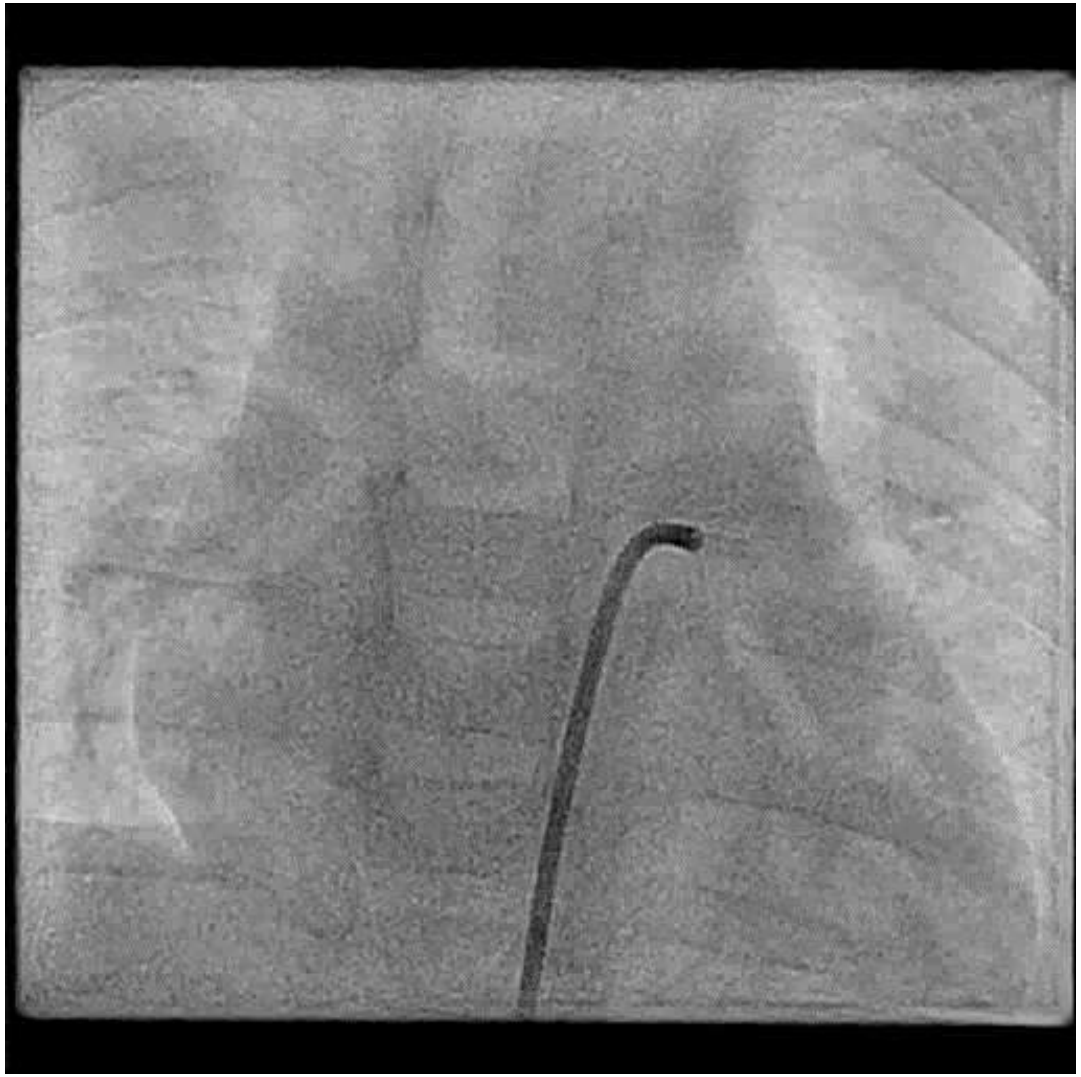
Cardiac Catheterization: Aorta

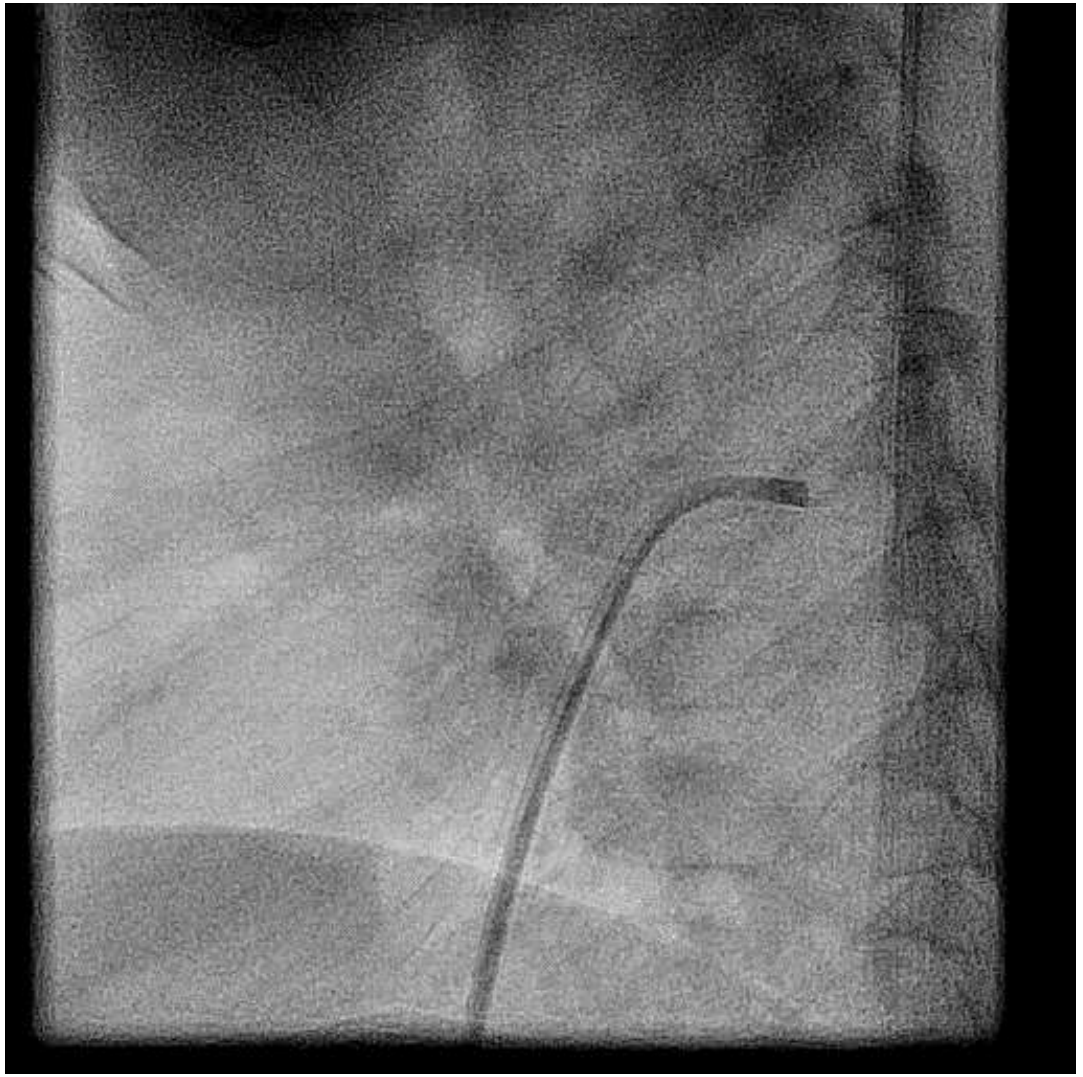




Images courtesy of Drs. Timothy Casarez and David Ferry

Cardiac Catheterization: AV Fistula





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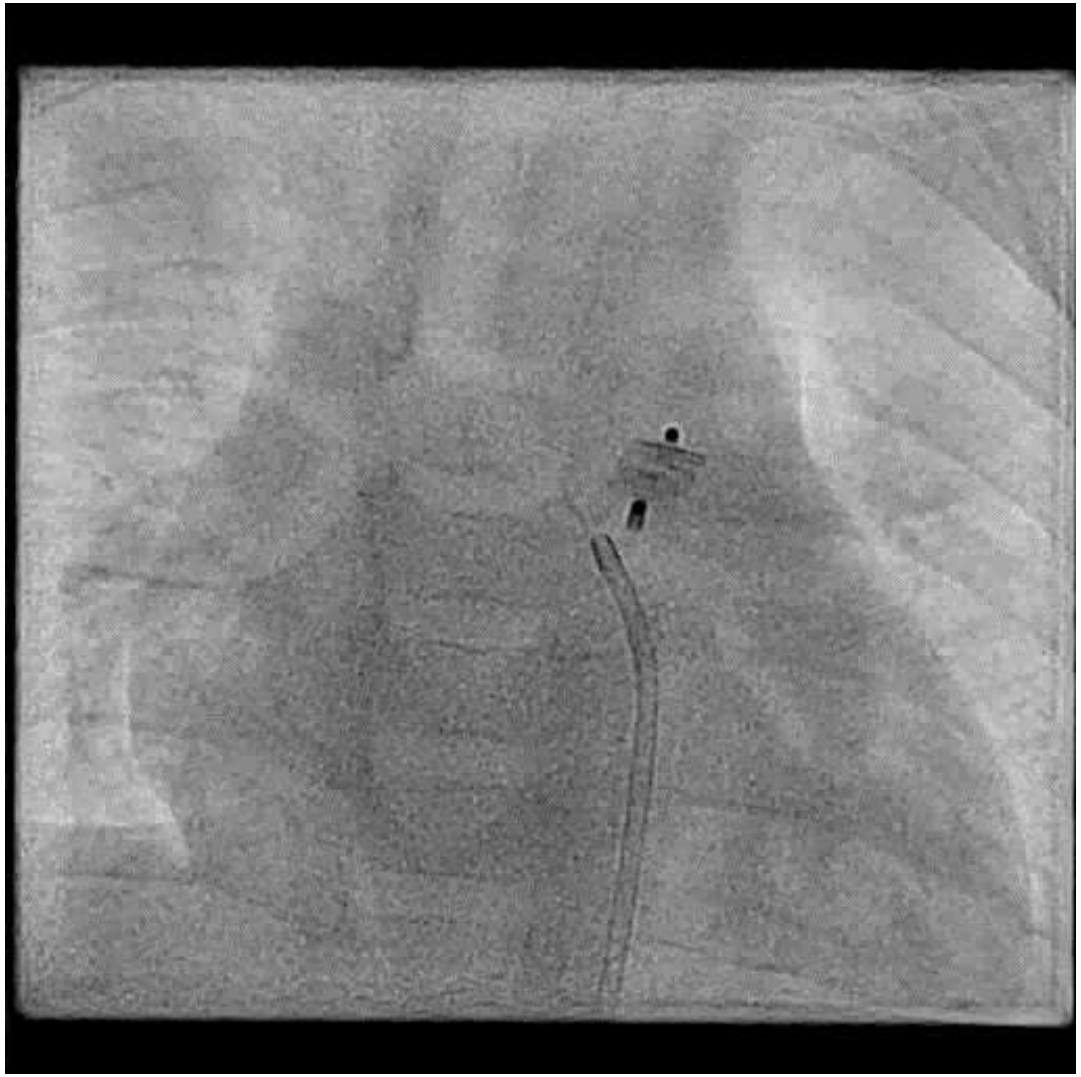
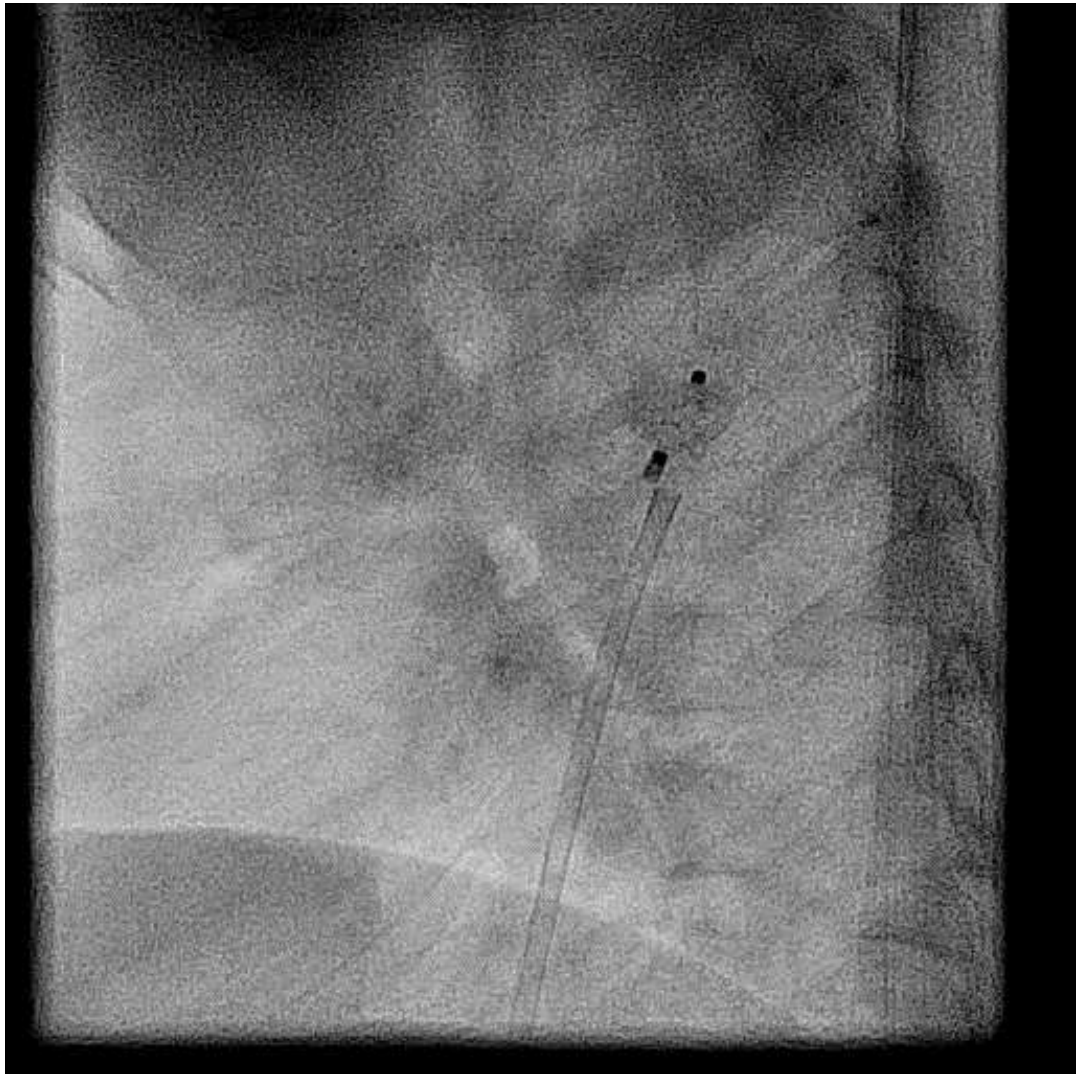
Cardiac Catheterization: Fistula Occlusion





Images courtesy of Drs. Timothy Casarez and David Ferry

Discussion

Questions?

Thank you!