

Why iCMR for Congenital/Structural Interventions?

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The NKOTB

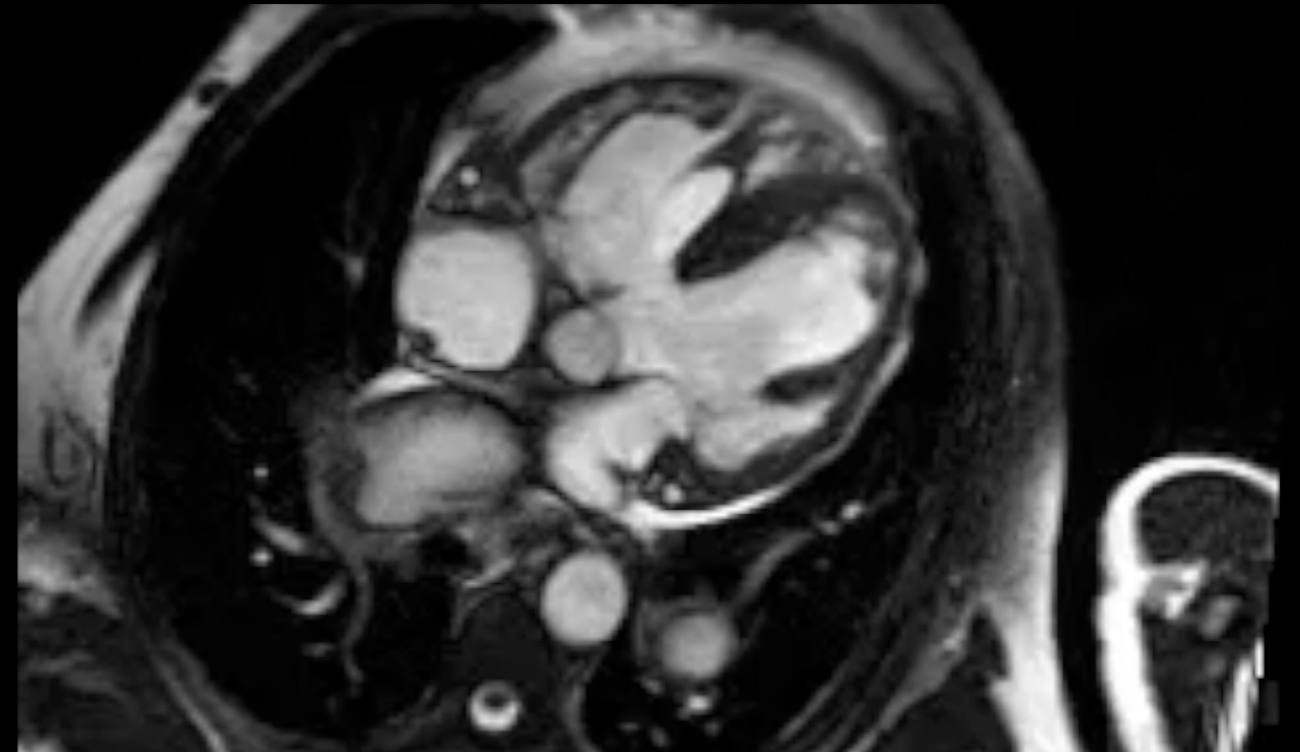
- **Where we are:**
- **Where we need to go:**



- The “Right” Stuff - Pulmonary Vasoreactivity in Shunt Physiology
- Quit Playing Games with My Heart - 3D Interventions in 2D
- I Want it That Way - High Risk Interventions in 2D/3D
 - Continuous 3D Structural information
 - Fluid dynamics guided interventions

The Right Stuff: Evaluation of Shunts and Pulmonary Vasoreactivity

- Pulmonary vasoreactivity testing in shunt physiology can be challenging:
 - O₂ sat samples may be unreliable
 - Assumes oxygen consumption based on age + gender
 - Sometimes PV sat can't be drawn



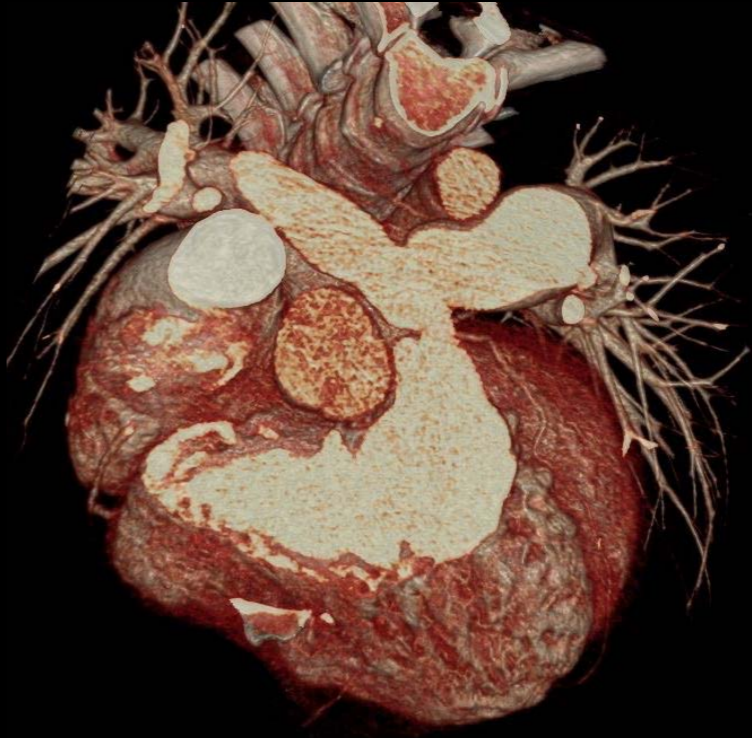
$$Q_p = \frac{\text{Oxygen Consumption}}{PV\ O_2\text{Content} - PA\ O_2\text{Content}}$$

$$Q_s = \frac{\text{Oxygen Consumption}}{Ao\ O_2\text{Content} - MV\ O_2\text{Content}}$$

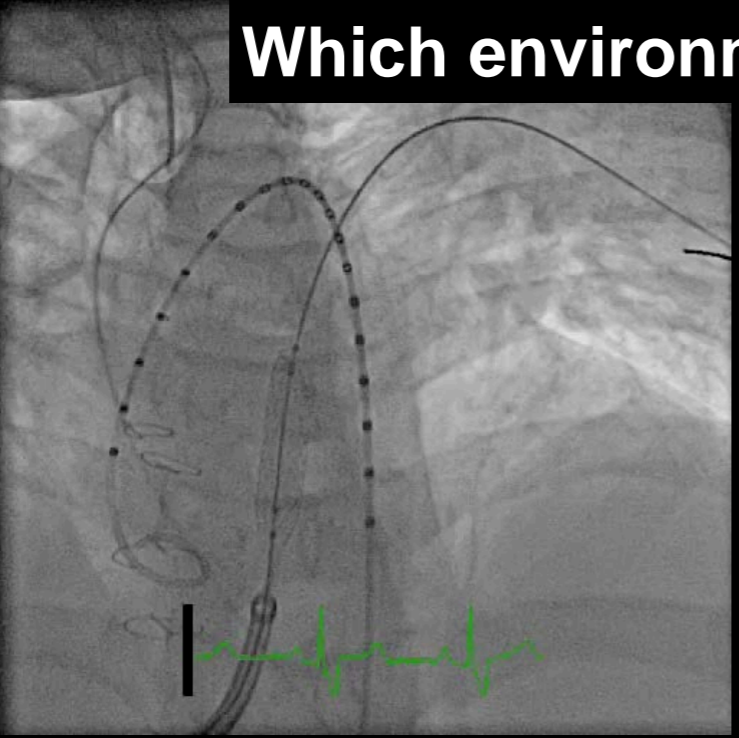
$$O_2\text{Content} = 13.6 \times Hgb \times O_2\text{sat} + 0.03 \times PaO_2$$

$$PVR = \frac{\text{mean PA} - \text{mean PV}}{Q_p}$$

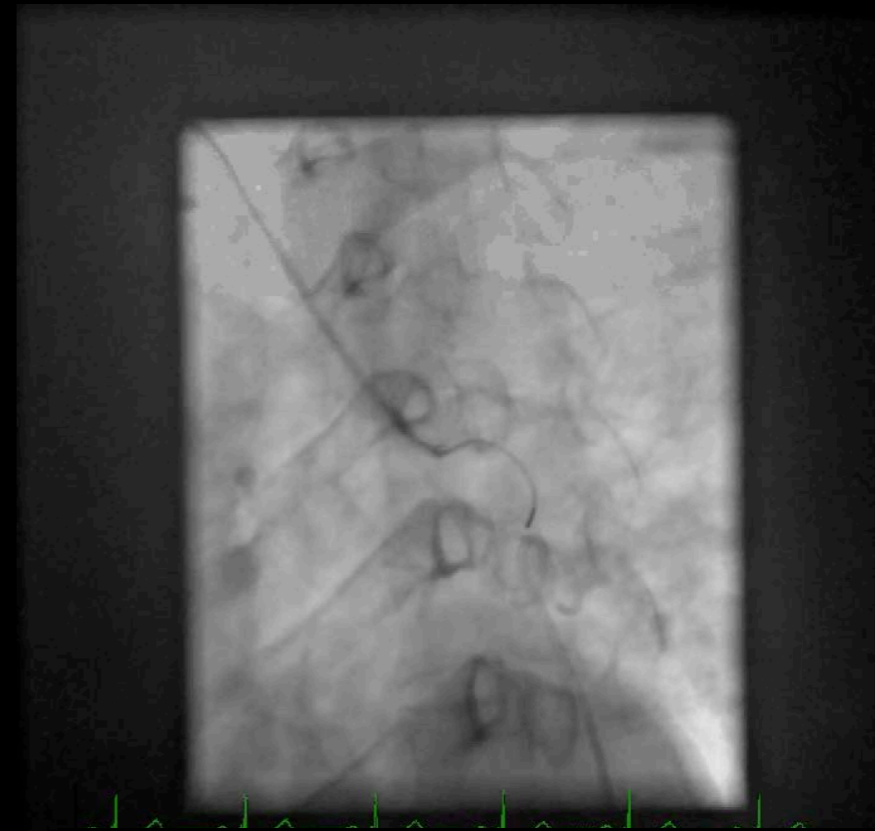
Quit Playing Games with My Heart: 3D Interventions in 2D



Which environment do you want to work in?



I Want it That Way: High Risk Interventions in 2D/3D





Thank you!

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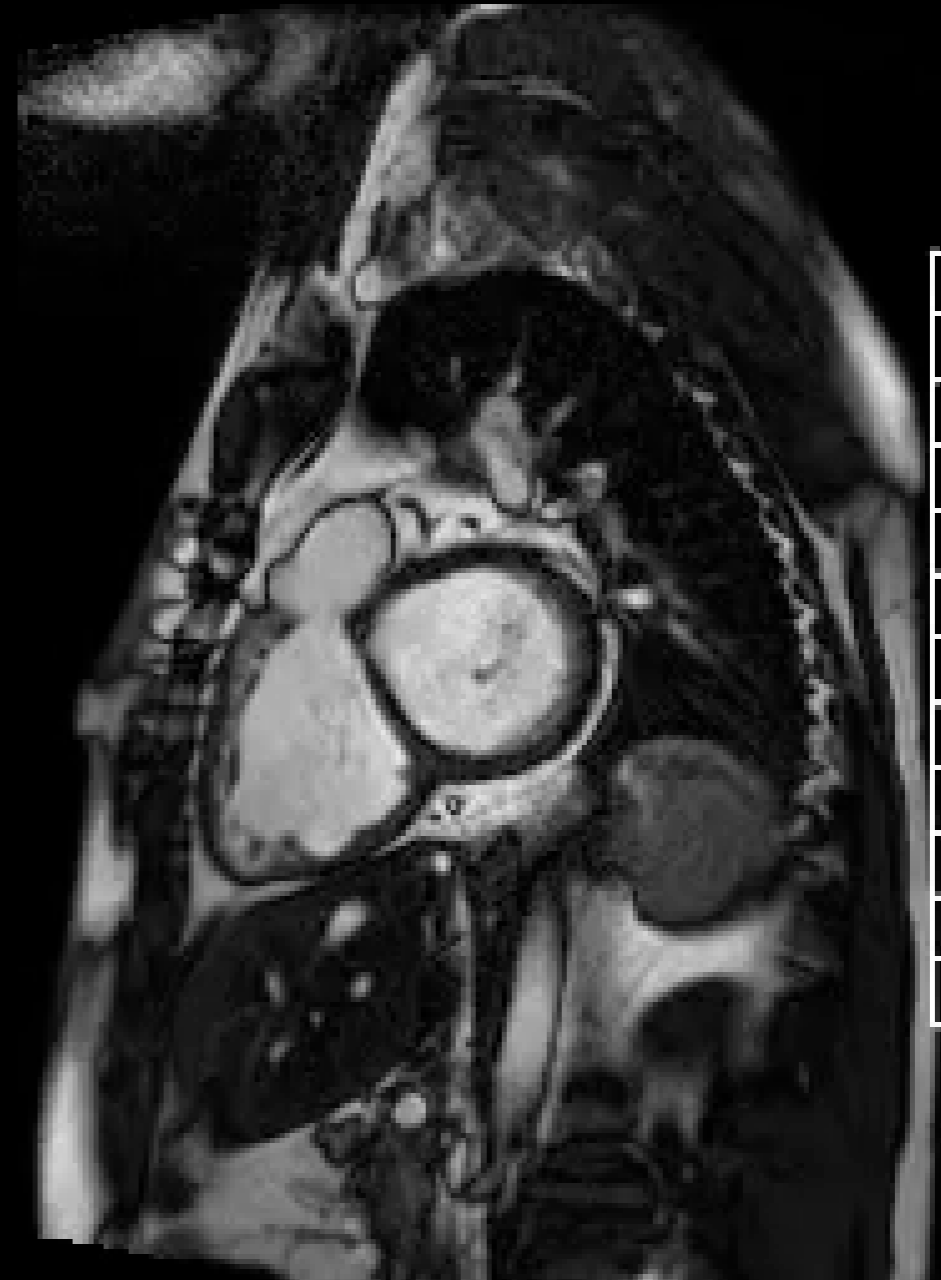
3D Challenges in 2D Environment

- How close is too close? Native RVOT Melody
- Congenital cases in an Adult World: TAVR Ventricular Septal Rupture
- How do you bridge the gap? Aortic Interruption



How Close is Too Close?

- 32M Tetralogy of Fallot
 - Initial repair age 3
 - Referred for residual Pulm stenosis (RV ~70mmHg)
 - MRI: Severe PR, Severe RVE (RVESVI 129), Severe RV dysfunction (RVEF 22%). “no PS”.

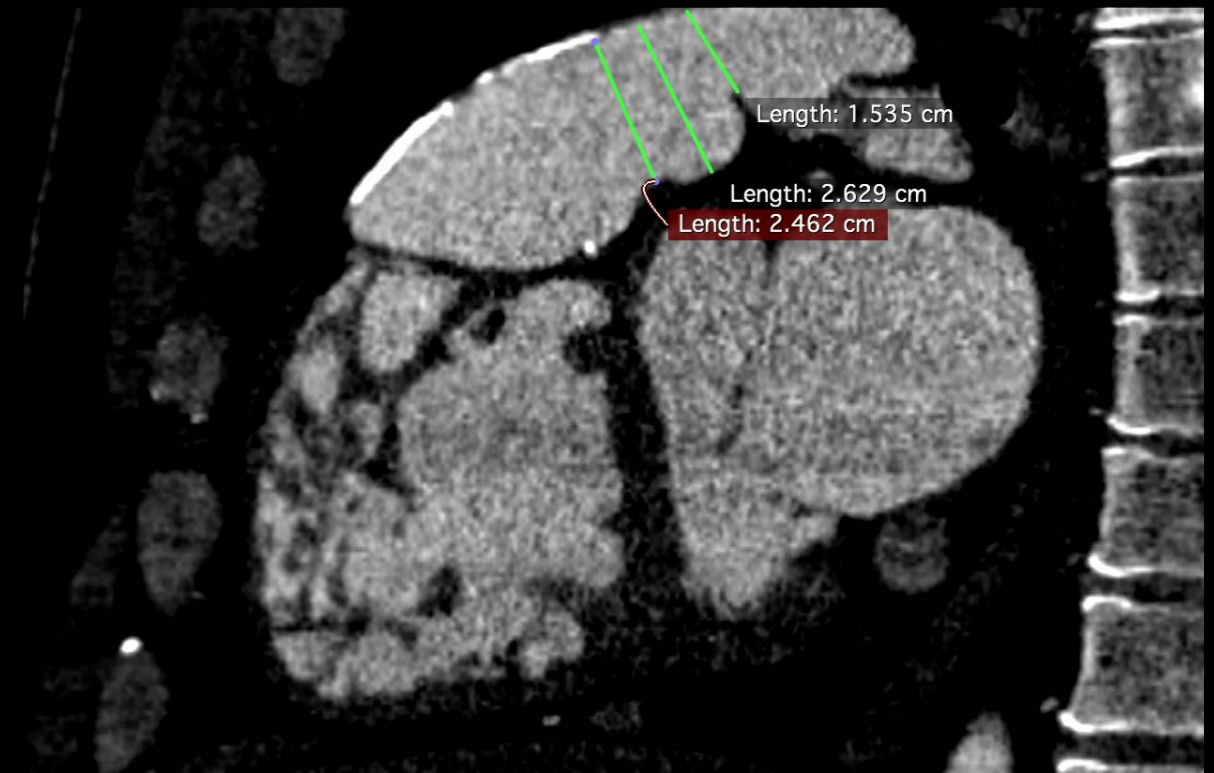


Where's the Lesion?

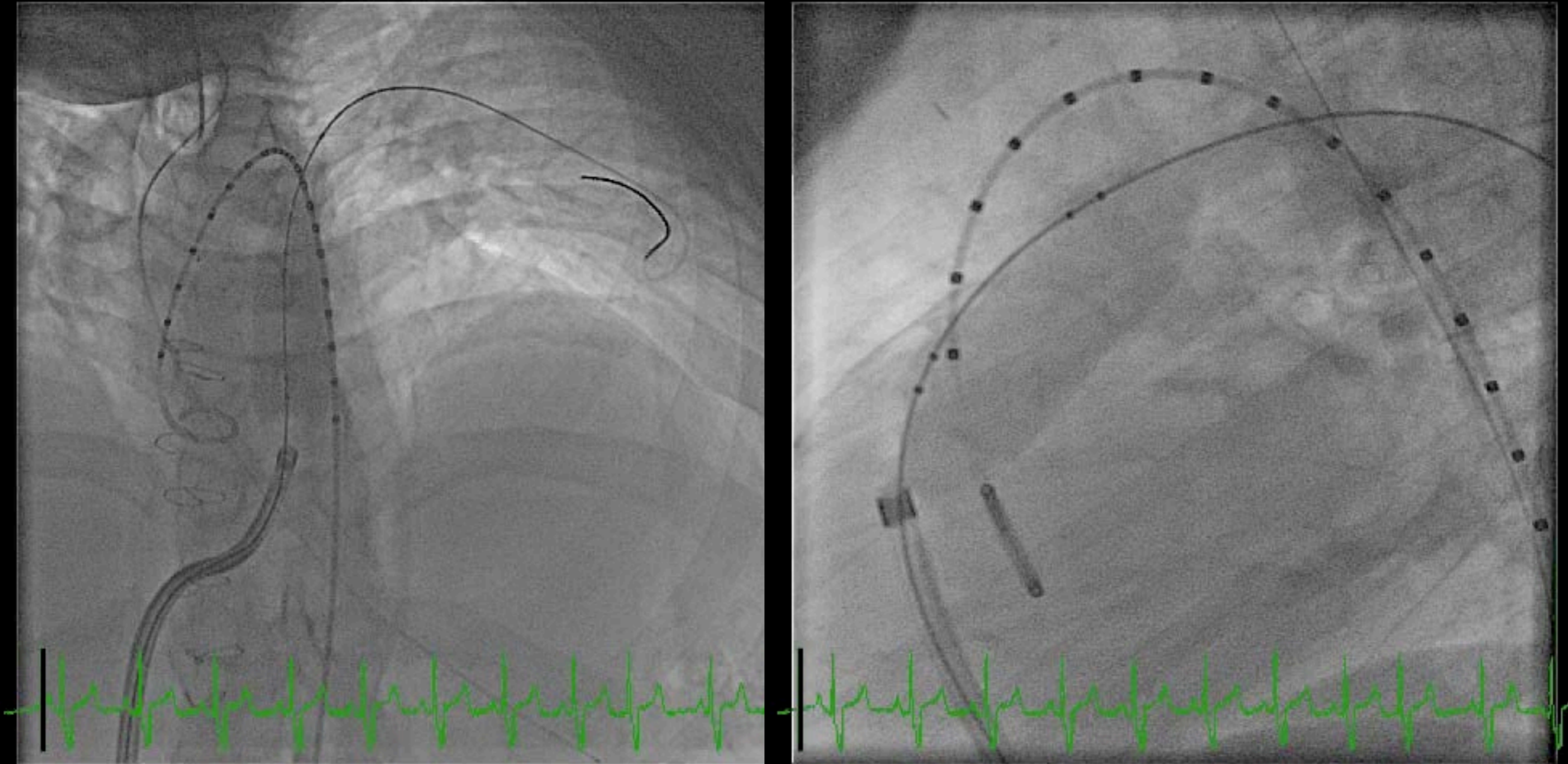
- Underwent right heart cath by his referring cardiologist: “Pulmonic valve stenosis, ~35mm gradient”
- Echo #1 (primary cardiologist): No pulmonic valve stenosis by Doppler
- Echo #2 (ours): “Pulmonary hypertension”
- CMR (ours): “No pulmonic stenosis”



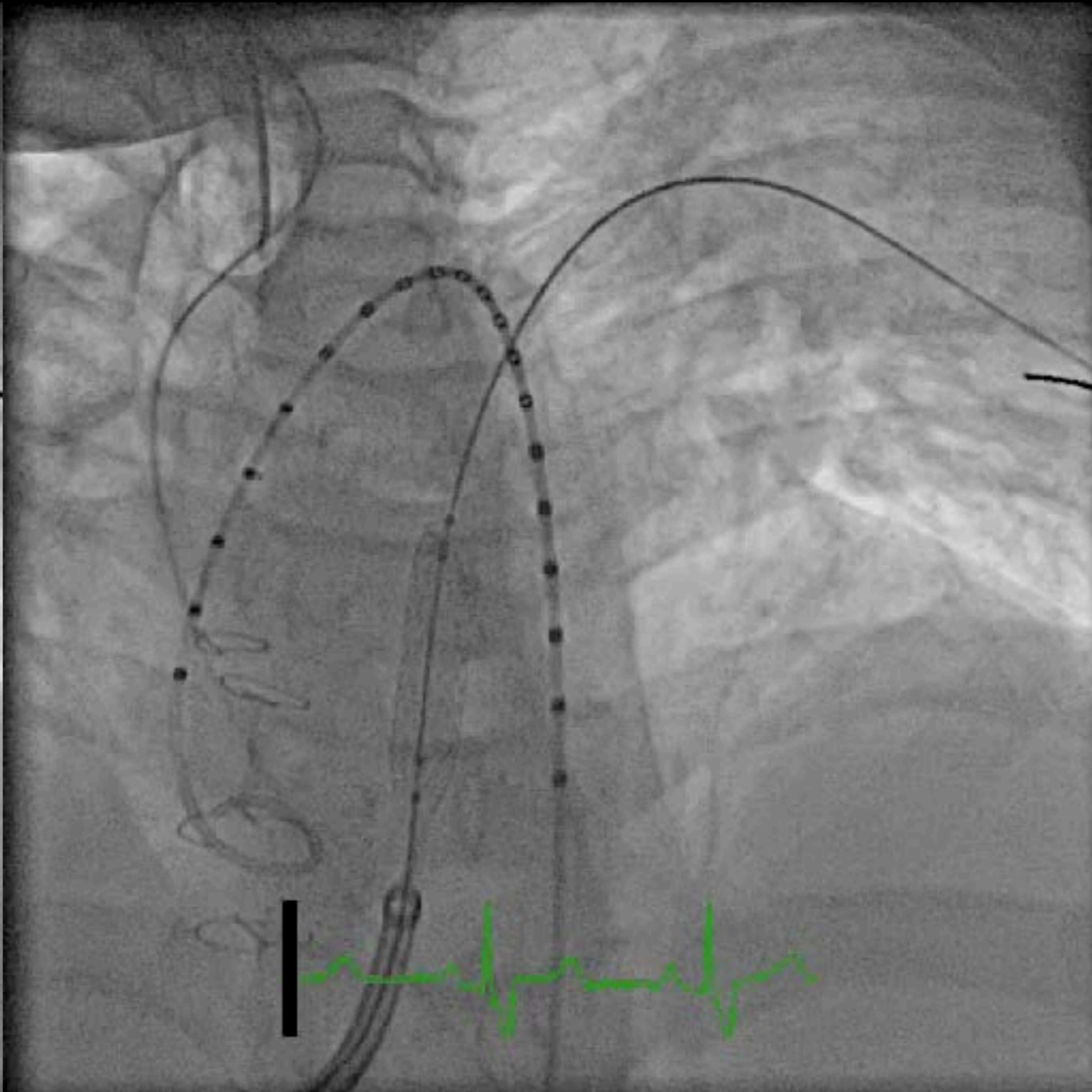
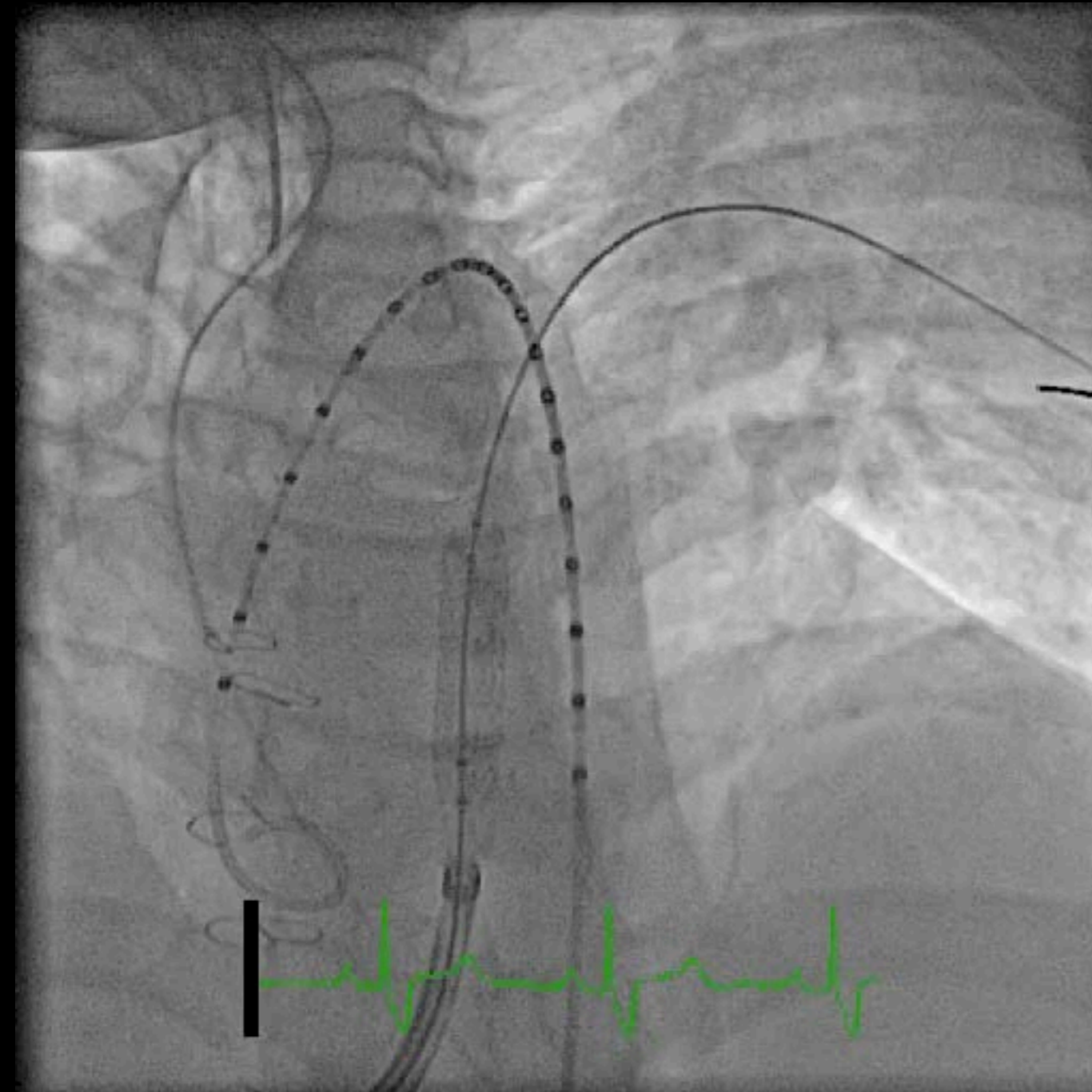
CT Measurements



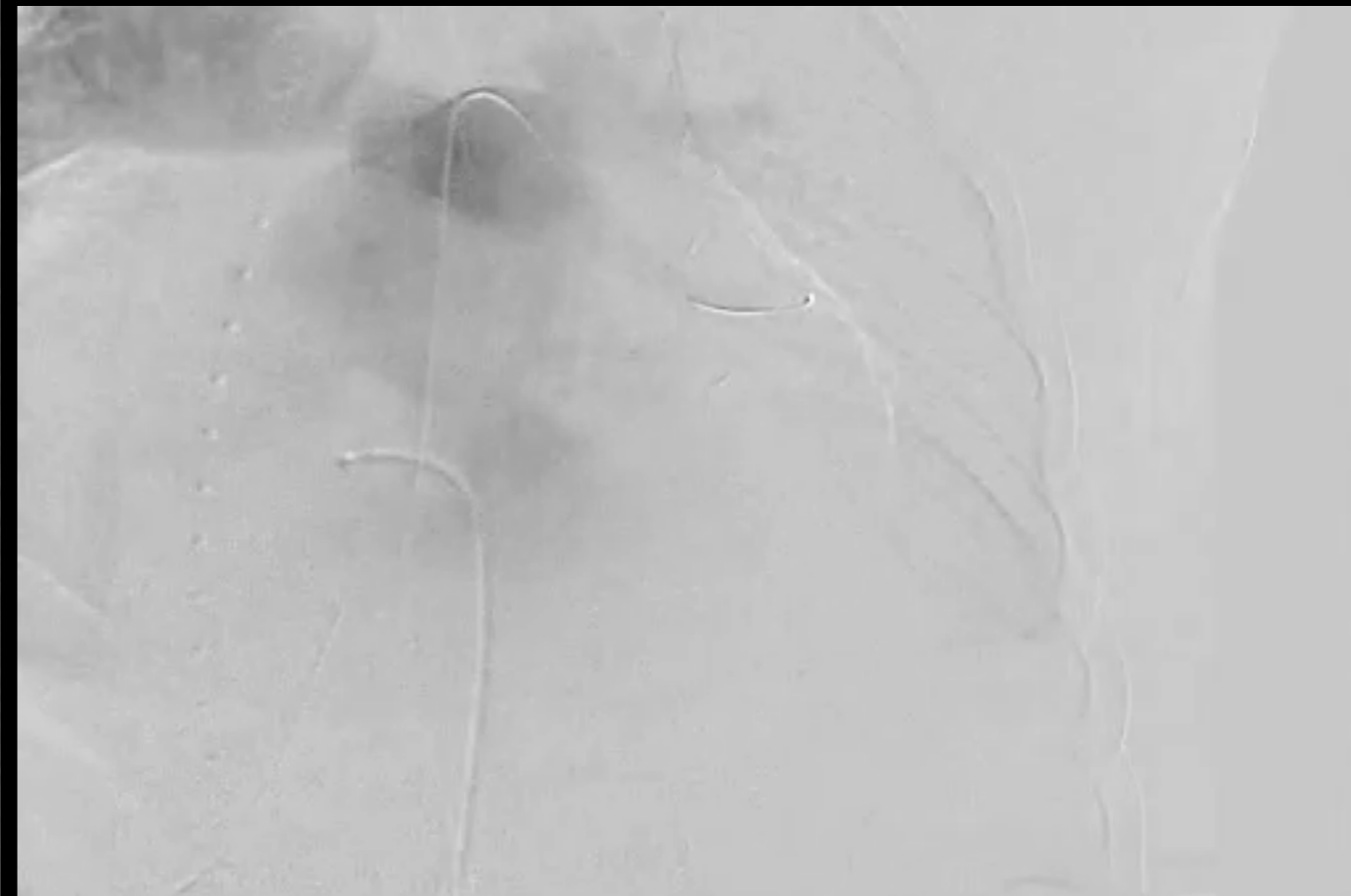
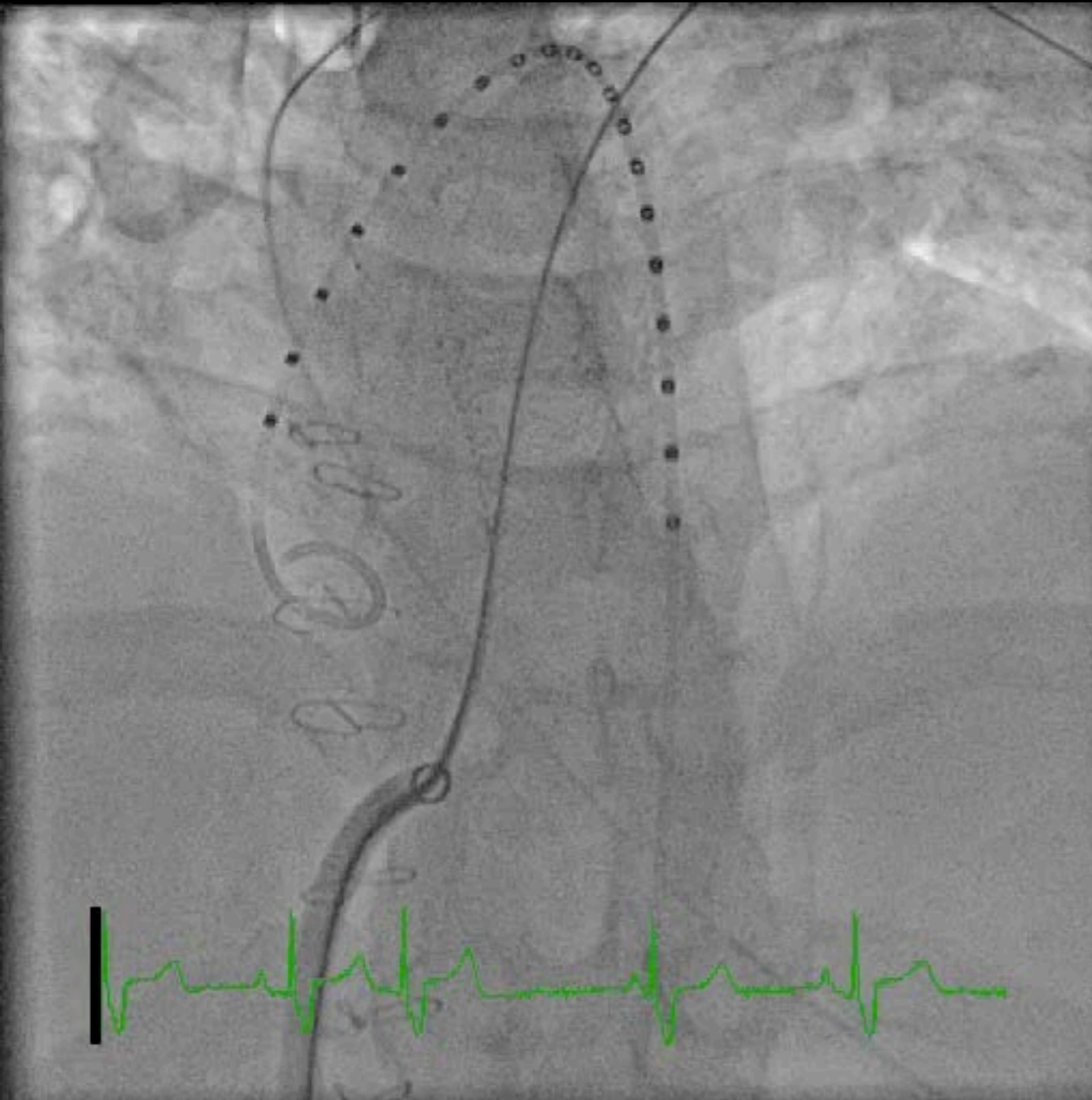
Initial Case - can you see?!



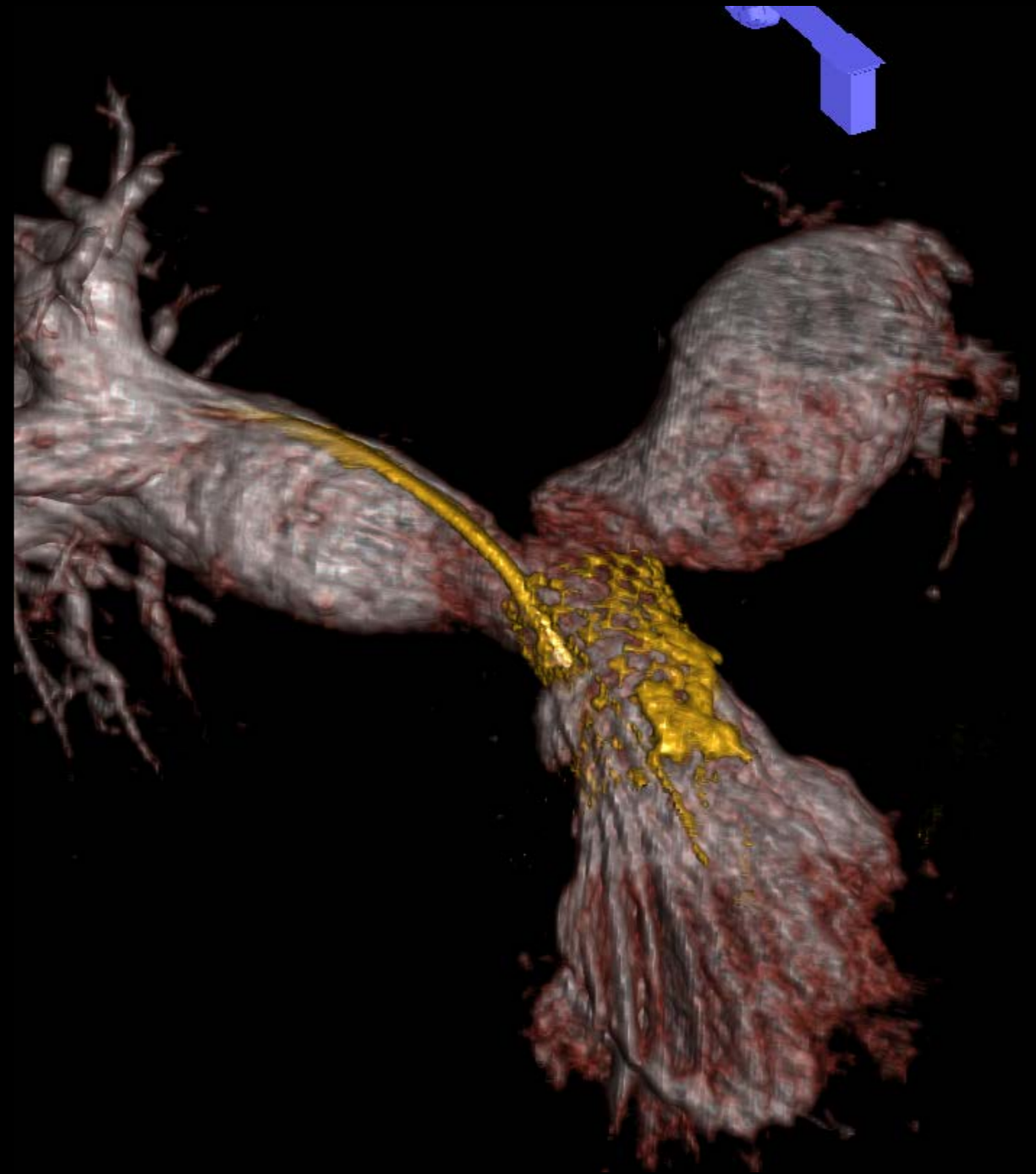
Where's the Bifurcation?



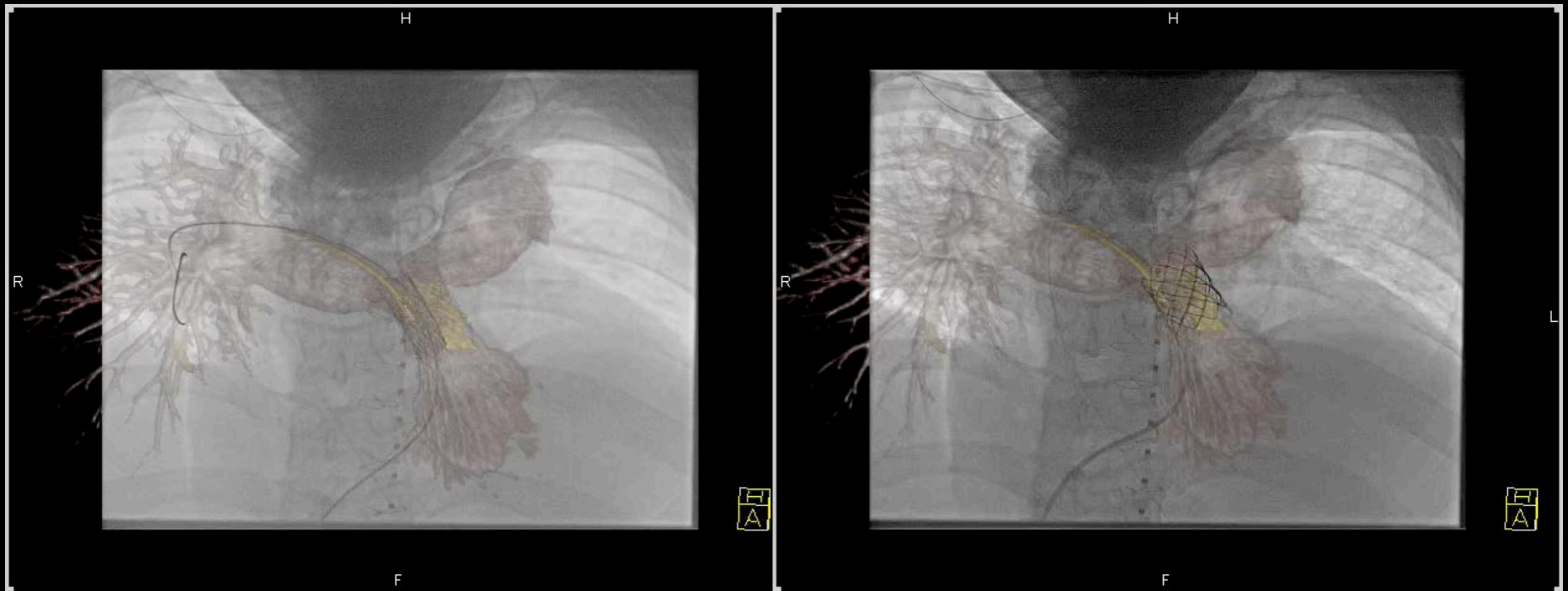
Too high?!



3D Recon with DSA Vindicates



Melody Deployment - Can't get enough "Cranial"



Congenital Guy in an Adult World

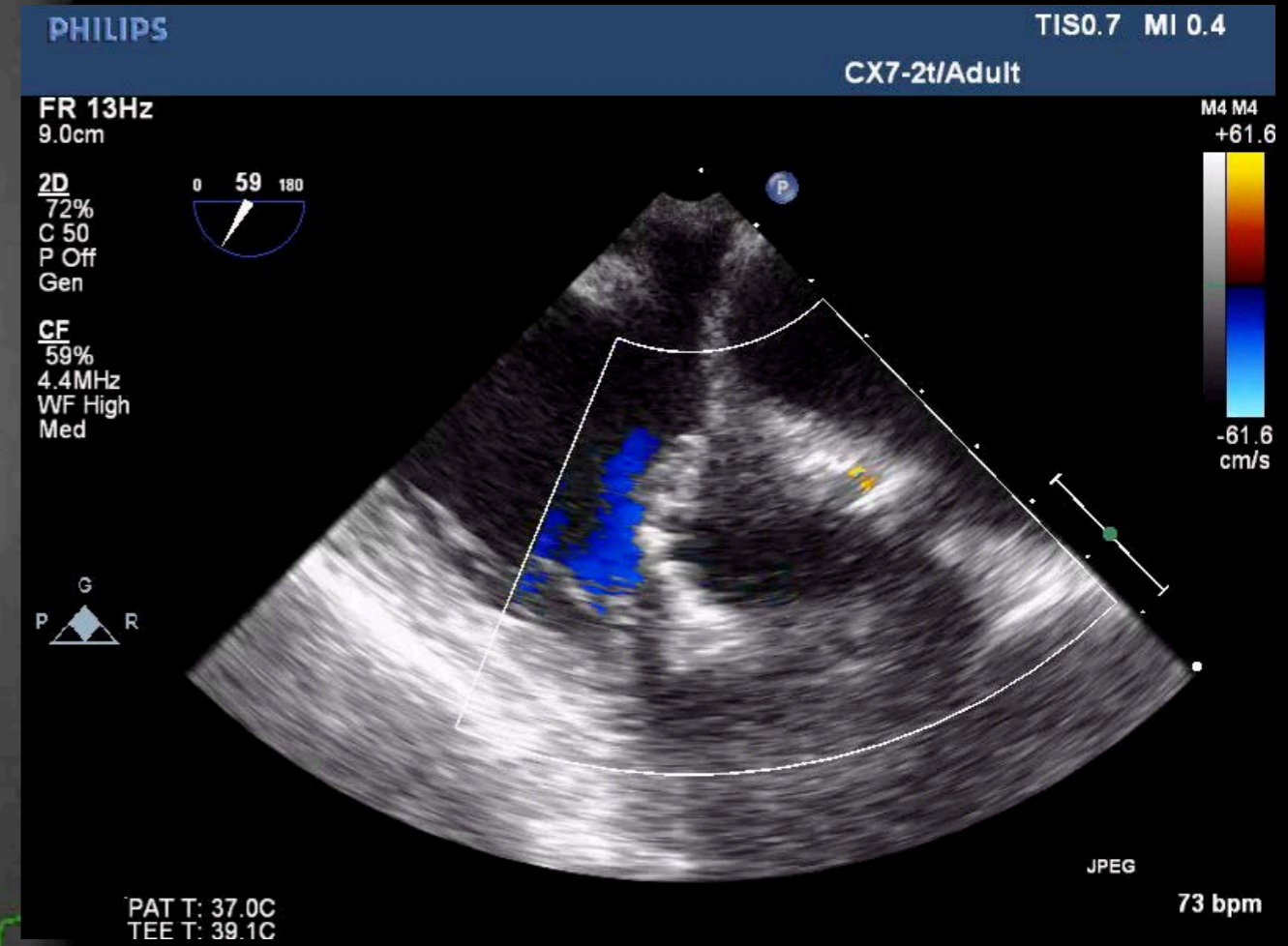
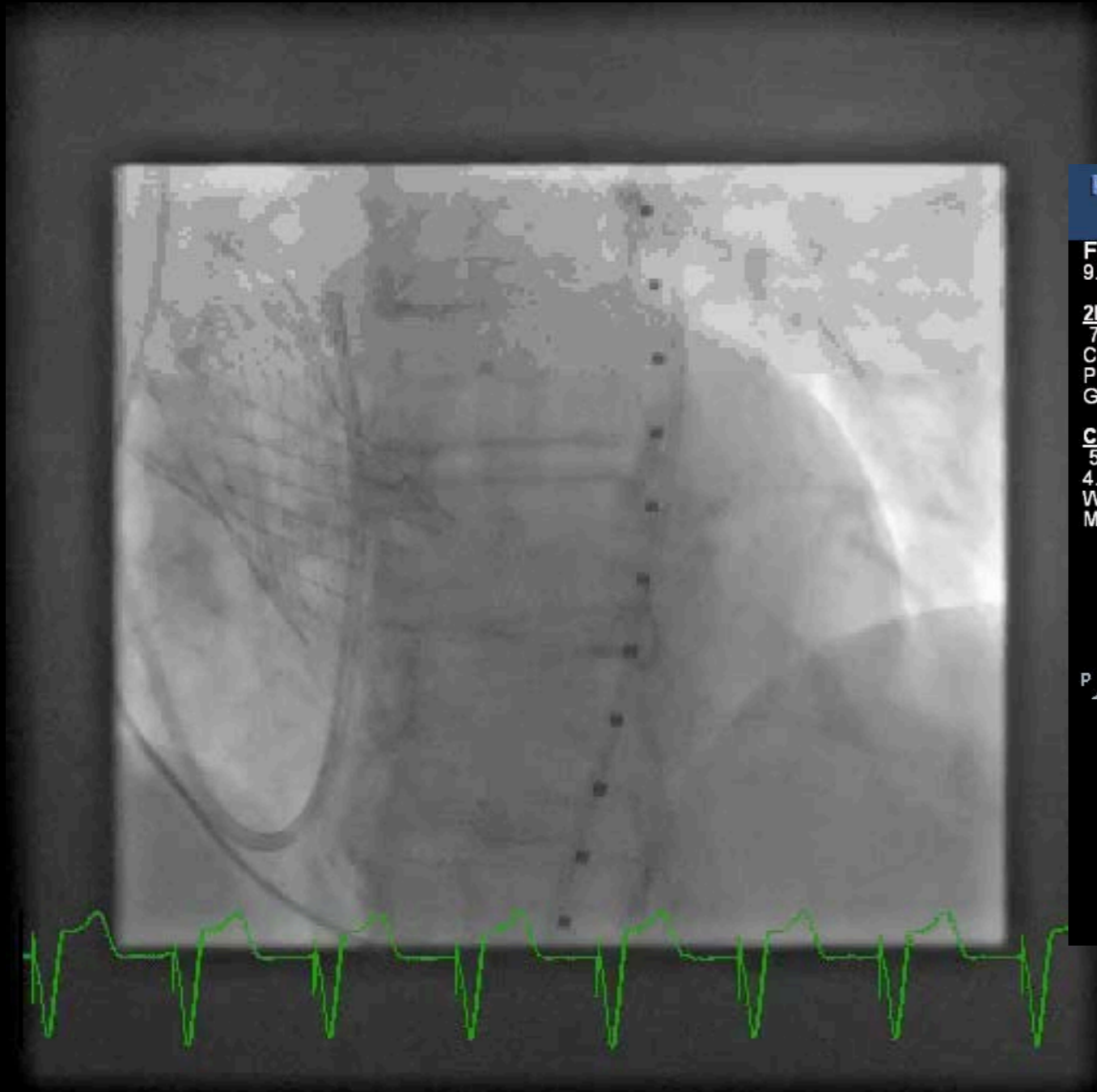
- 39M with Borderline HTN, Borderline hyperlipidemia
- On his way back from dropping off his parents at the airport
- Called by his boss, “Hey, uh can you come in to take a look at something?”
- Screamed at by wife in passenger seat “You’re not even on-call!”

The Real Case

- 87F Severe AS, moderate surgical risk, randomized to TAVI
 - Valve implantation goes well
 - Perivalvular aortic regurgitation seen
 - Post Stent Balloon Dilation performed



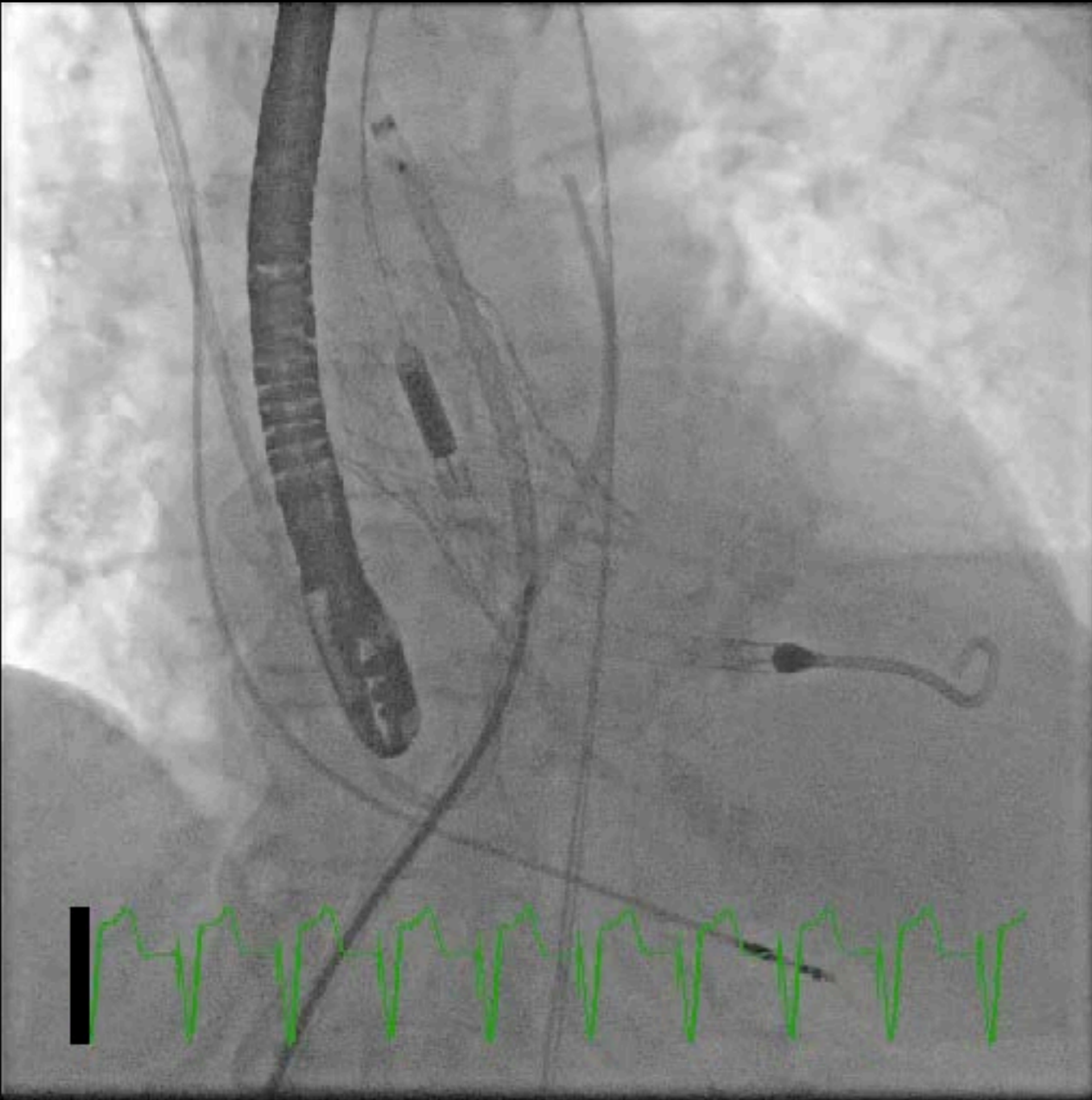
Hypotension



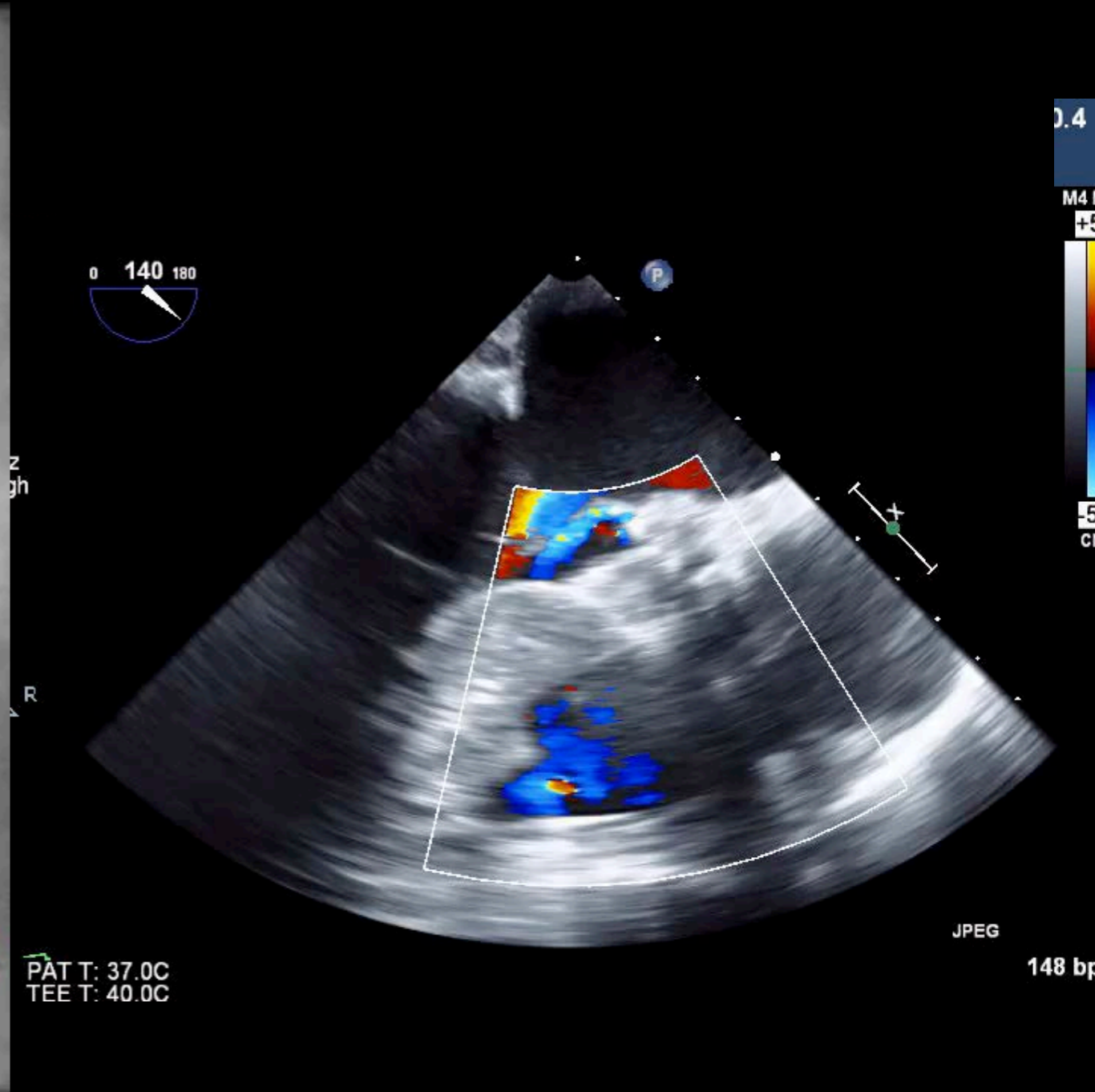
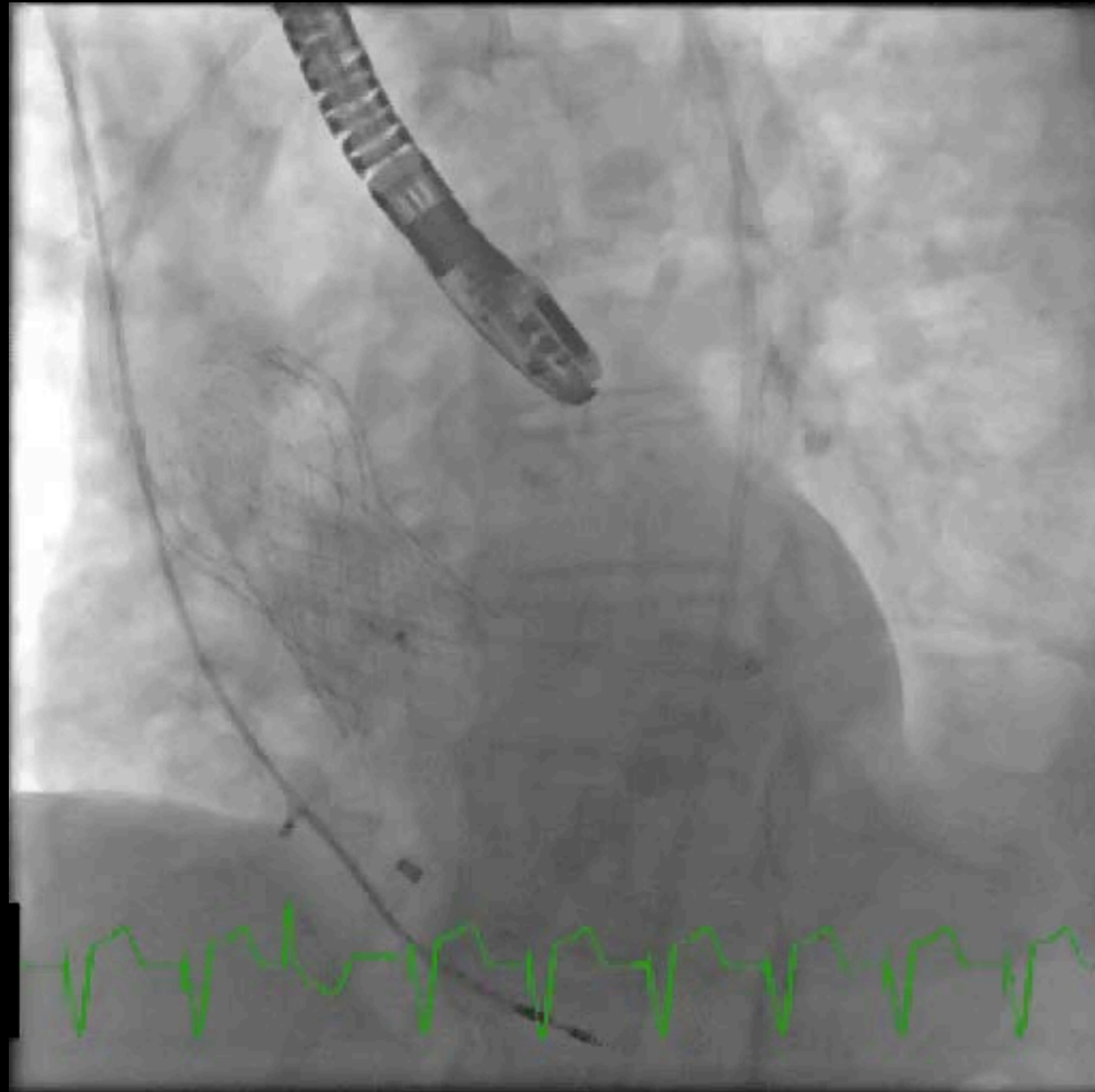
Now What?!

- Open now, that's why the surgeon is in the room
- Put in ventricular assist, wait it out
 - Open repair if needed
 - Transcatheter repair if needed
- Transcatheter repair

Transcatheter Repair



Enemy of Good...



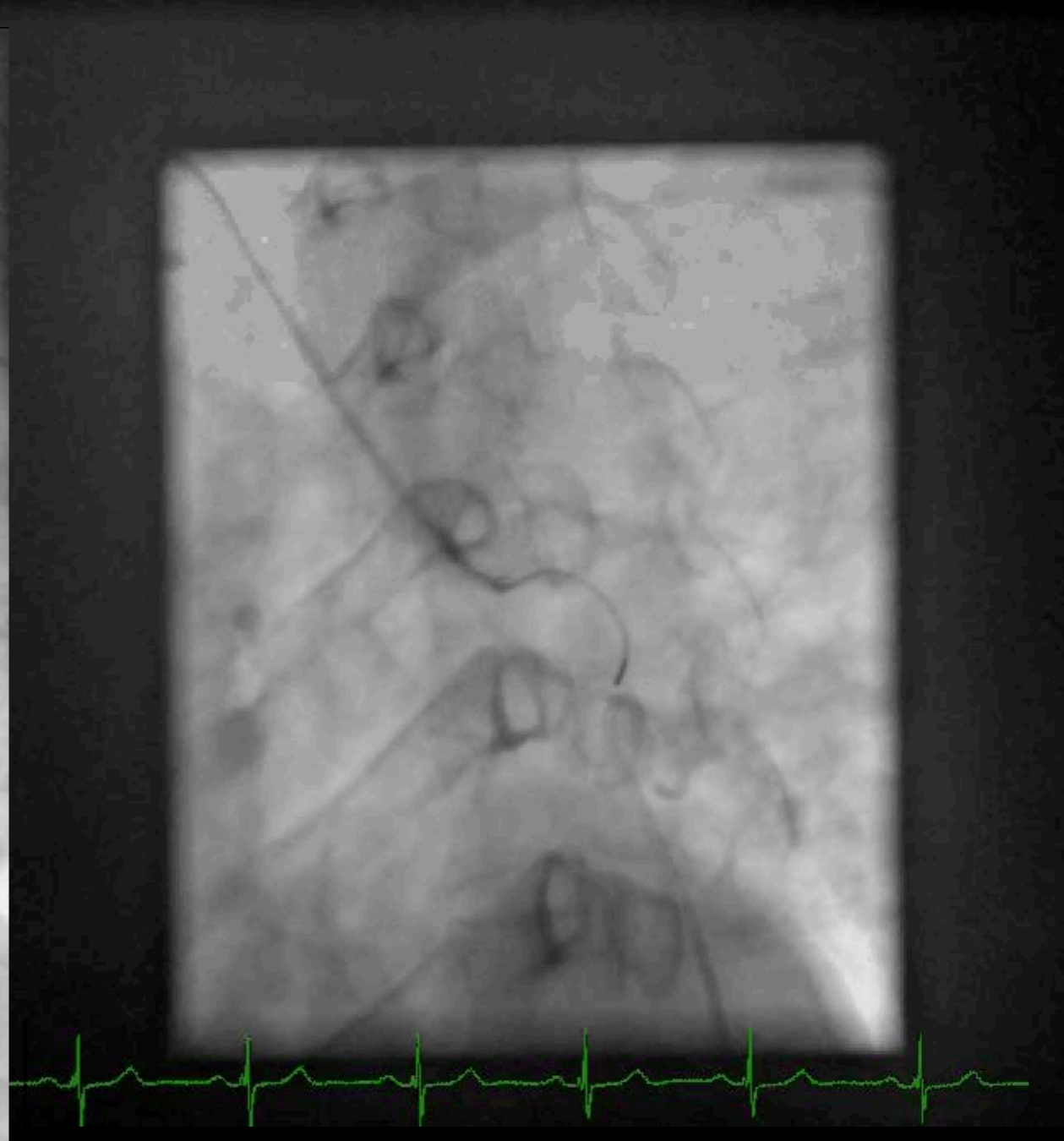
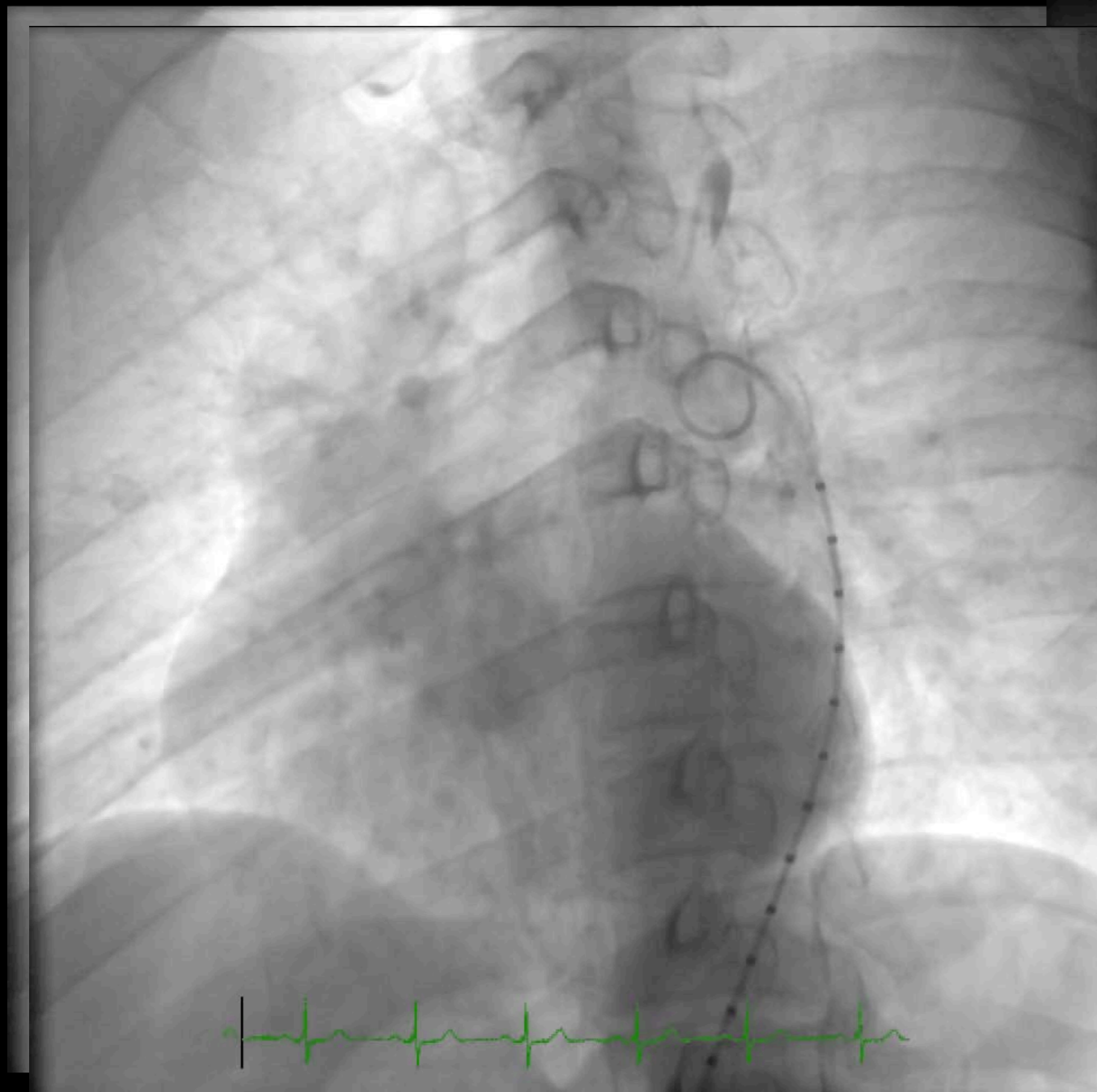
TAVR VSR Epilogue

- Weaned from mechanical support
- Ultimately extubated
- Transferred to nursing facility, rehabilitating and walking
- Passed away with sudden death about 4 months later.

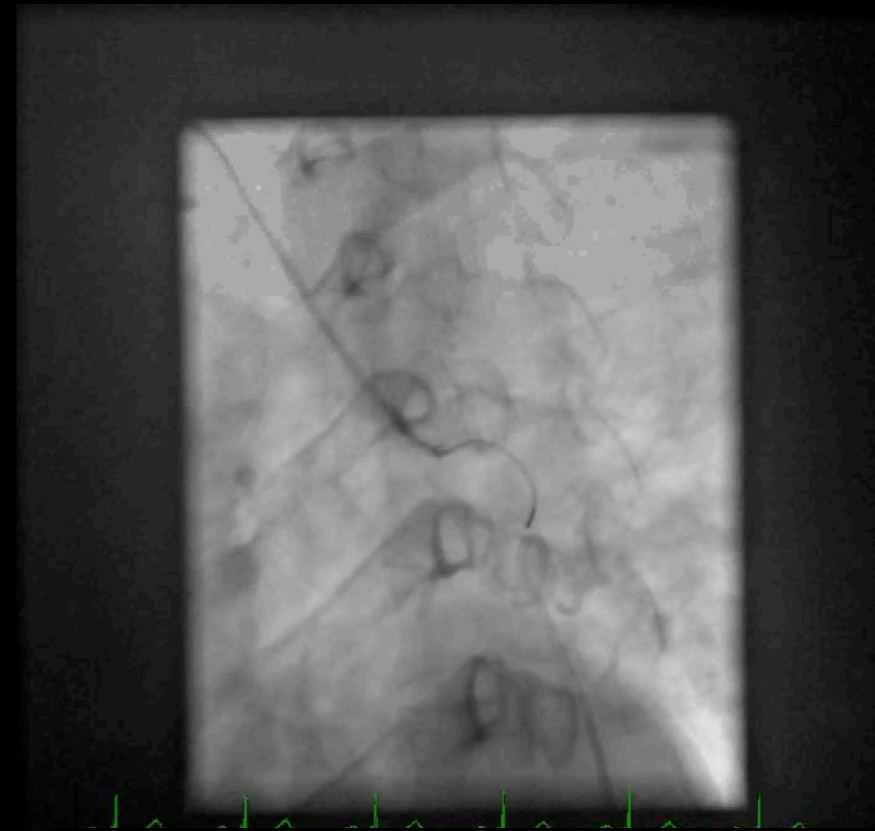
How would you bridge the gap?

- 42M with severe hypertension
 - RMCA stroke, mild residual two years prior
 - BP 200/110, 70mm gradient to lower extremities
 - CT at OSH -> “Coarctation”
 - No insurance or finances

Surprise!



I Want it That Way: High Risk Interventions in 2D/3D





Thank you!

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