

Three VSD Closures

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Case 1. VSD due to Stab Injury

13 YO boy

Multiple stab injury by his psychotic brother
Massive bleeding from the chest stab wound,

- 3 cm laceration
- Deepest wound with bleeding in superolateral portion of the left nipple





Rt neck



Forehead



Facial

Rt. ankle



Back



Back



Lt. chest



deepest wound

He arrived at other general hospital with a shock state,

sBP; 60 mmHg

**Active bleeding from
the chest stab wound**

Initial Hb 6.0g/dl

After chest tube insertion,

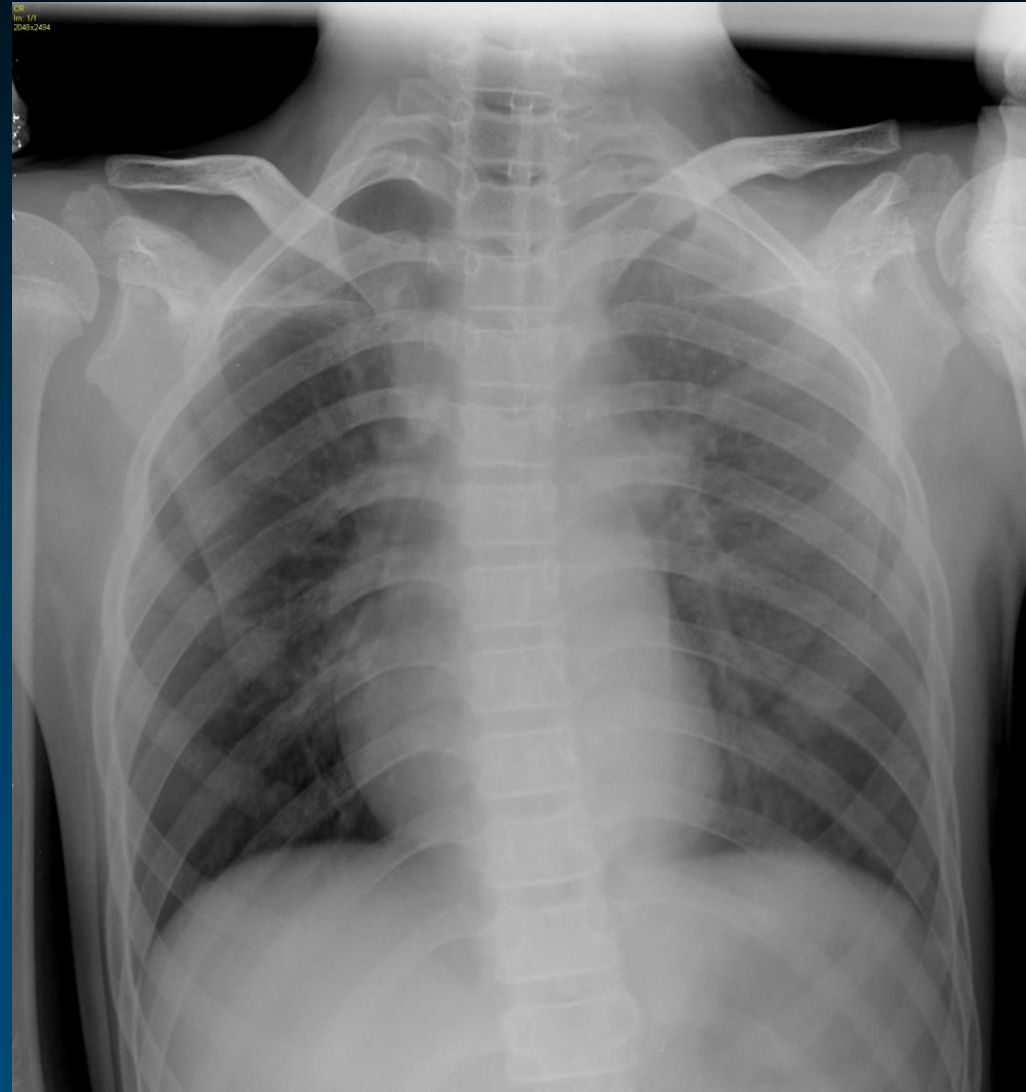
→ Initial 800 cc bleeding

→ Continued bleeding

→ Chest tube was clamped

→ Transfer to our ER

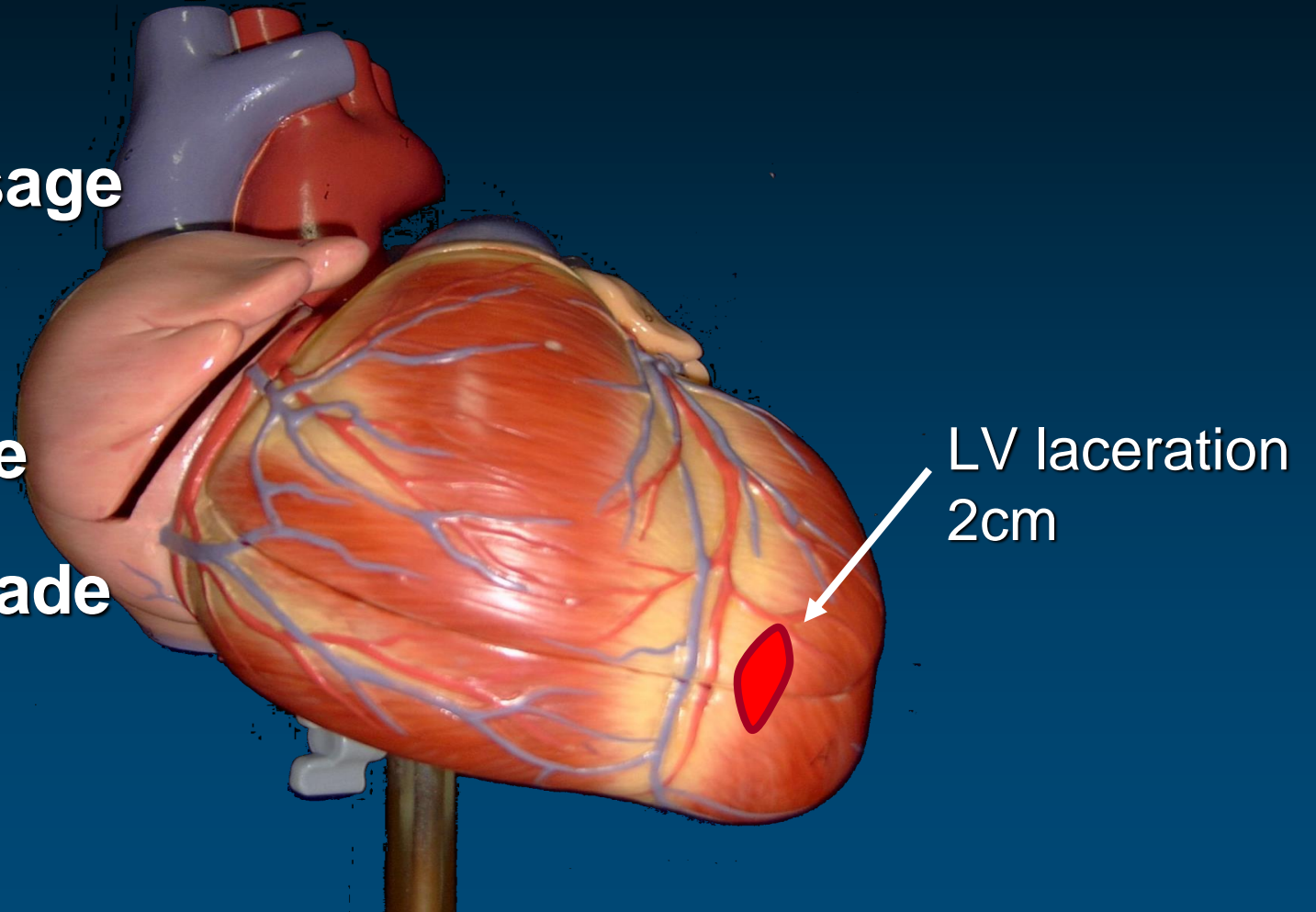
→ Immediately moved to OR



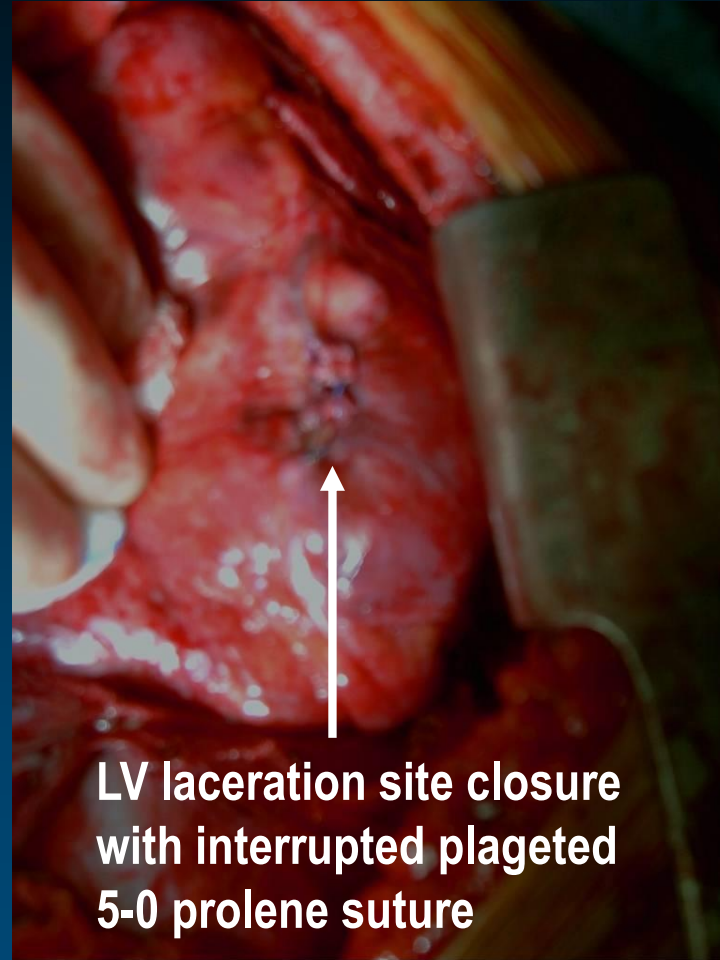
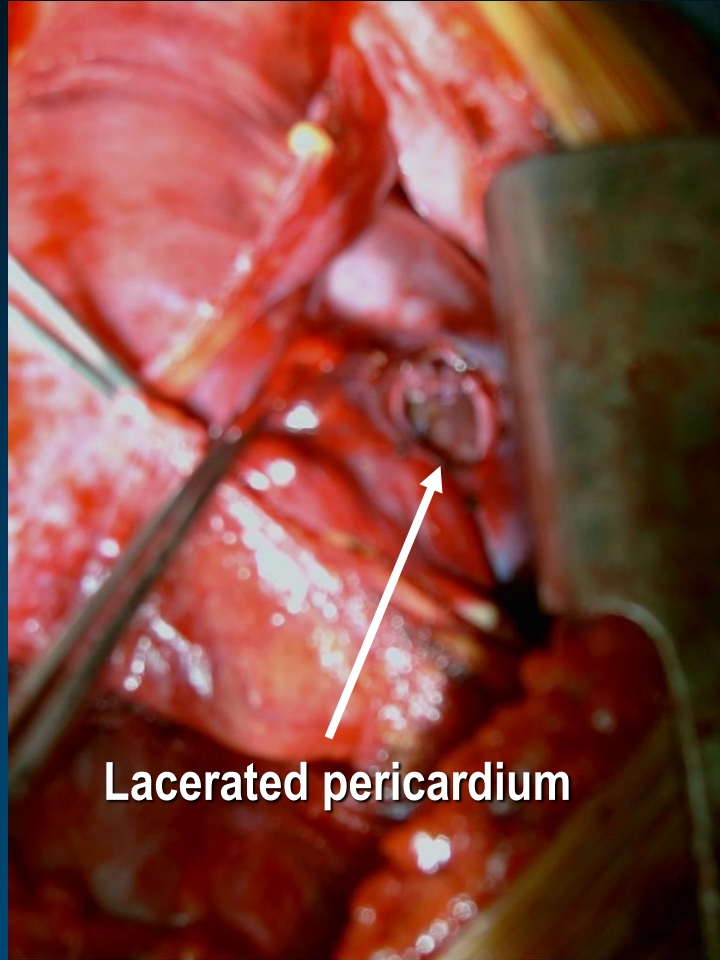
1st Operation

Cardiac arrest at OR

- External cardiac massage
- Median sternotomy
- Open cardiac massage
- Relief cardiac tamponade

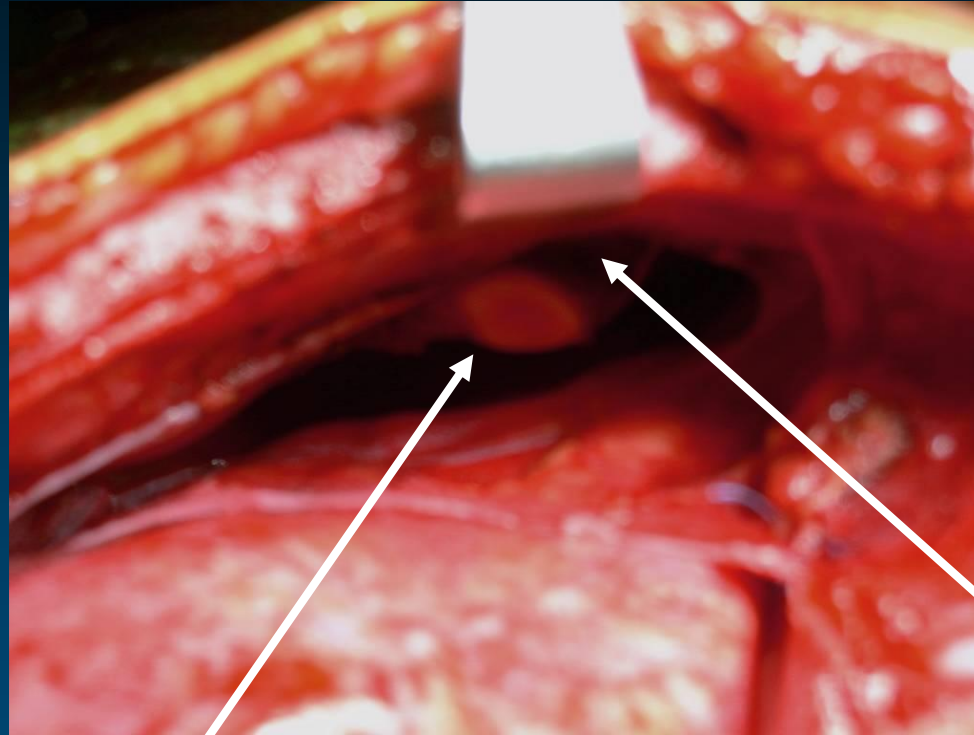


LV repair



Simple closure of LV laceration

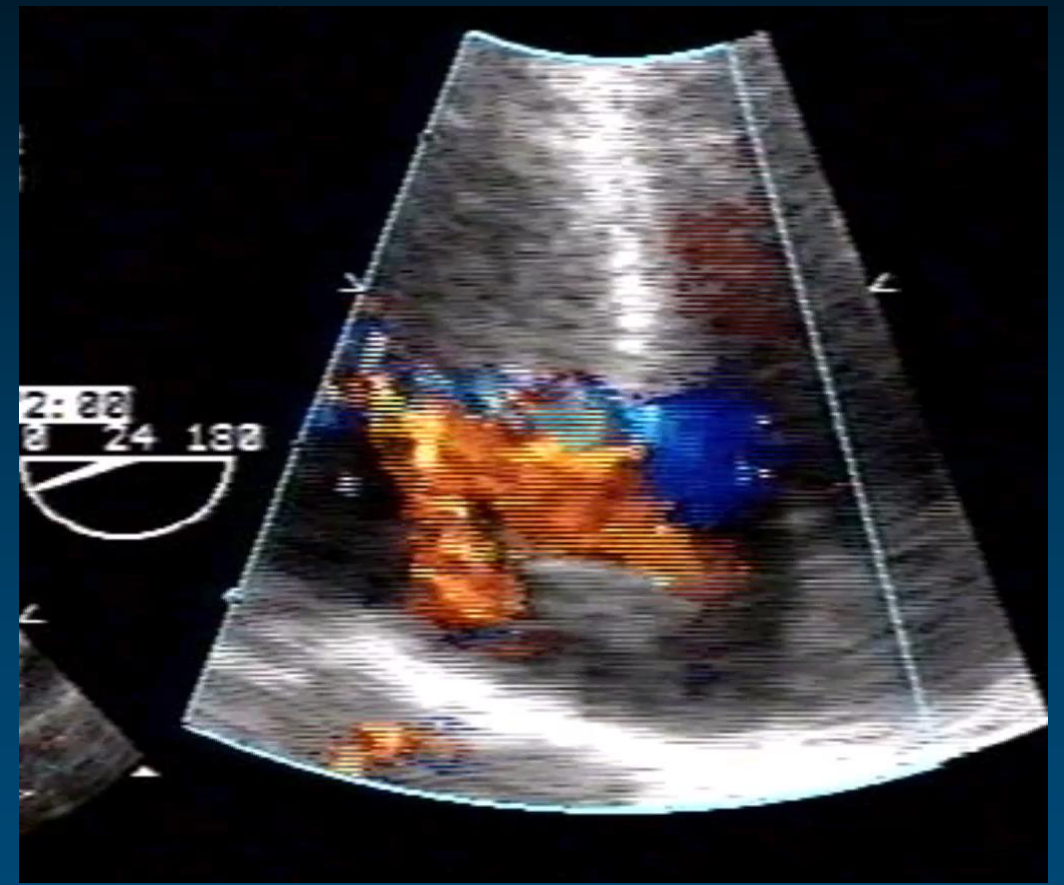
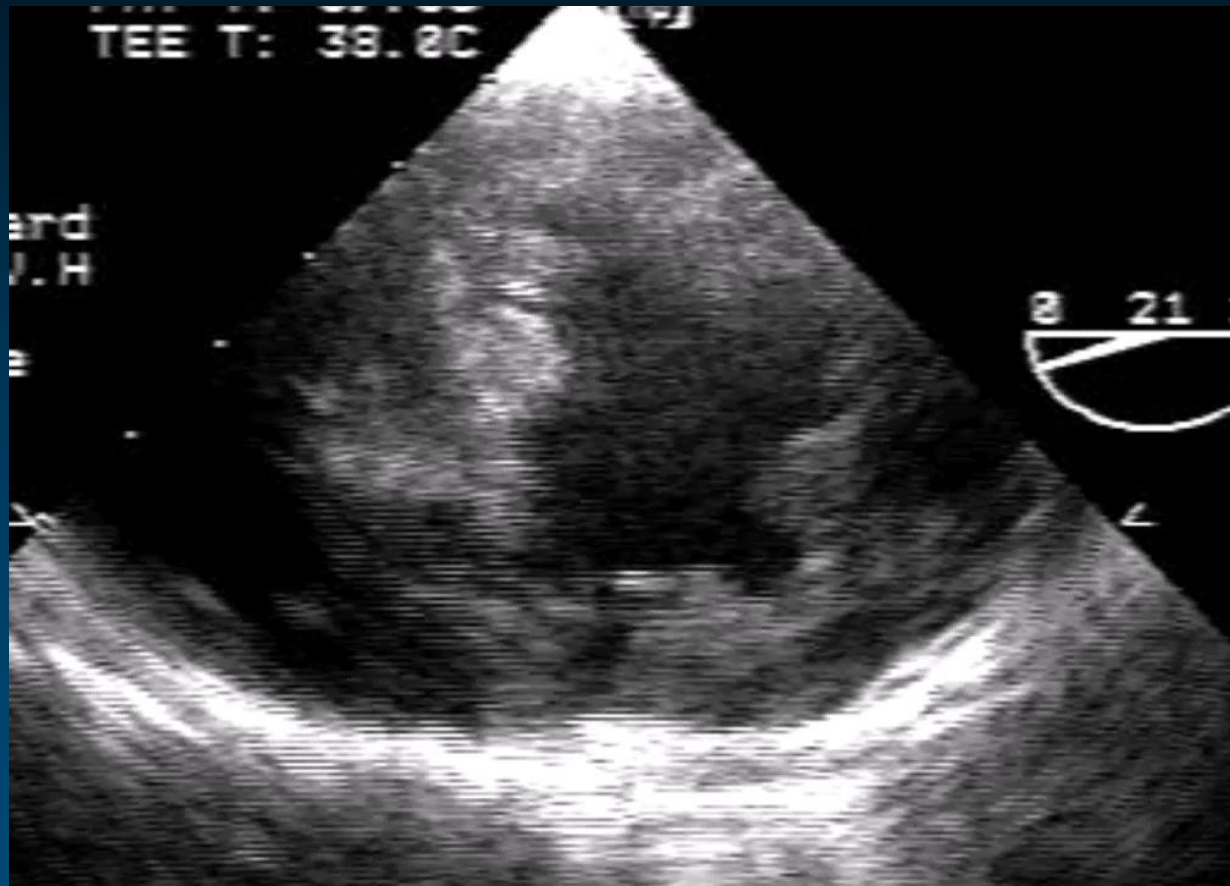
Intrathoracic bleeding control



4 th rib Fx at sternocostal joint

Intercostal v. bleeding

Intraoperative TEE after ventricular wall repair

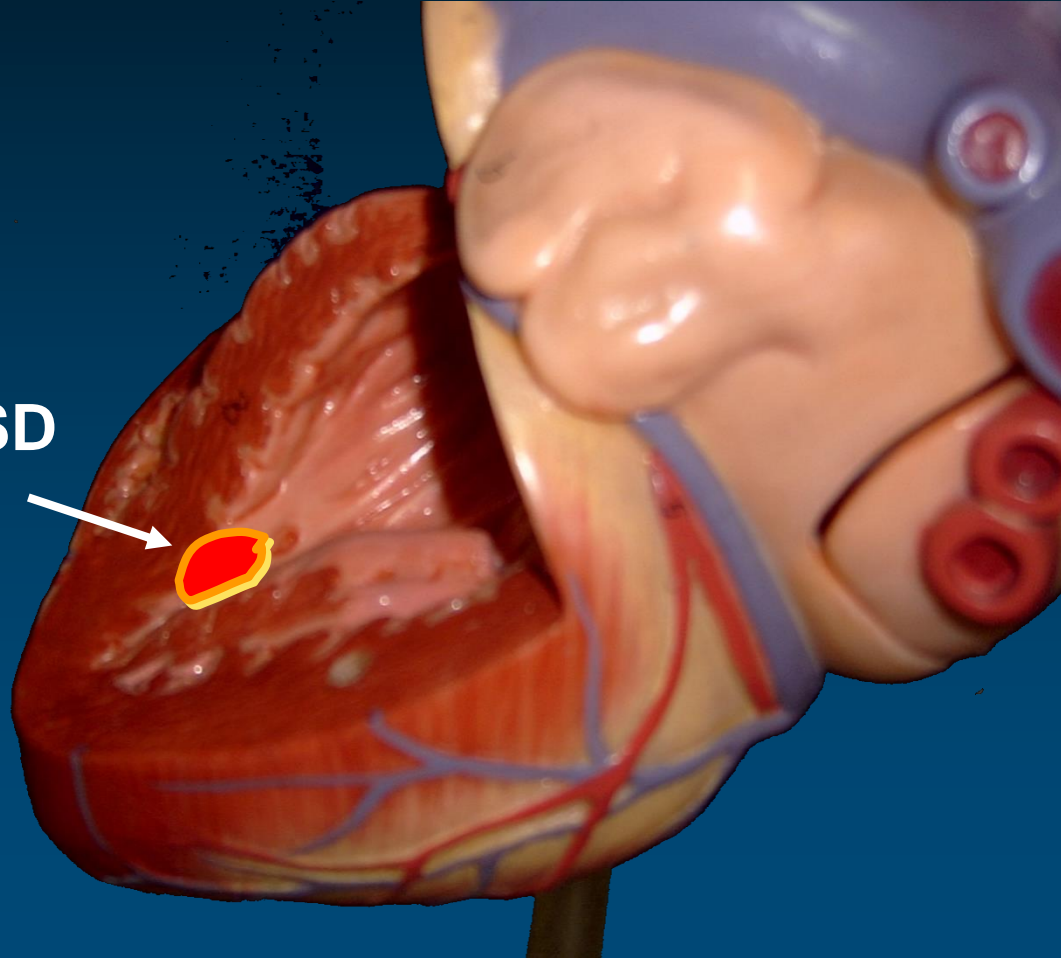


Large muscular VSD near the apex (with L-R shunt)

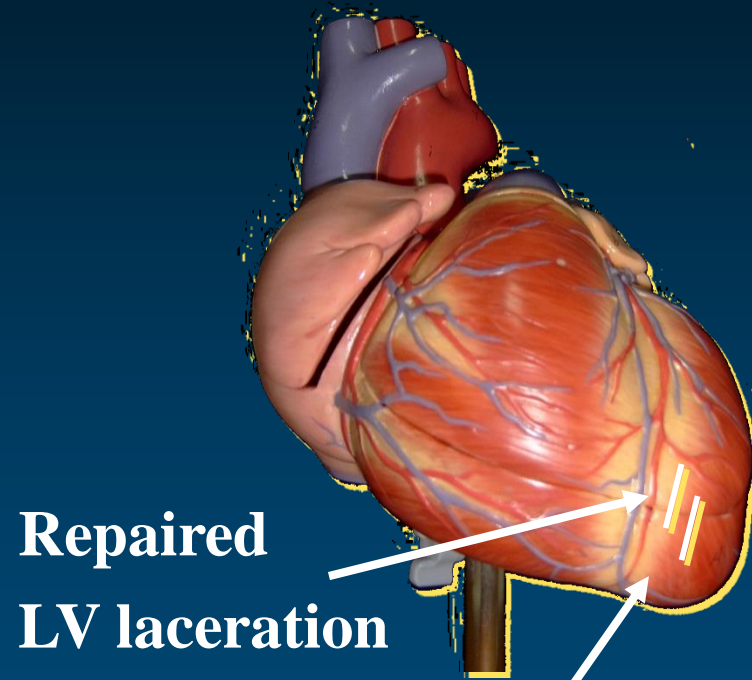
2nd Operation

Repair of traumatic VSD with Dacron patch

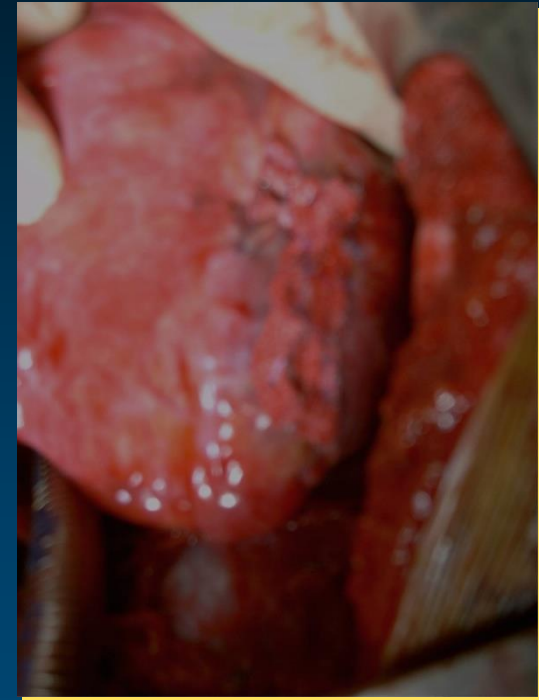
Traumatic VSD



Septal Defect Repair

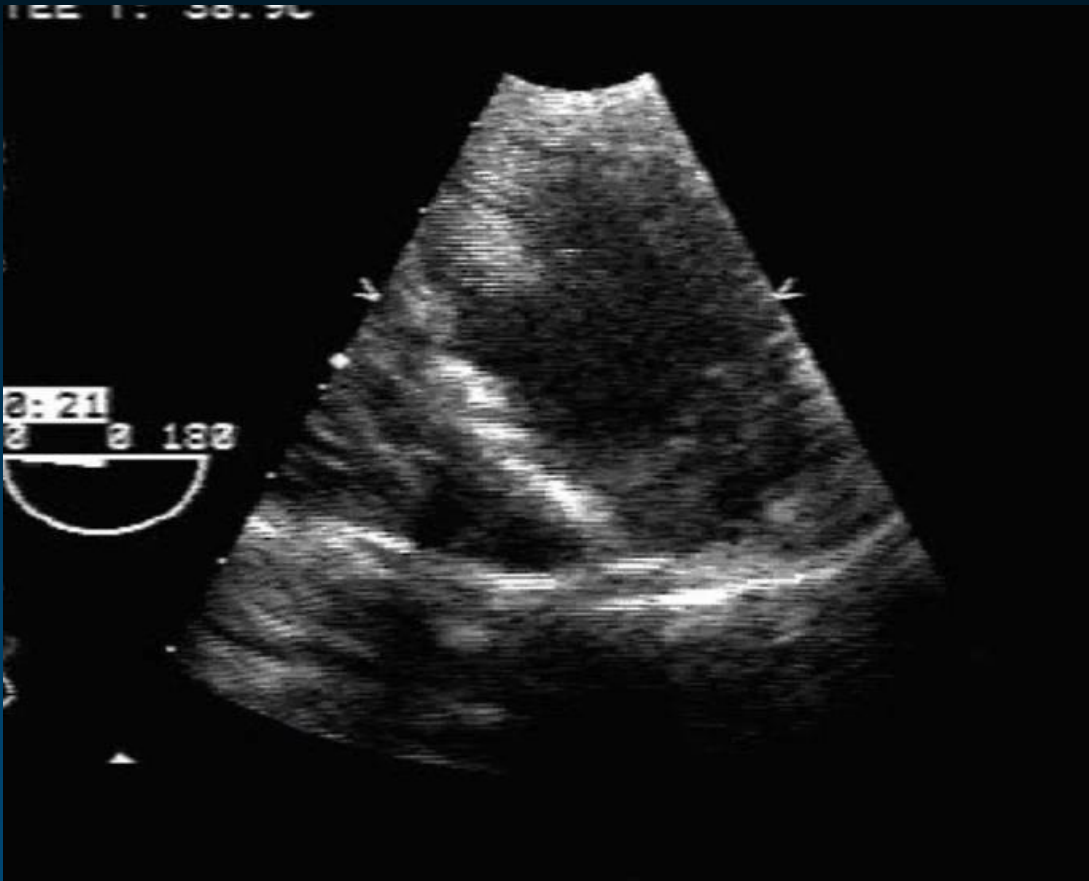


LV-tomy for VSD
repair, 3.5cm



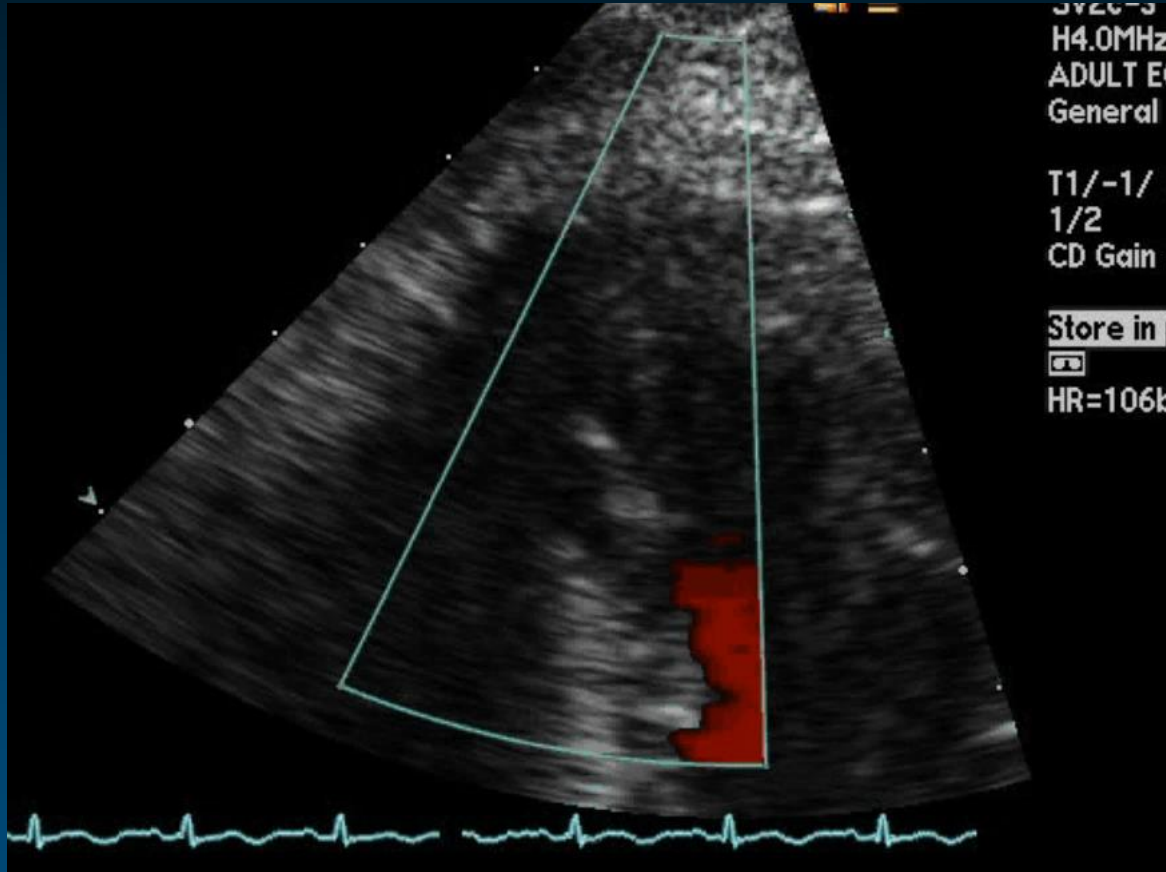
LV-tomy & VSD repair

Intraoperative TEE after VSD repair

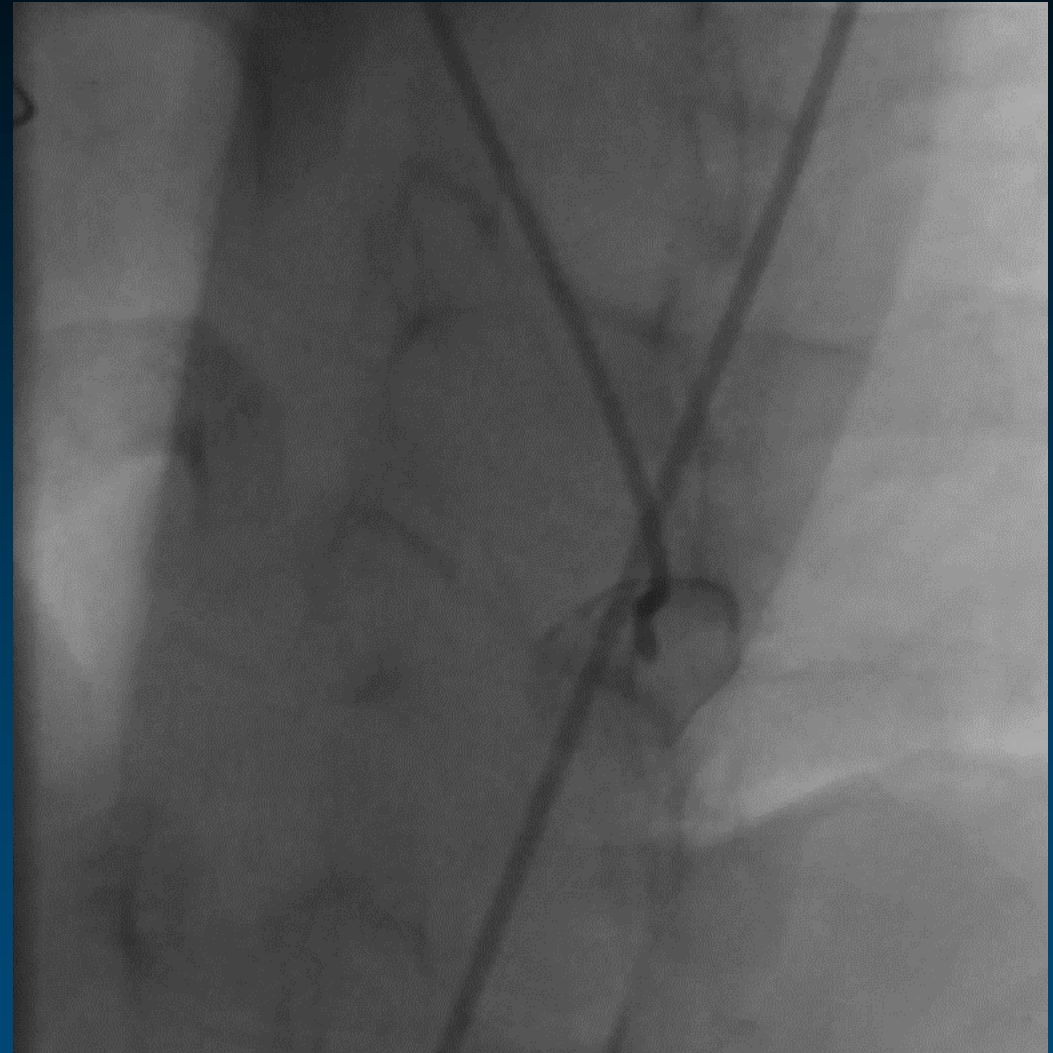
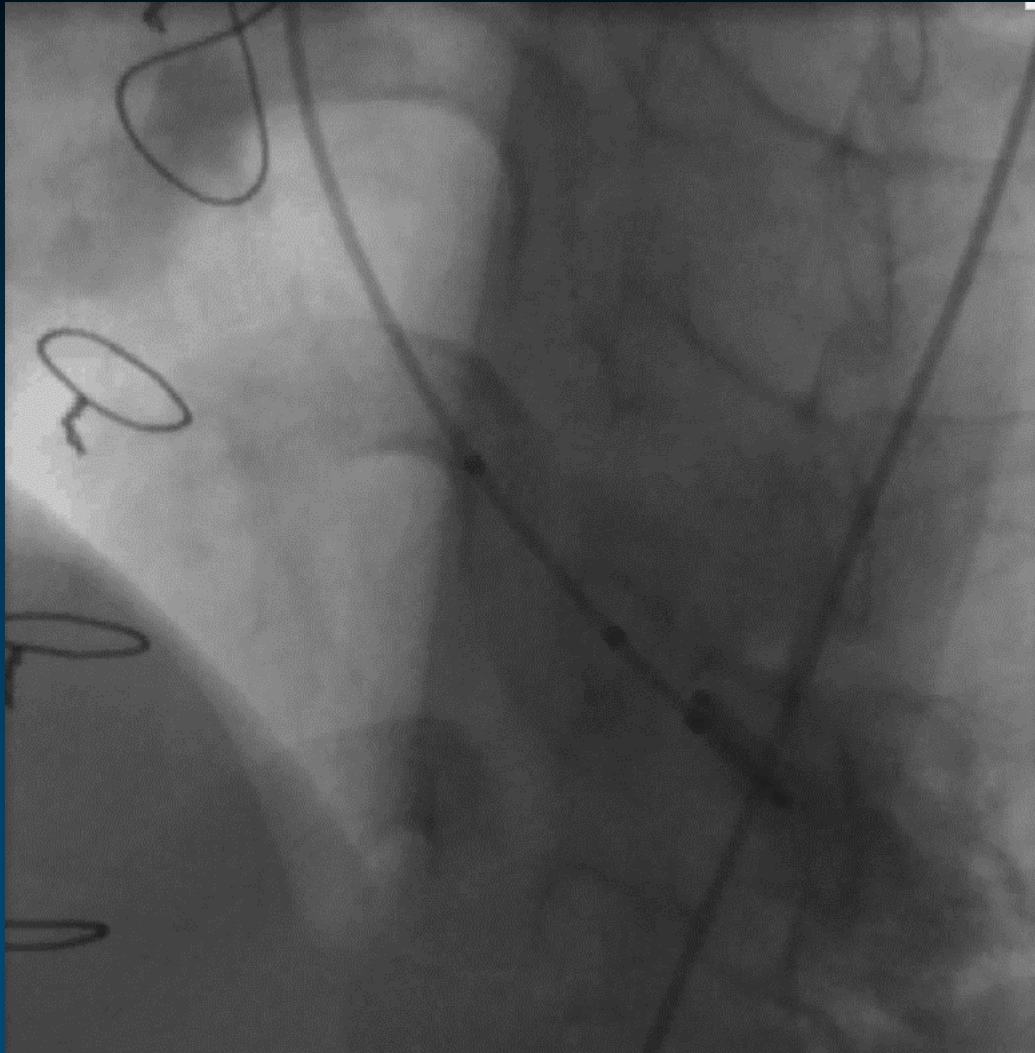


Still residual defect but, could not assumed the amount of cerebral injury
→ Surgery was completed with residual defect

Postop. TTE (2 weeks later)

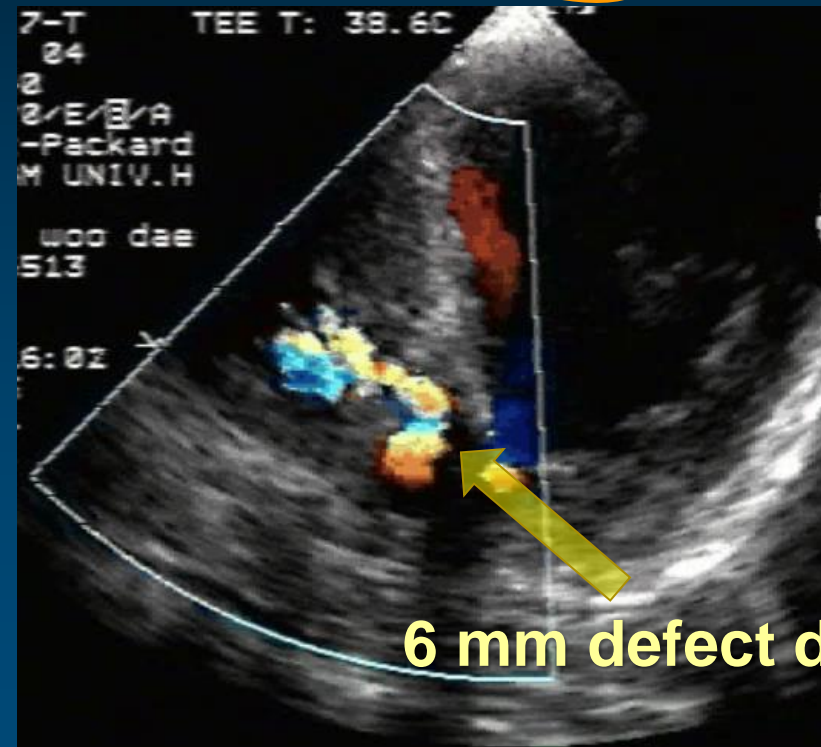
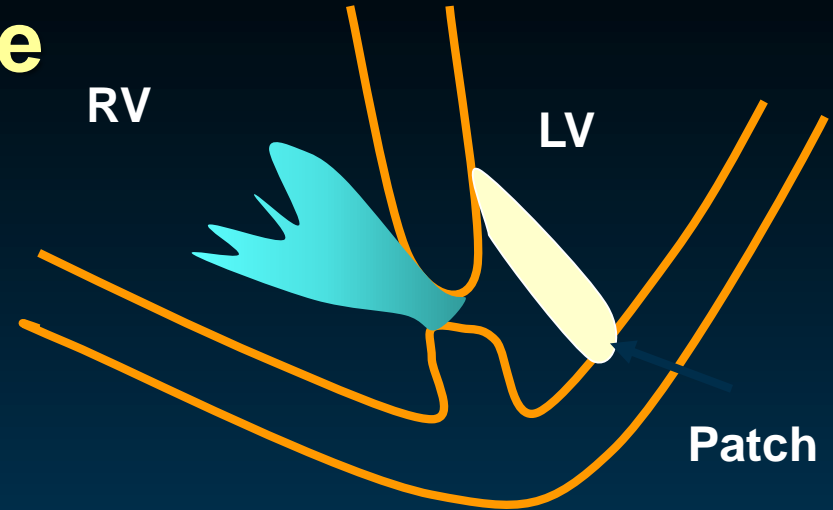
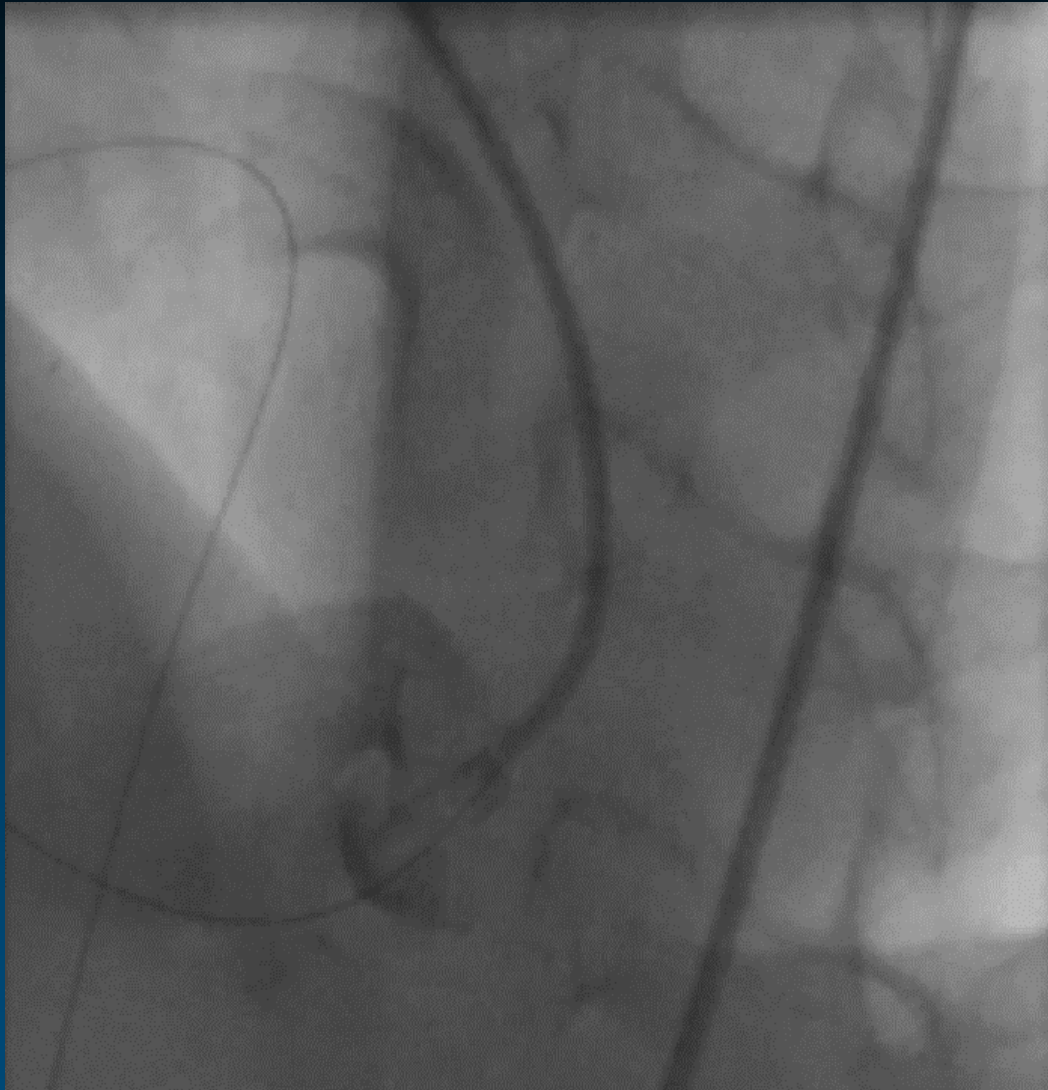


6 months later (DOE Fc 2)



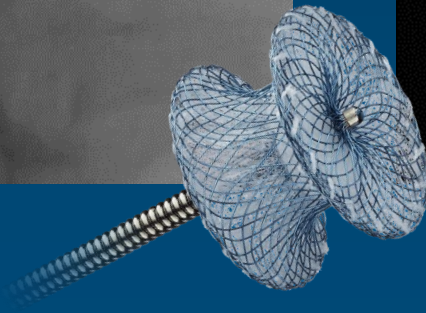
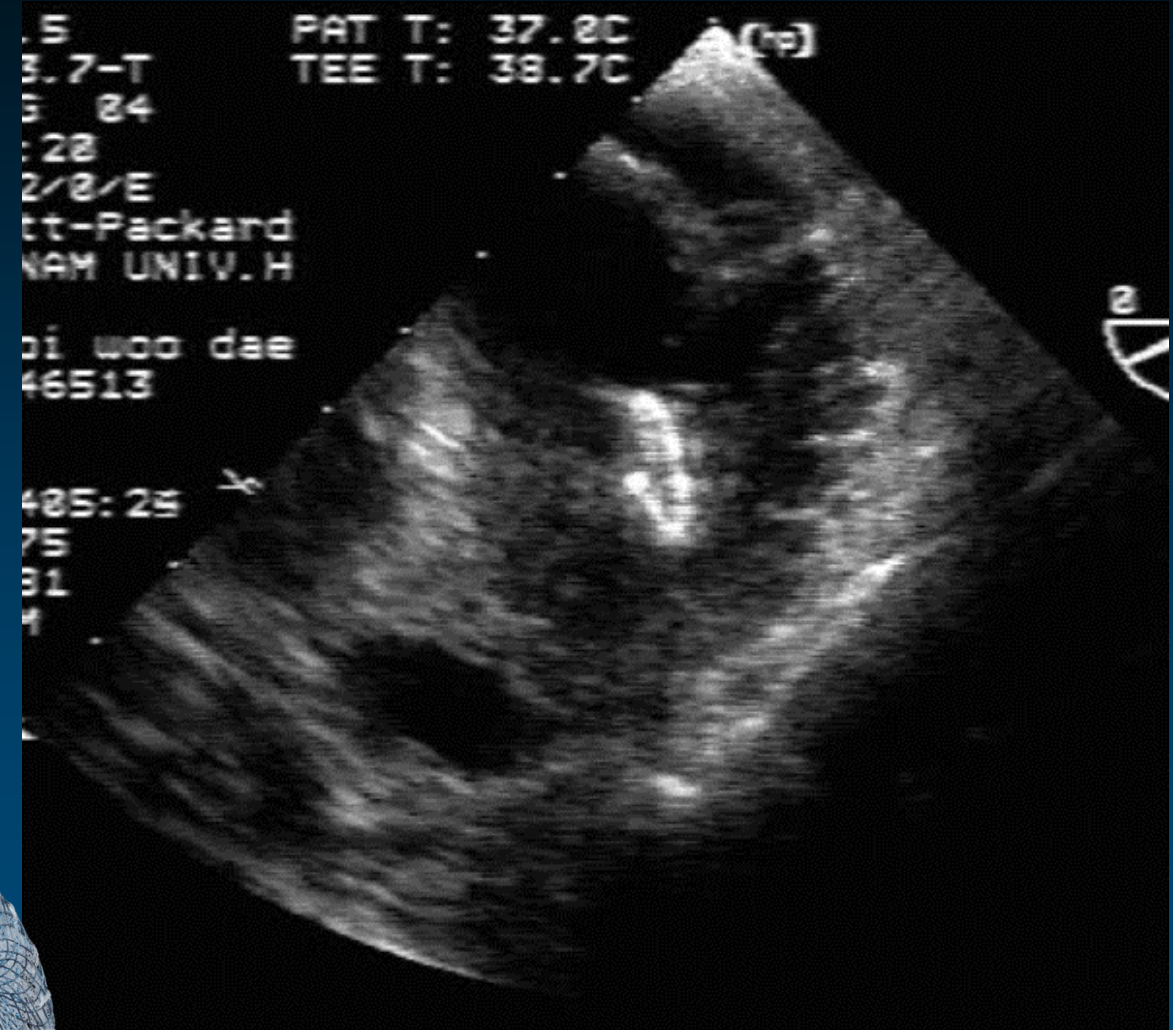
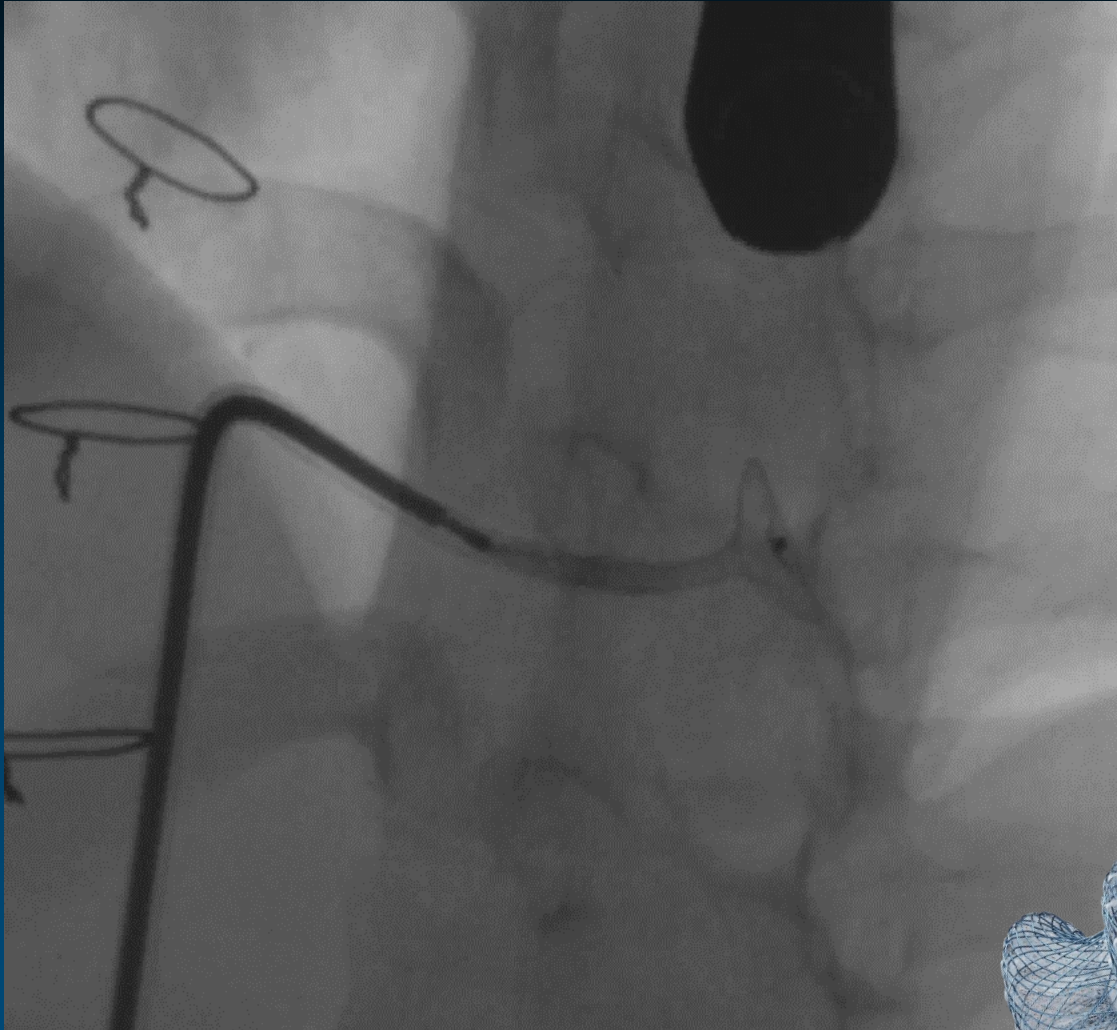
$Q_p/Q_s = 2.2$, peak PA pr 54 mmHg

General anesthesia, TEE guidance



L→R passage and Snared from femoral vein

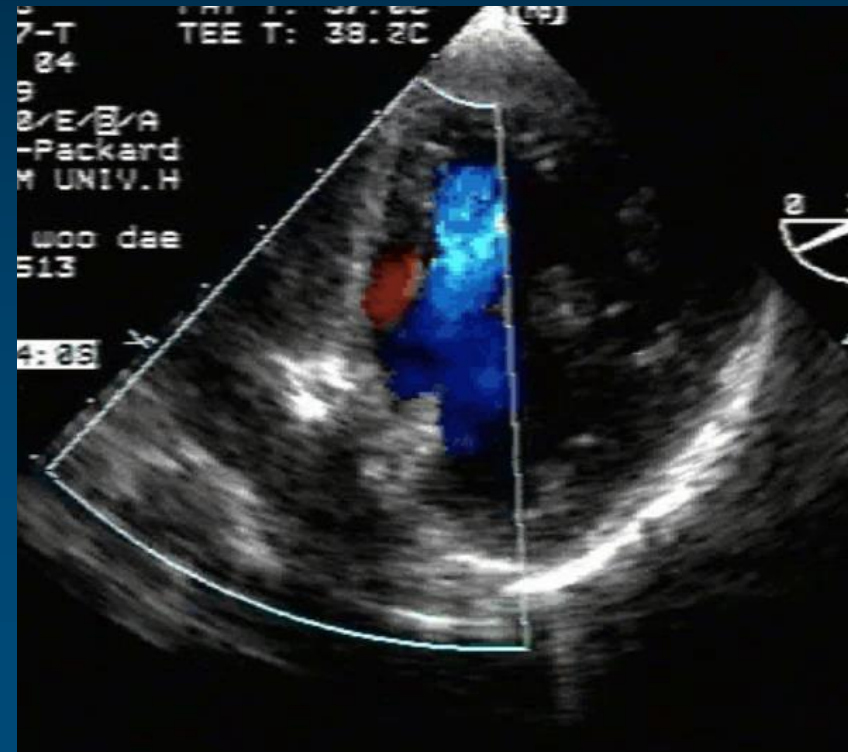
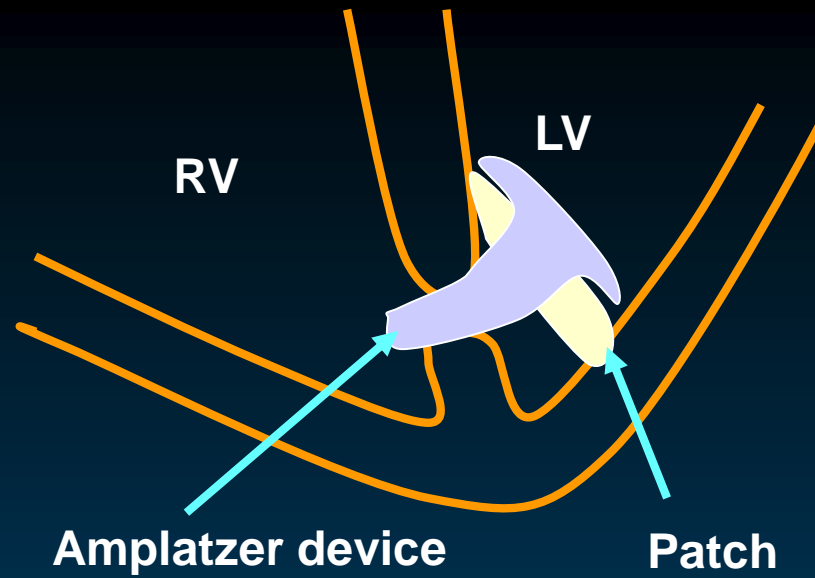
7 Fr delivery sheath, 10 mm muscular VSD device



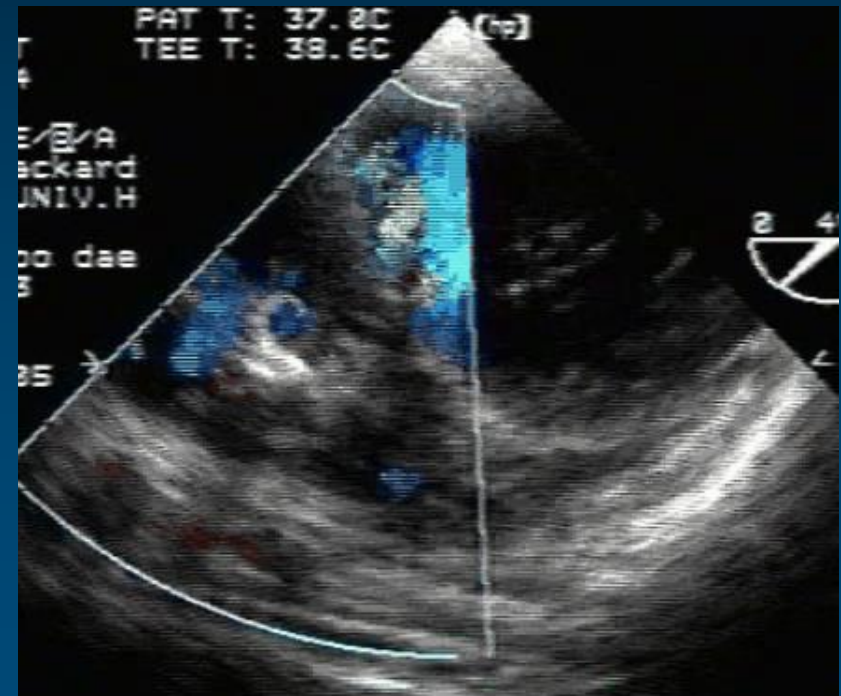
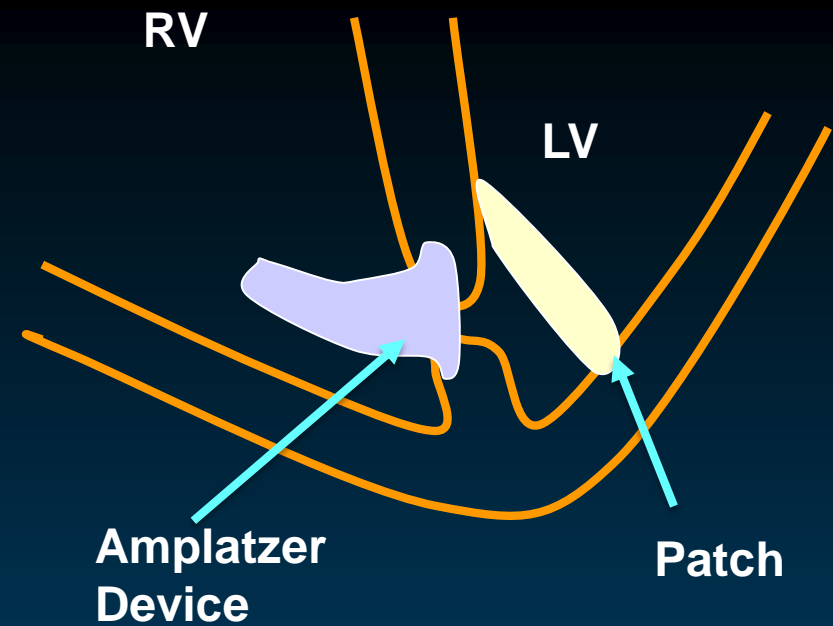
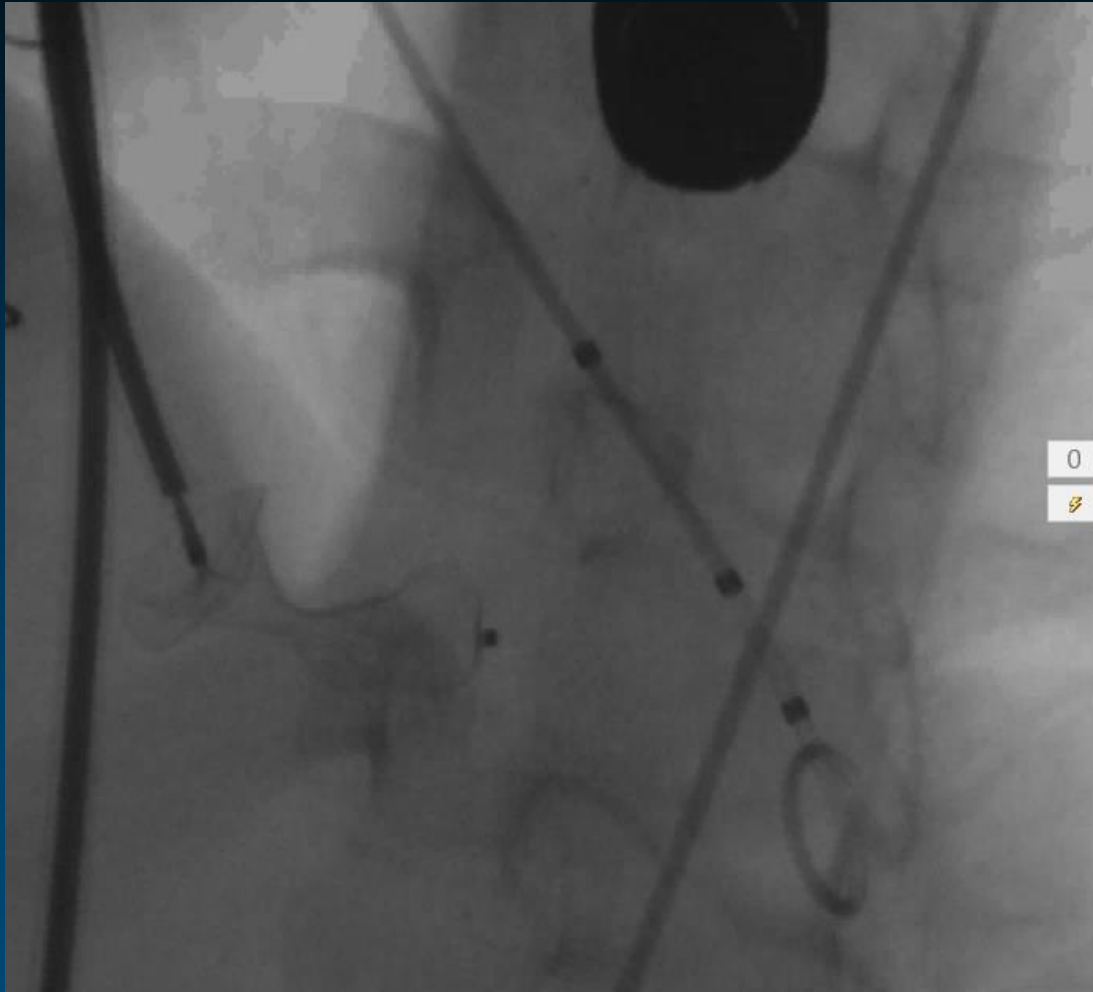
Device Positioning



Too deep → protruded to the LV

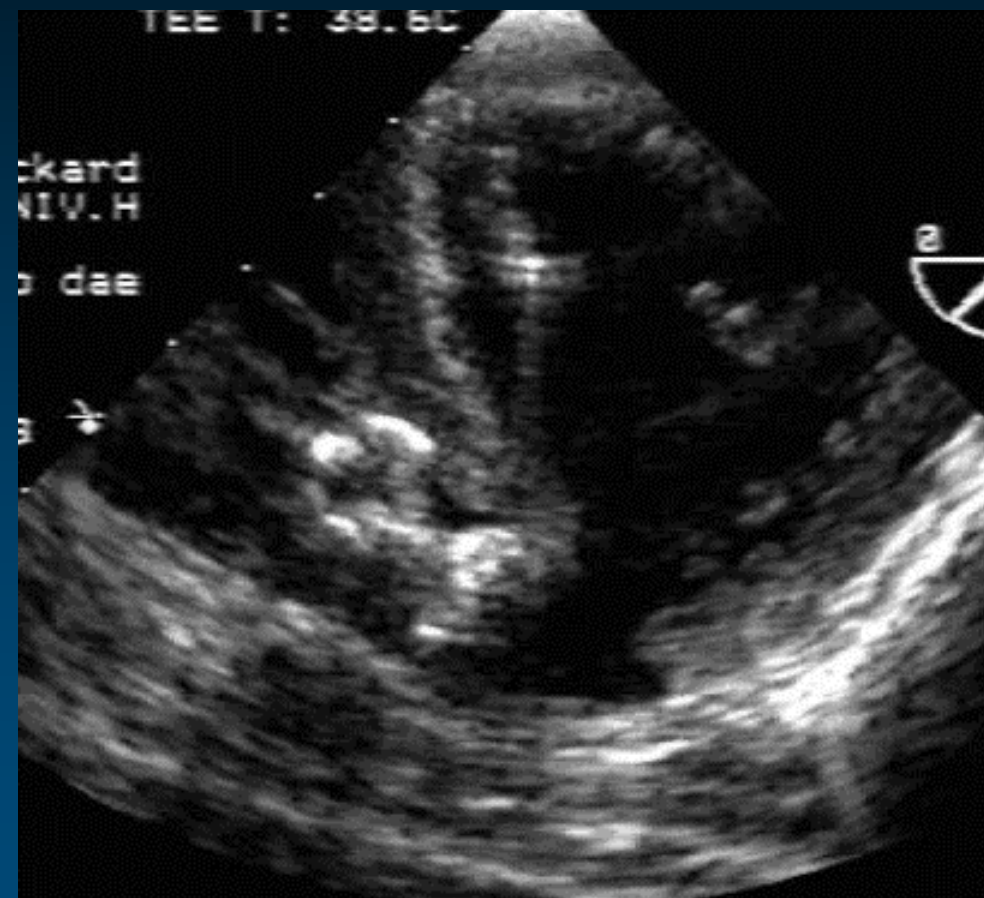
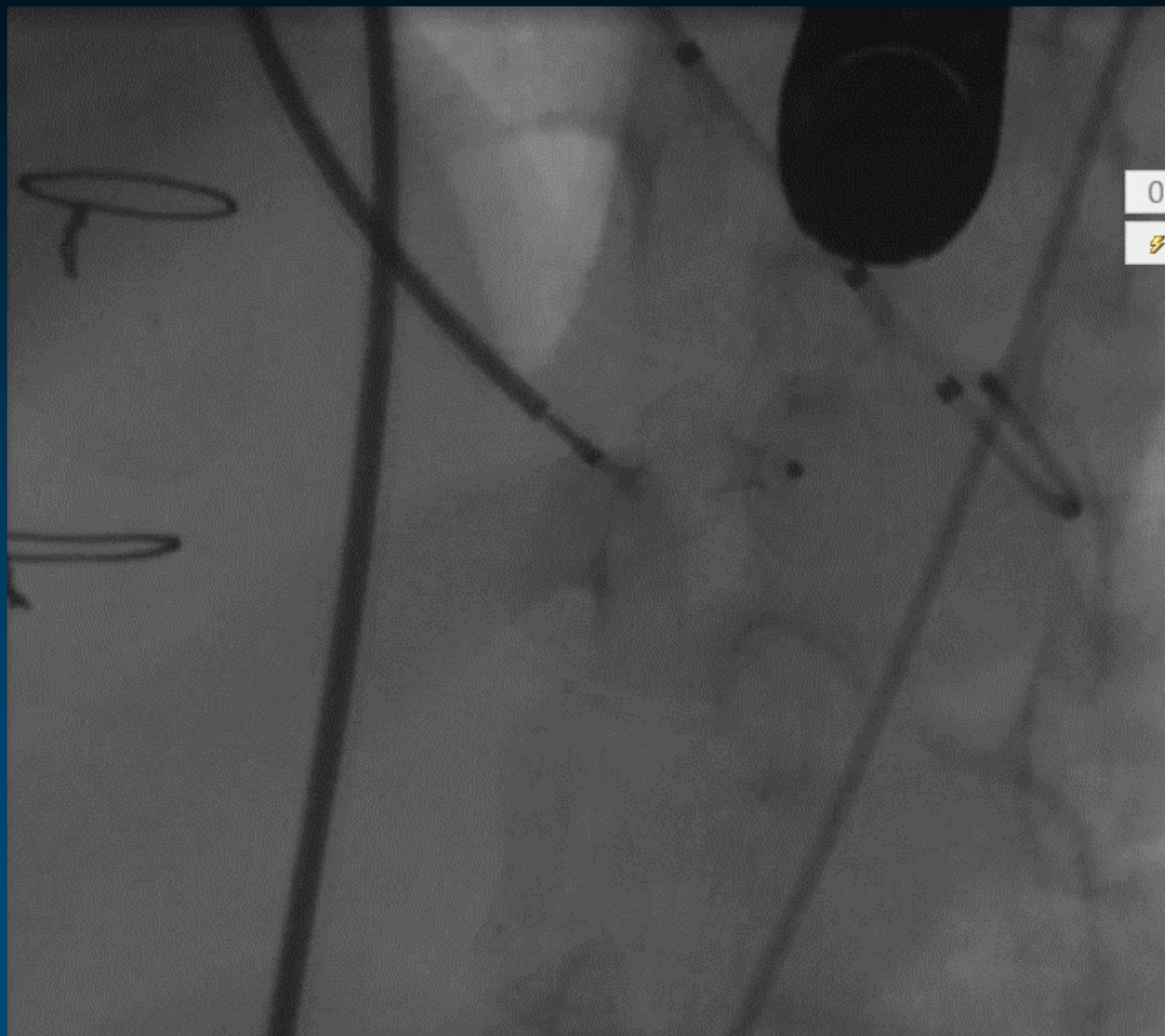


Device Positioning

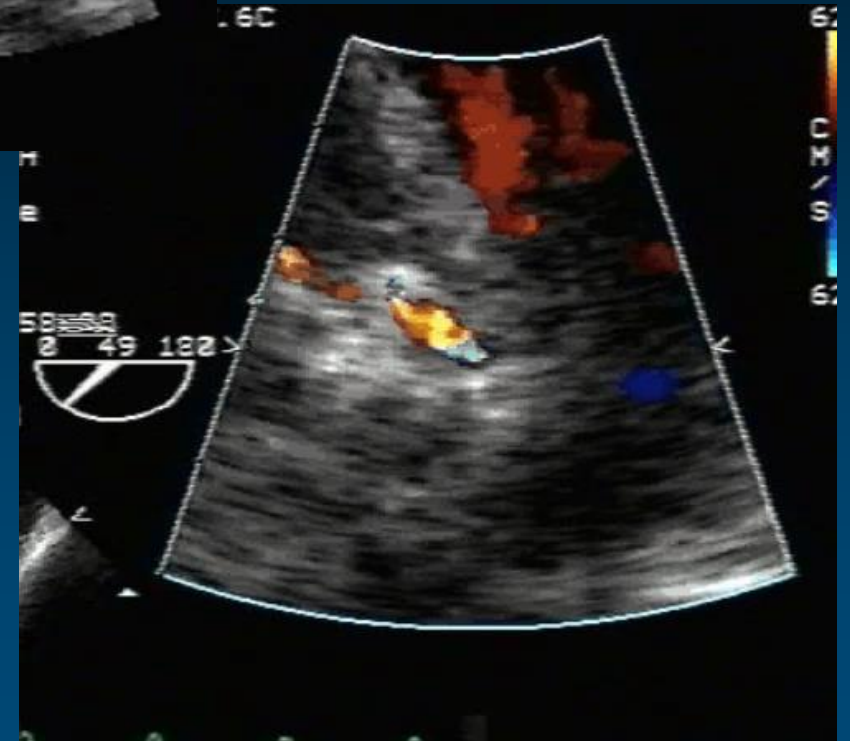
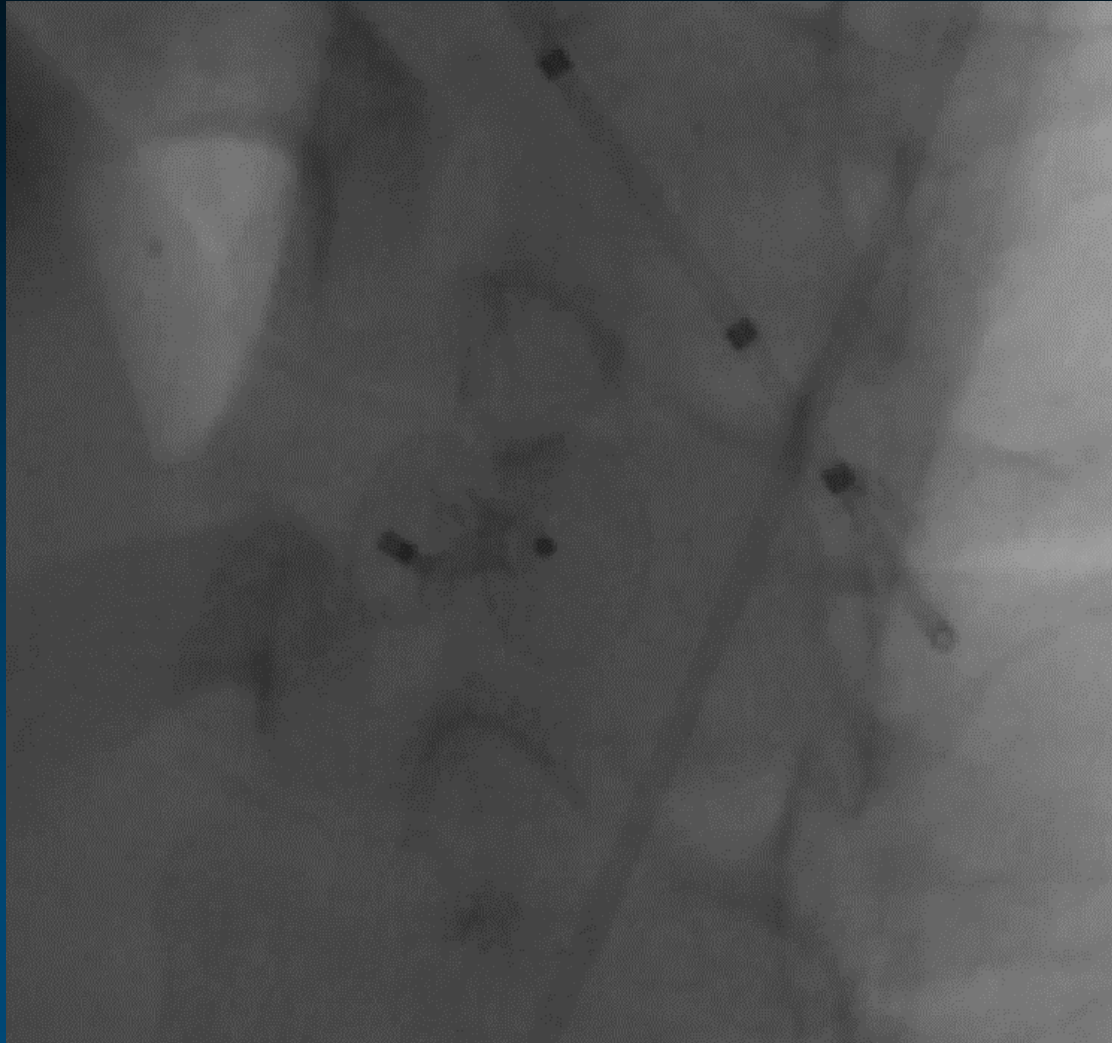


Too superficial →
LV disc expanded in the VSD tunnel

Final Device Position

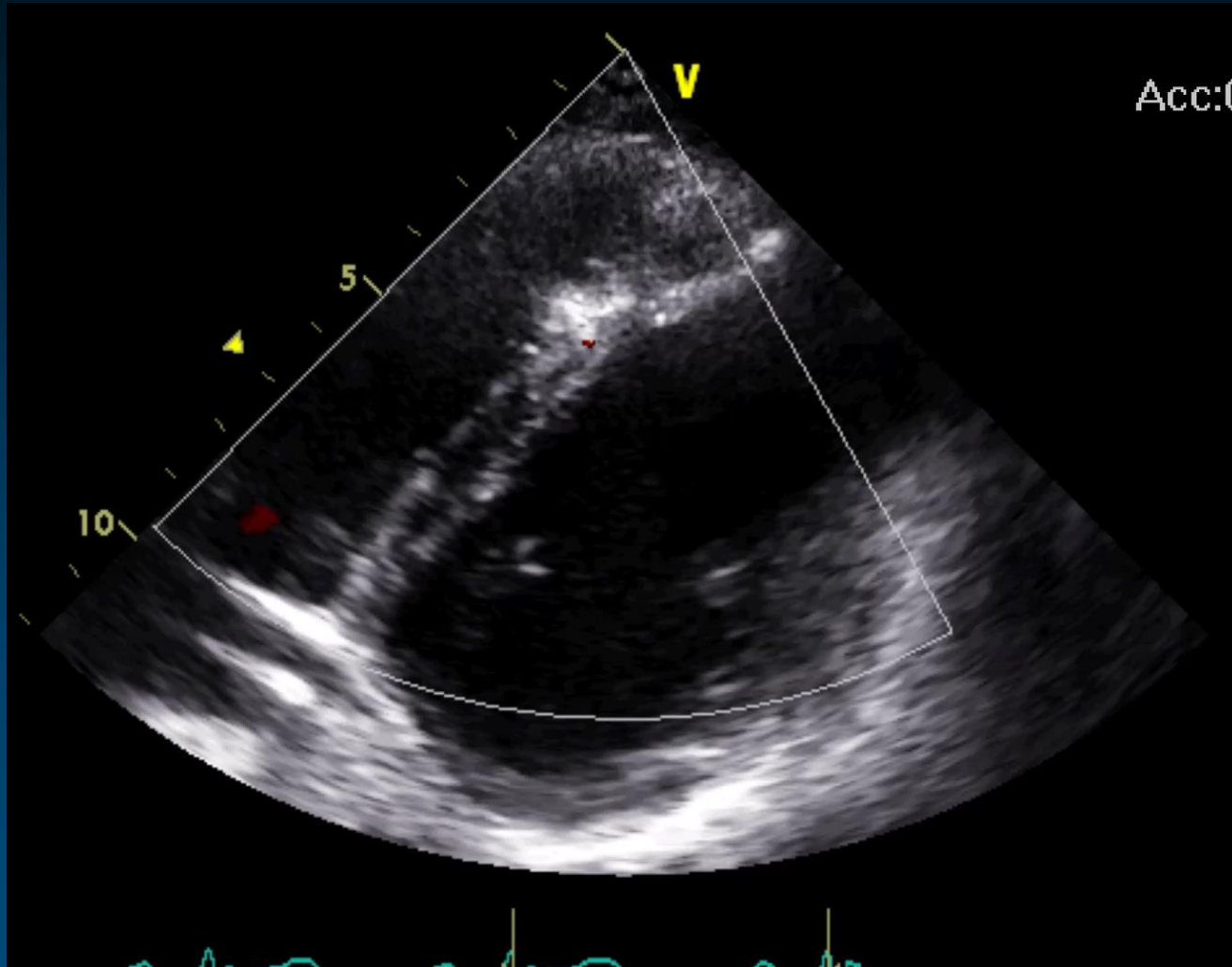


Device Detached



$Q_p/Q_s < 1.2$, minimal residual shunt on TEE

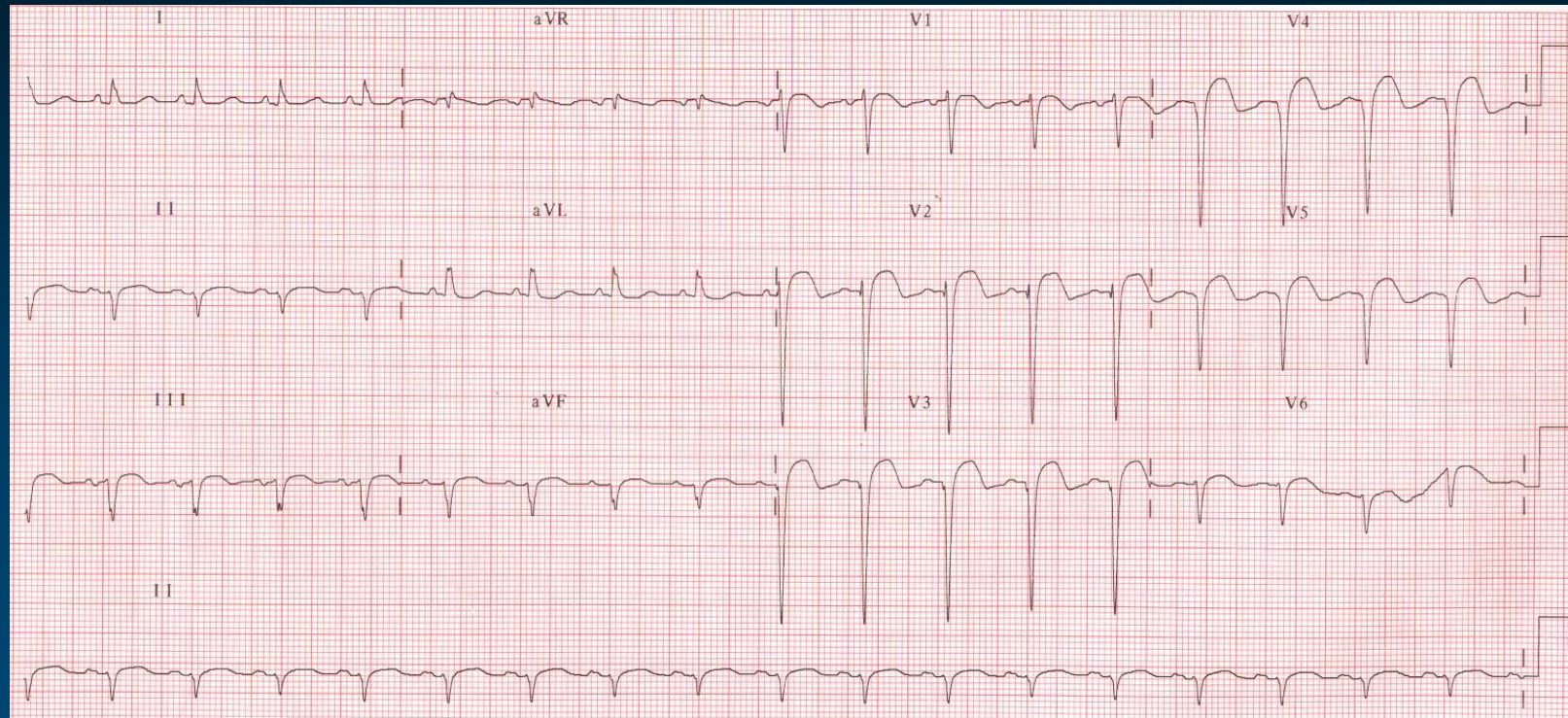
16 years later (Now 29 YO man)



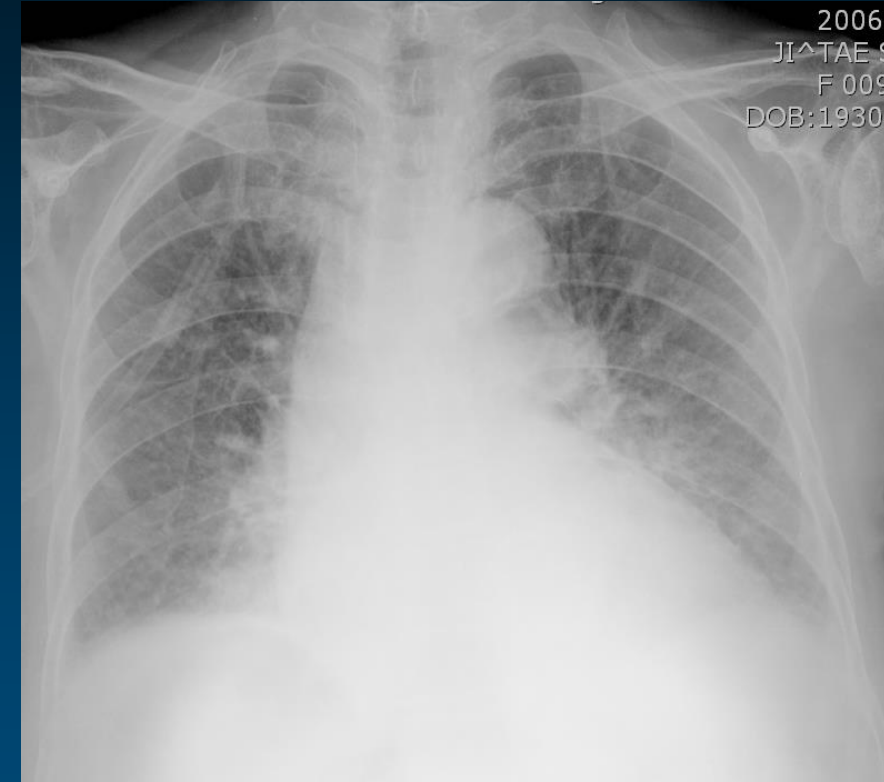
The 2nd case, Infarct VSD

- F/76, 20 PY smoker, Previous healthy
- 5 DA, continuous resting pain for 12 hrs followed by worsening dyspnea
- P/E
 - V/S 94/62 mmHg – 110 – 26 – 36.5°C
 - Pansystolic murmurs on LLSB, IV/VI
 - Coarse inspiratory crackles on BLLF
- Enzyme
 - CK / MB / Tn-I 99 / 1.72 / 2.60

Initial ECG

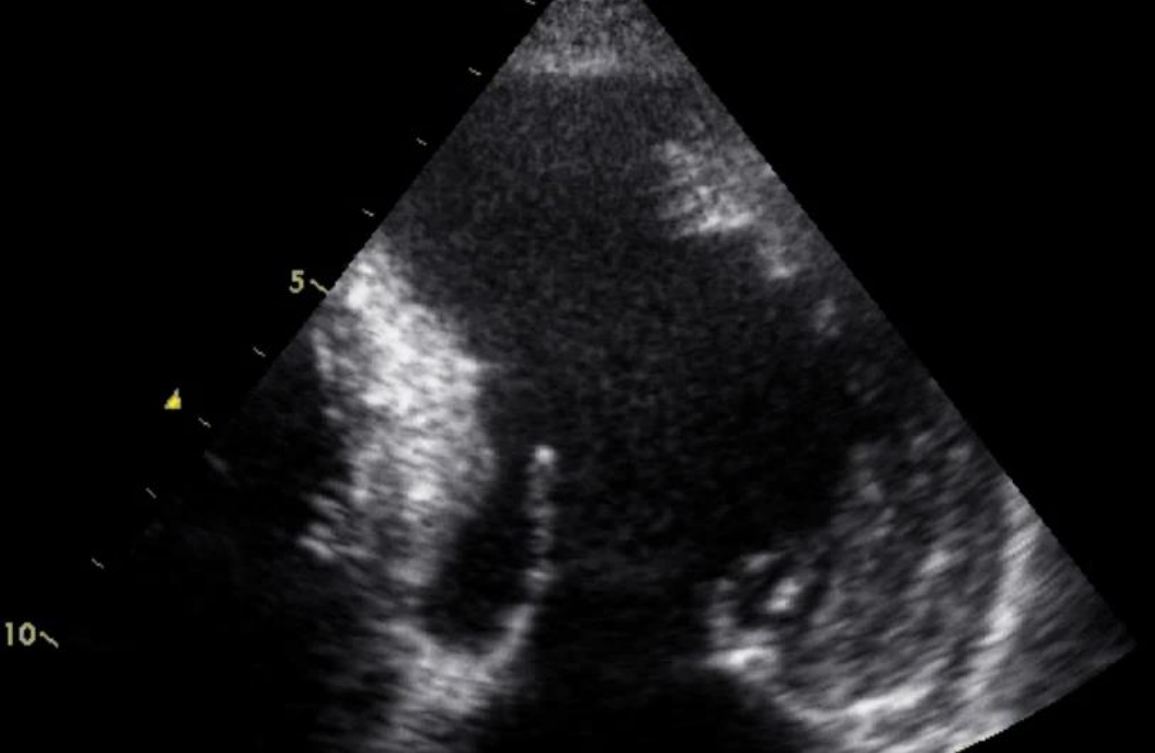
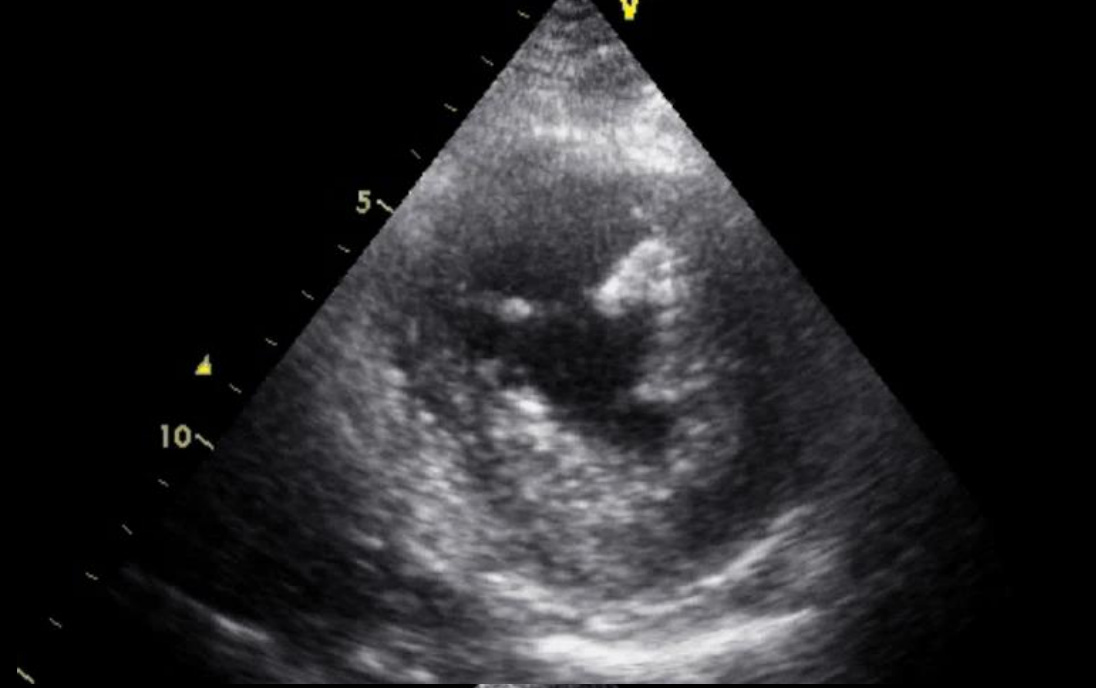
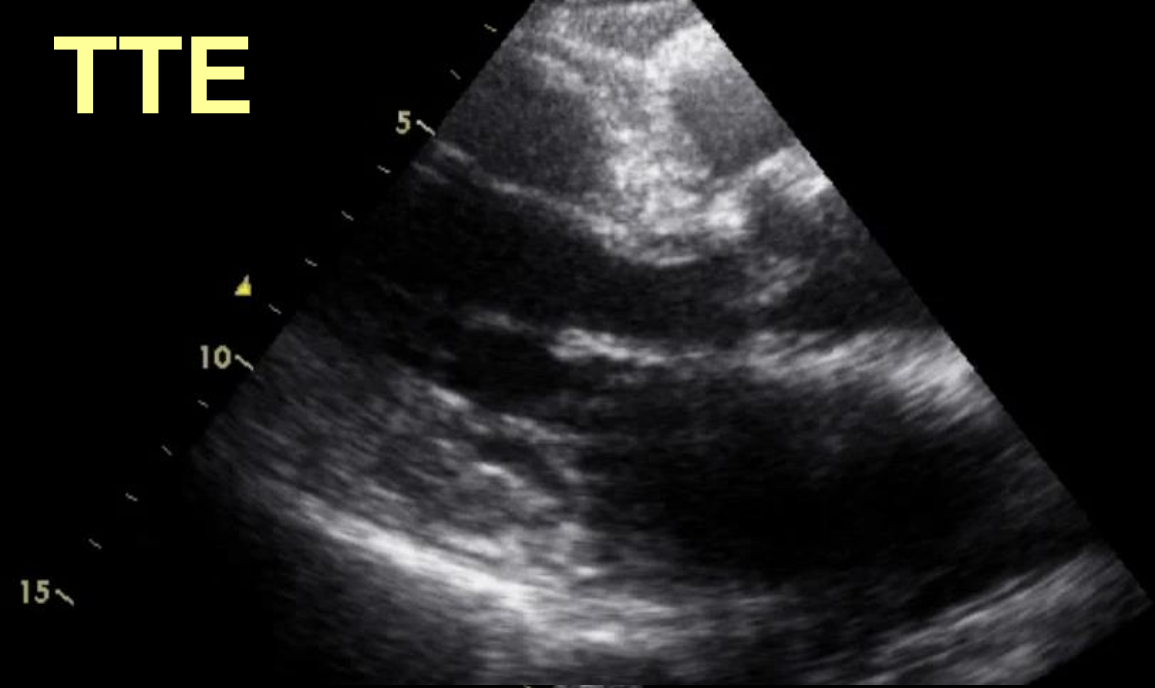


Initial CXR

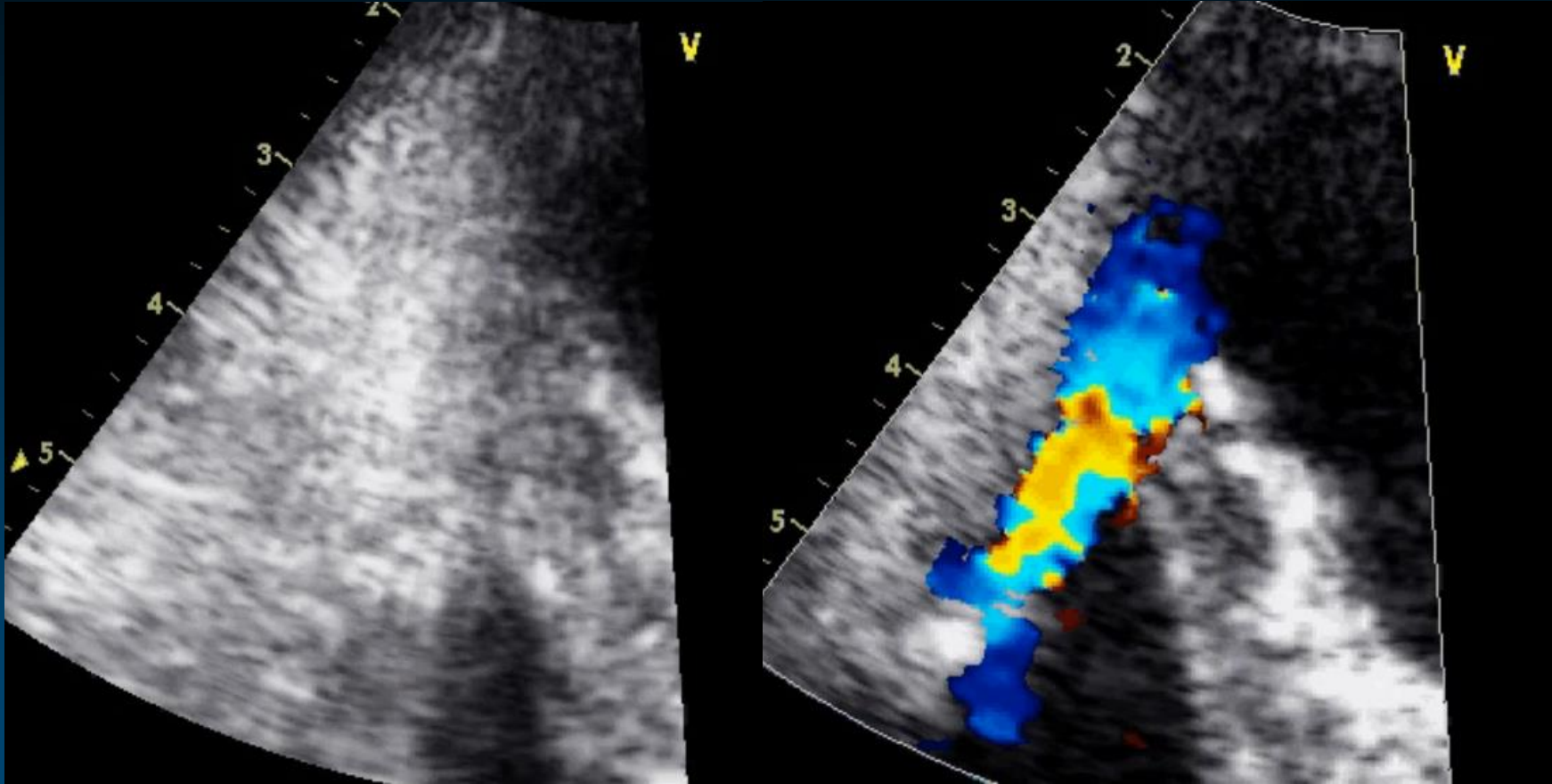


Delayed presentation of anterior STEMI with pulmonary edema

TTE



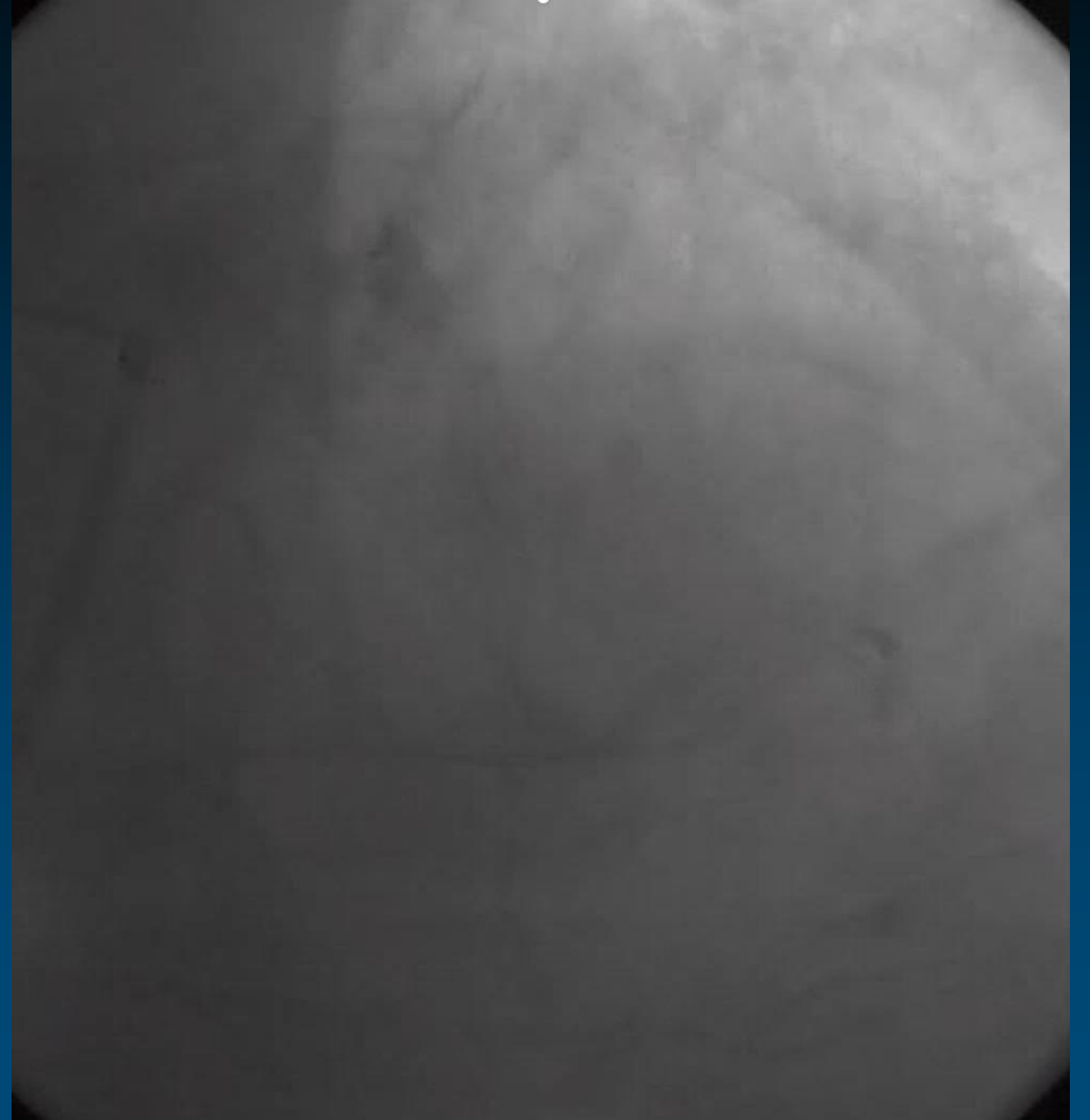
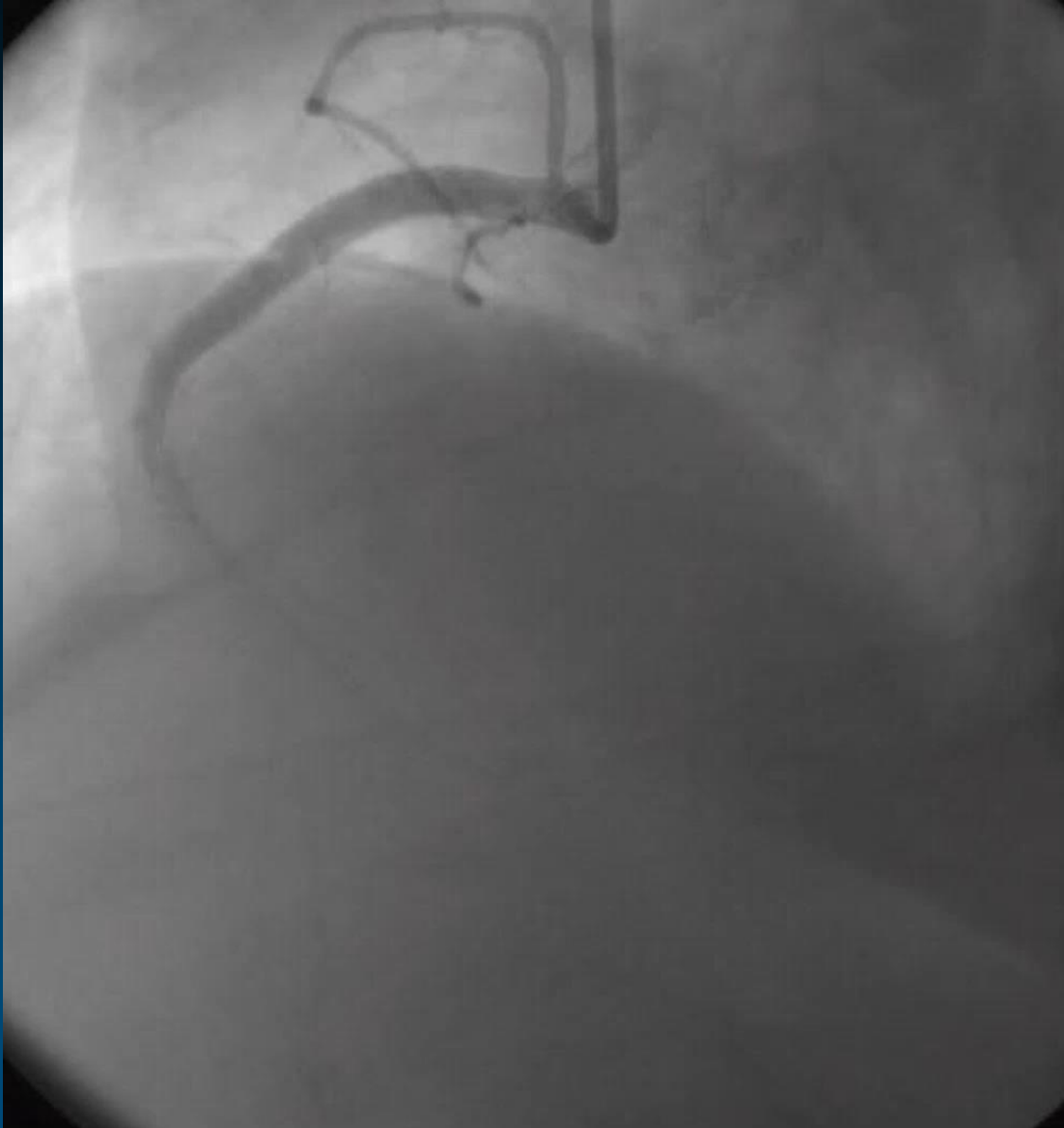
TTE; VSD measurement



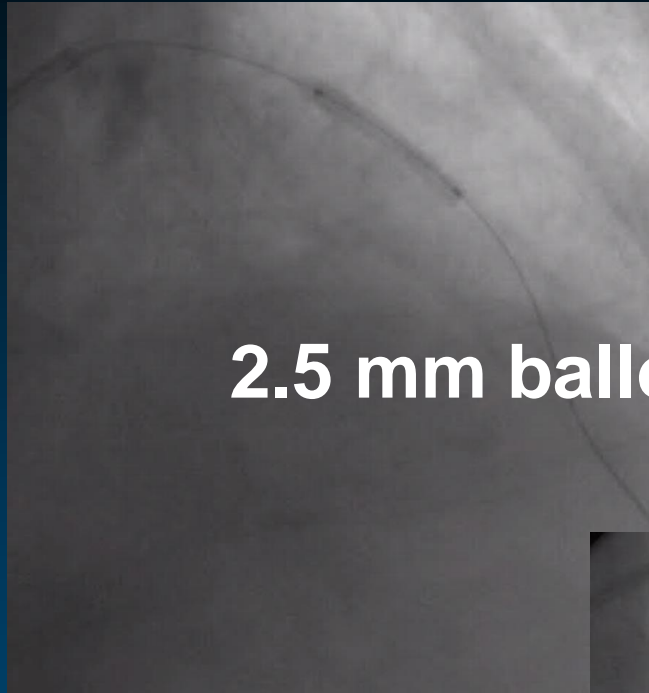
7 mm defect on apical septum



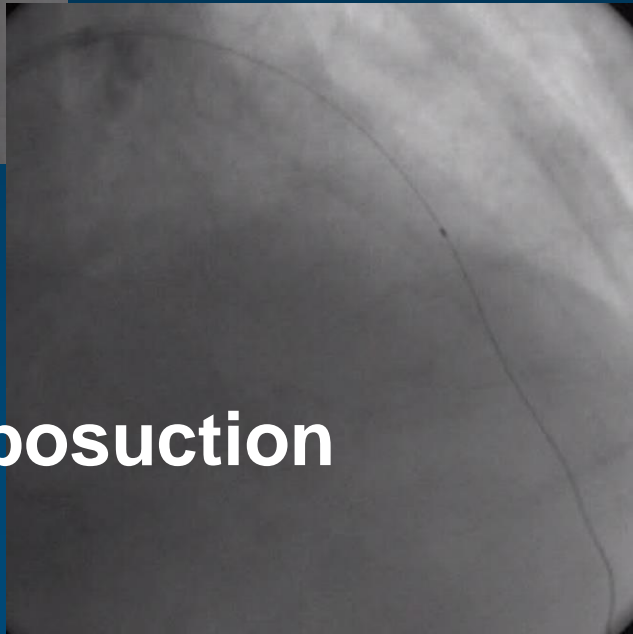
HF management for 2 days → Angiogram



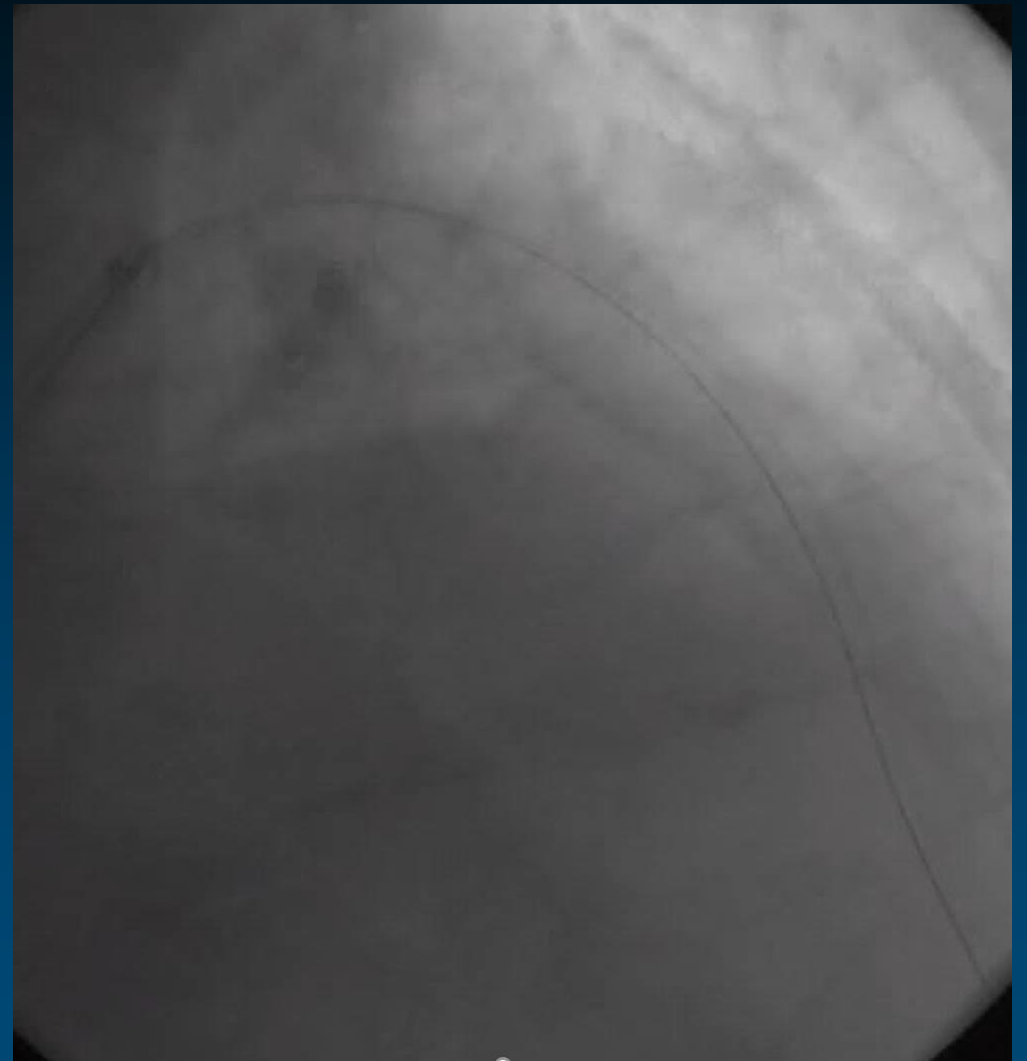
POBA and Thrombosuction



2.5 mm balloon



Thrombosuction



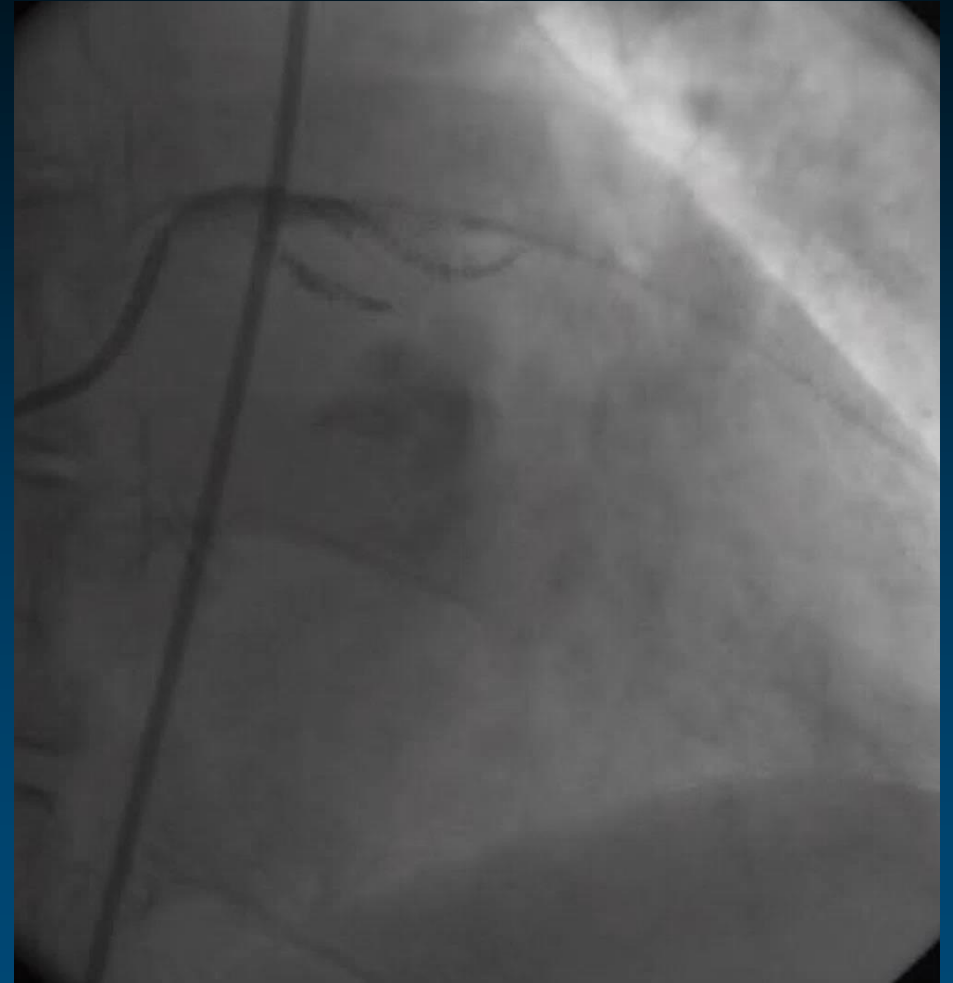
TIMI 0 flow

1 week later



Improved pulmonary edema,
but DOE while moving to the bath room
Surgery recommended → reluctant
→ percutaneous VSD closure planned

FU Angiogram



Somewhat improved but,
poor distal to-and-fro runoff

LV Angiogram

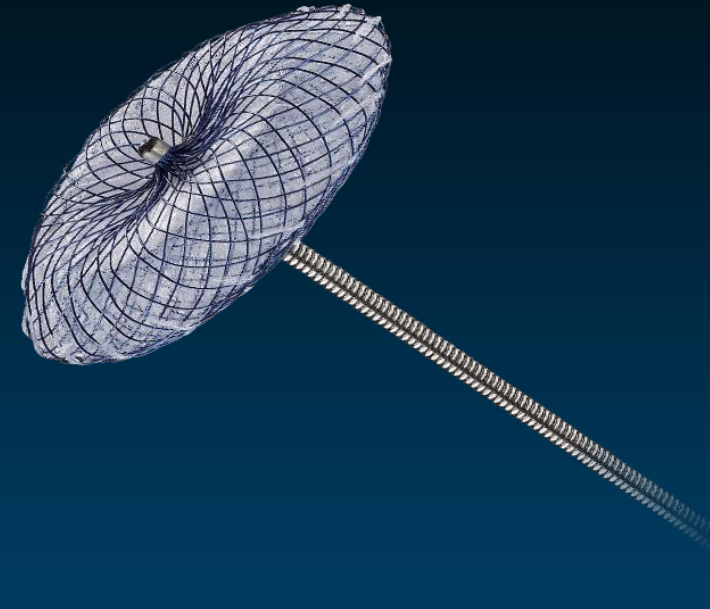


$Q_p/Q_s=2.5$, peak PA pressure 50 mmHg

Amplatzer Occluder



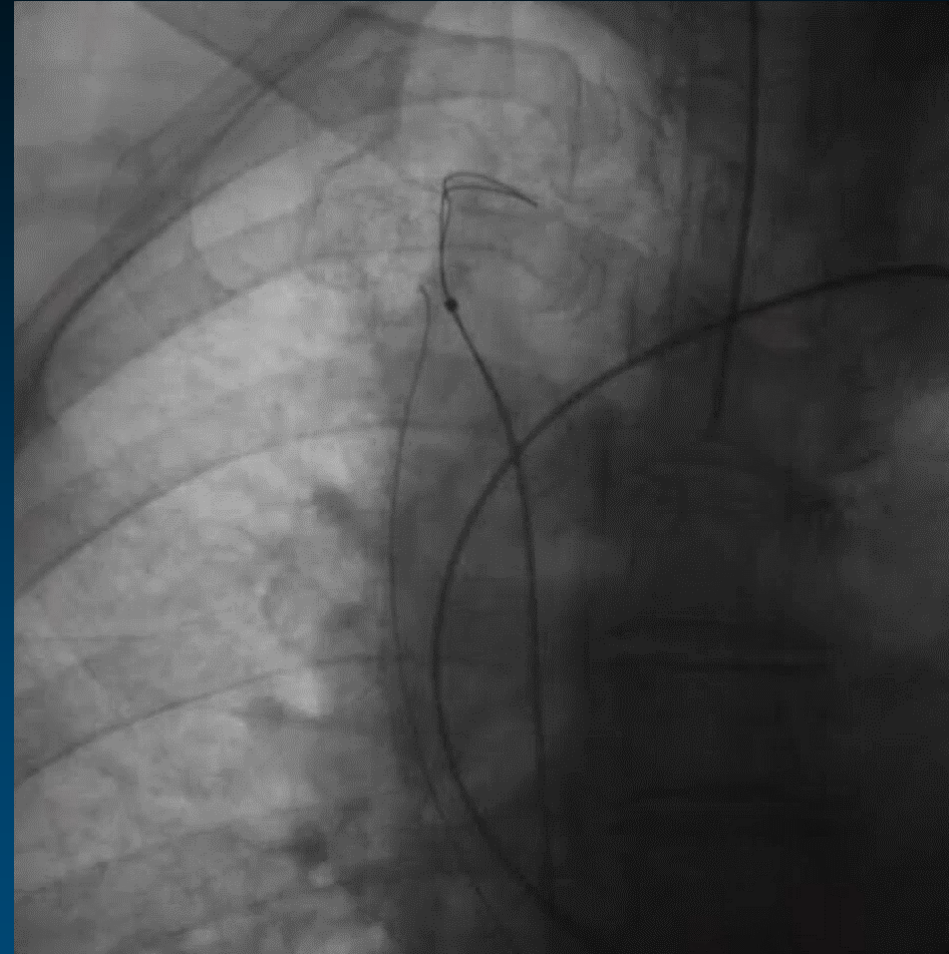
m-VSD occluder
; Not available



ASD occluder
; not permitted

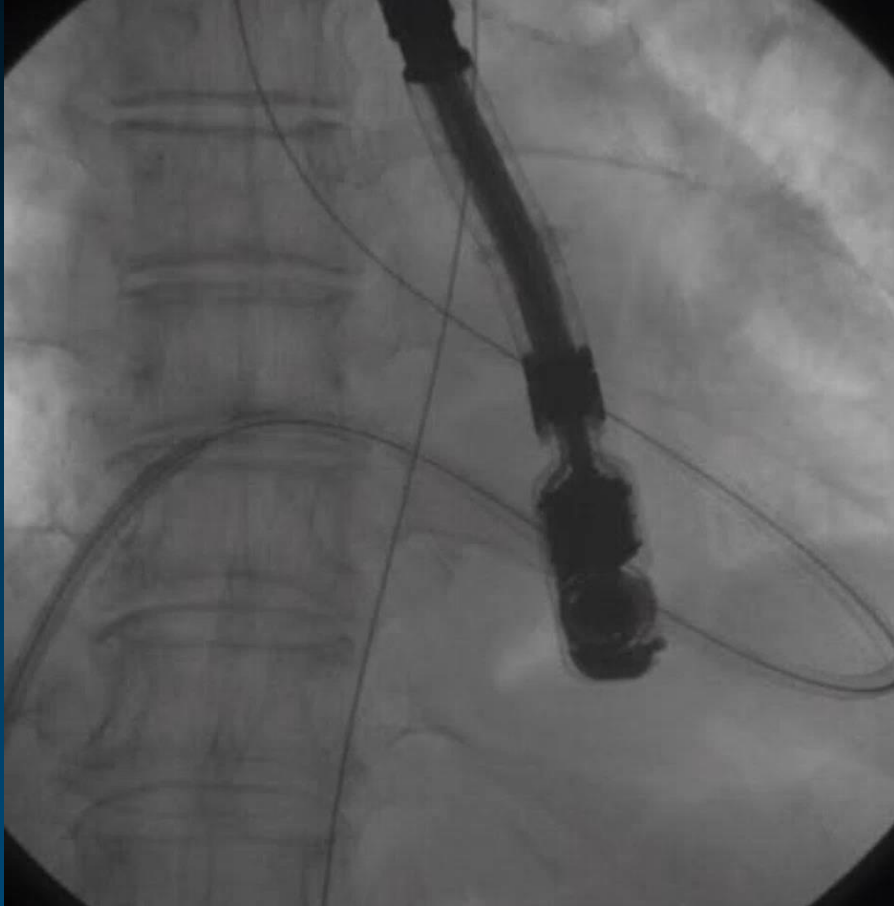
Off label use of ASD occluder
; *thin VSD defect*

General anesthesia, TEE guidance

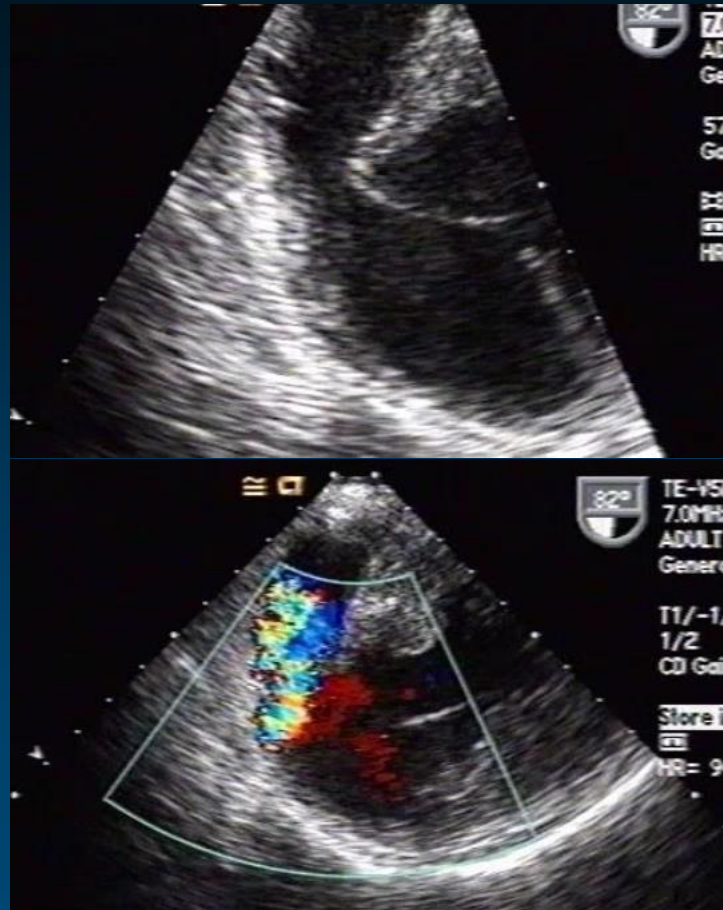


JR 5Fr + Terumo .035" → Snared from the femoral vein

TEE Measurement



9 Fr sheath delivery



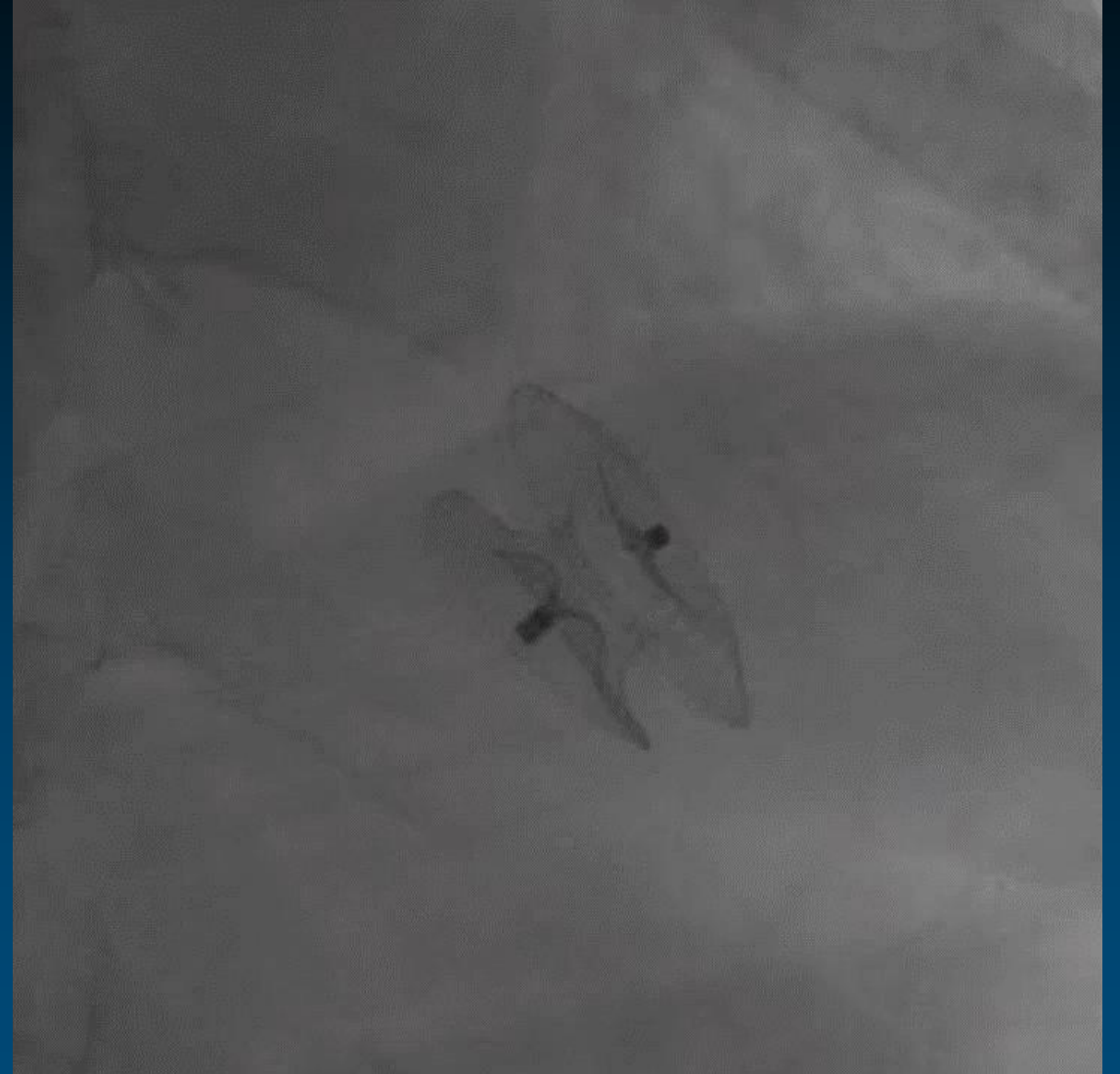
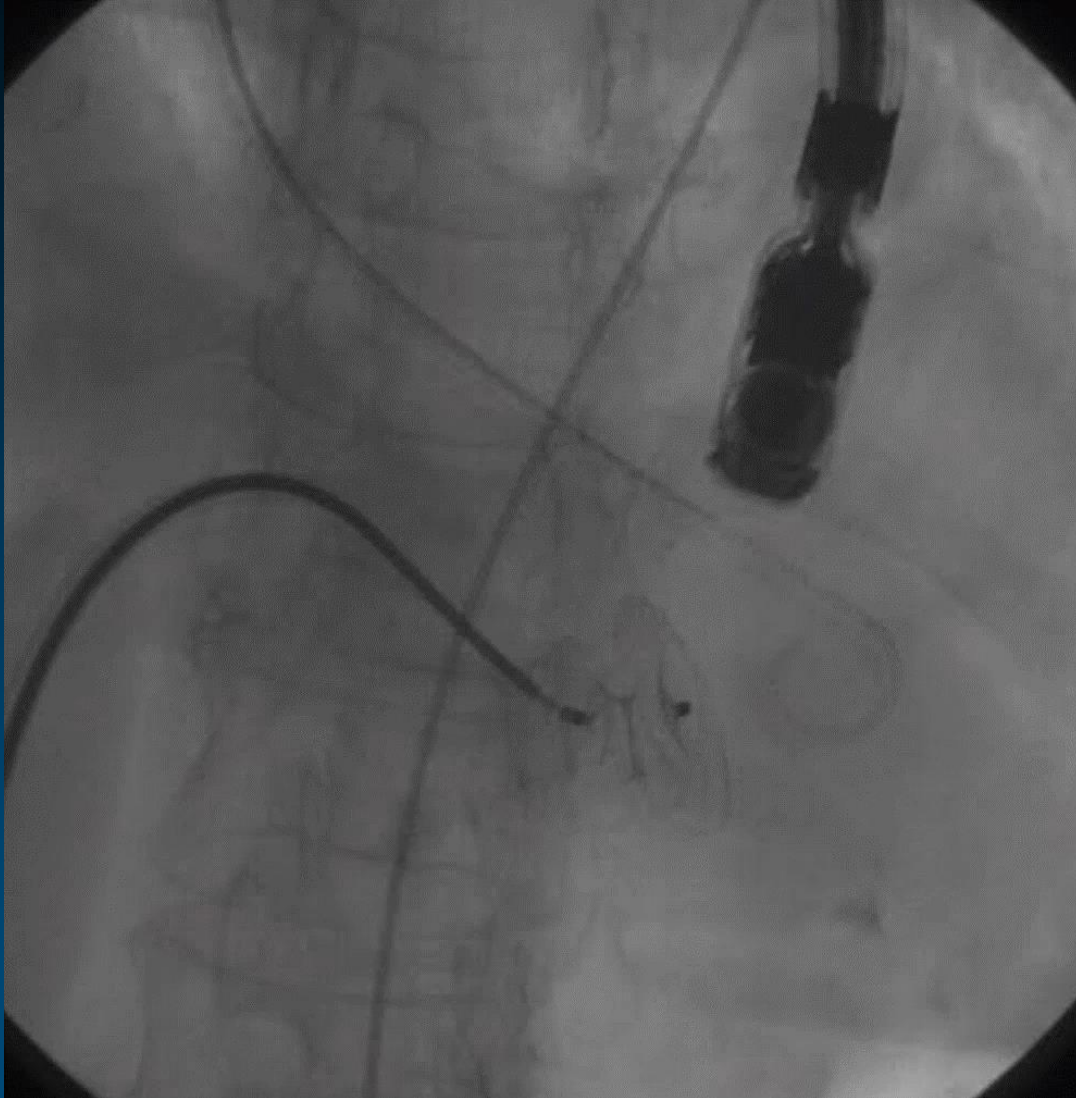
9 mm defect

Positioning & Detachment



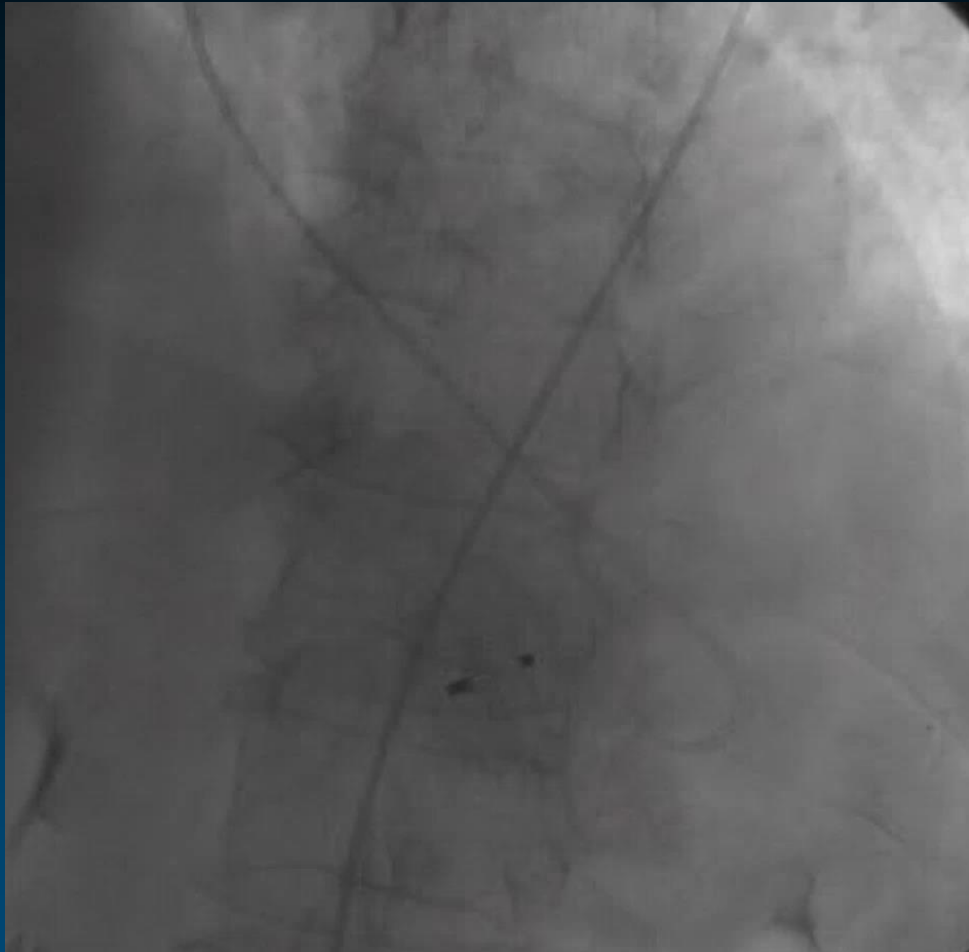
Amplatzer ASD 18 mm occluder

Wiggling & Detachment

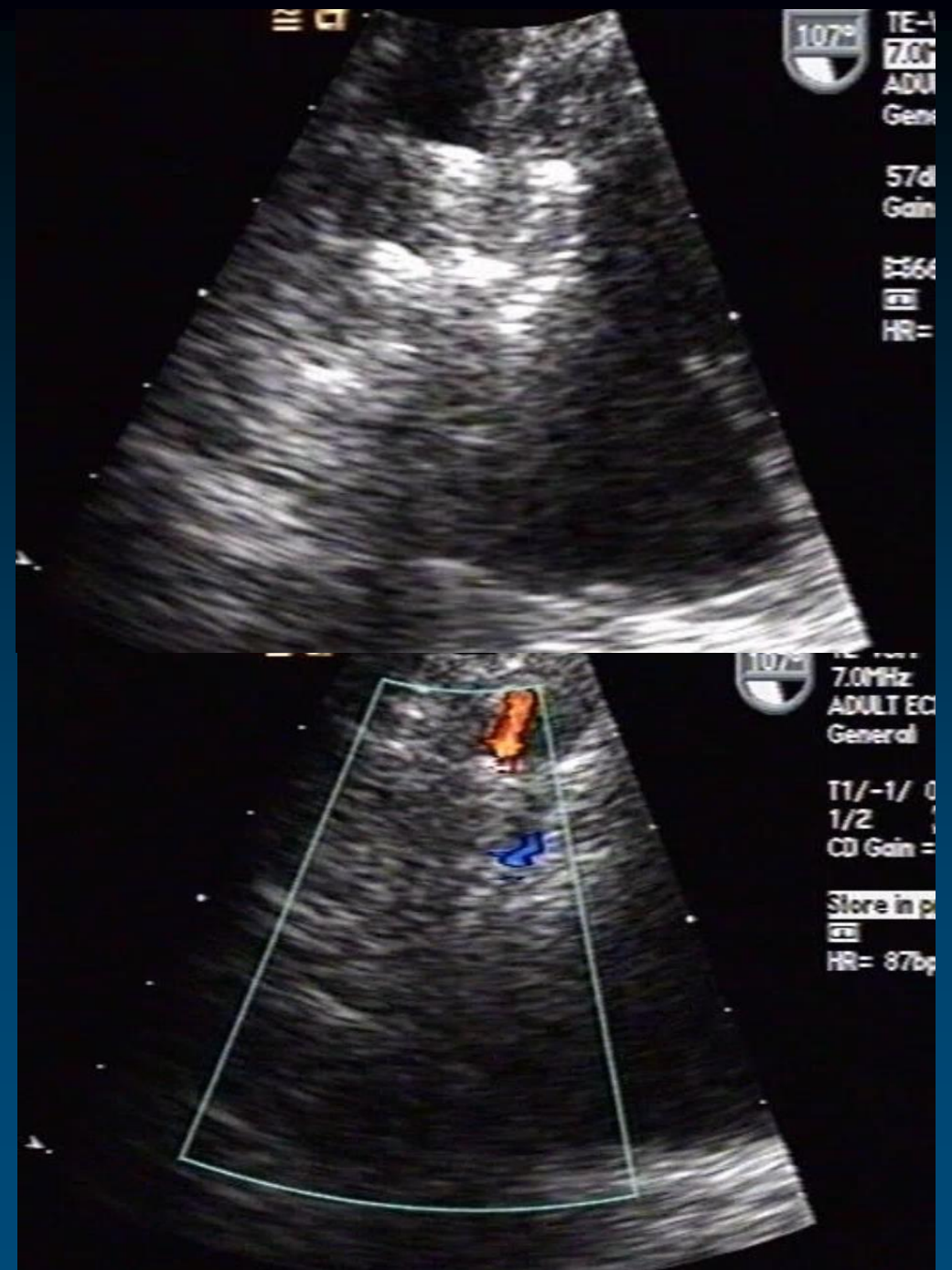


Amplatzer ASD 18 mm occluder

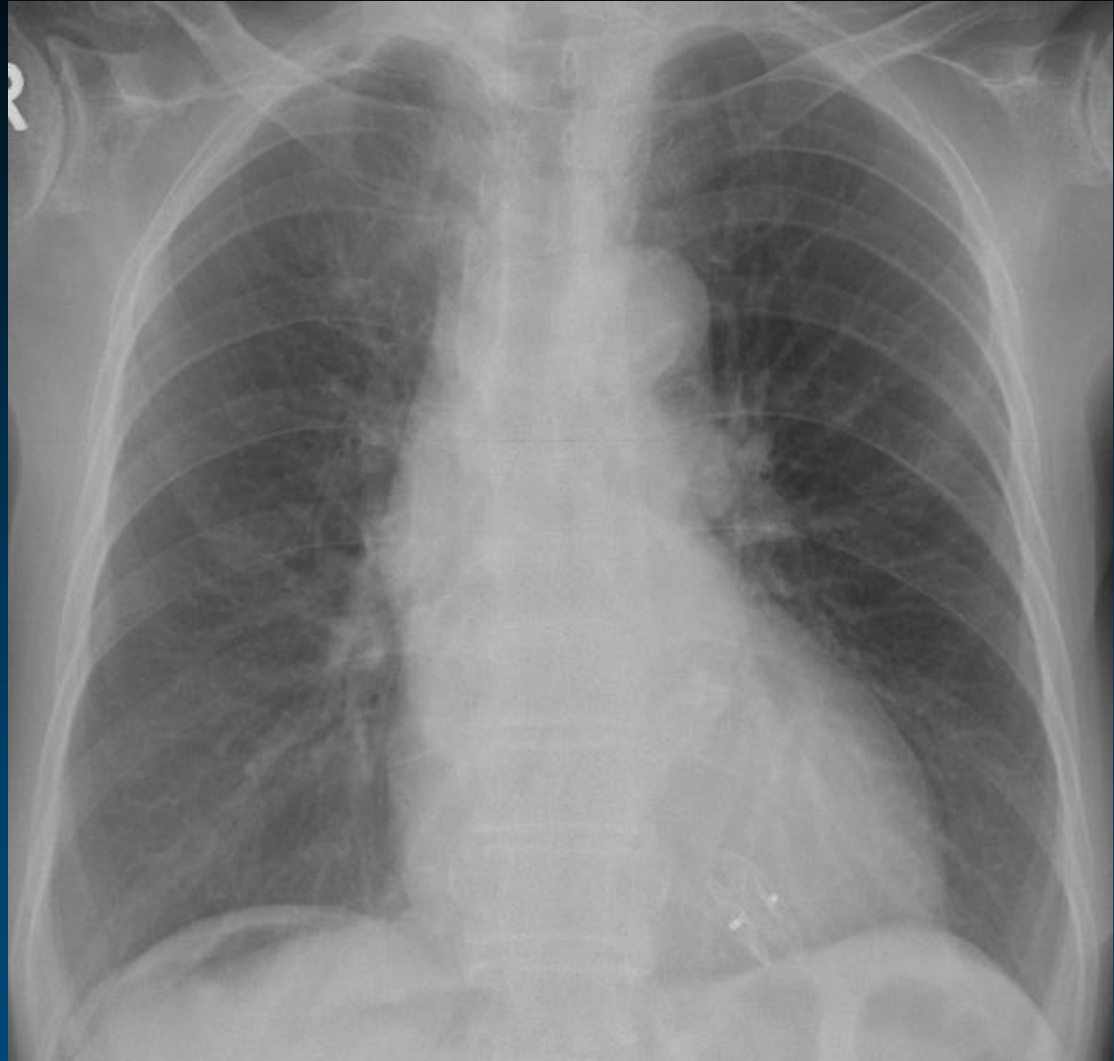
Residual Shunt



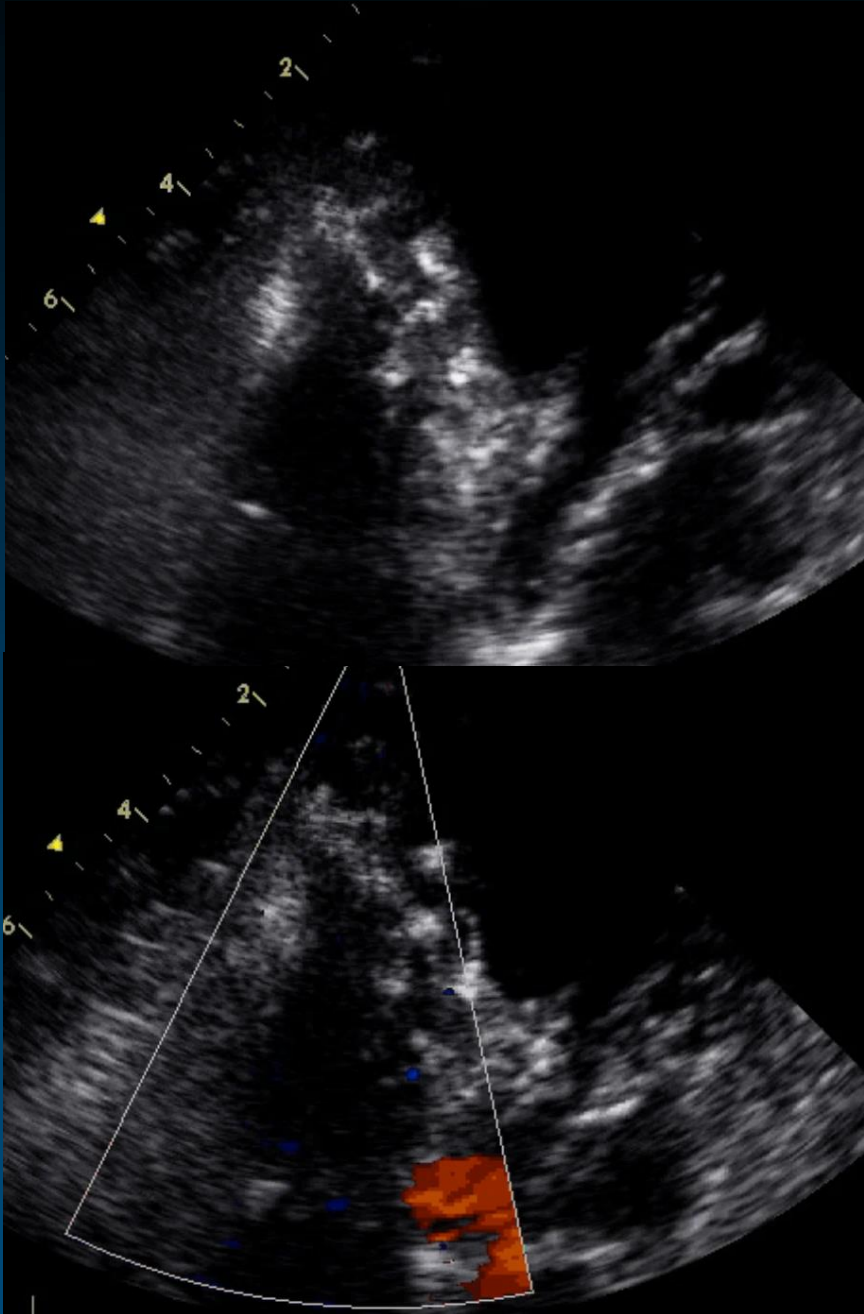
Q_p/Q_s 2.5 \rightarrow 1.7



At 10 days



Still DOE Fc IIb - III

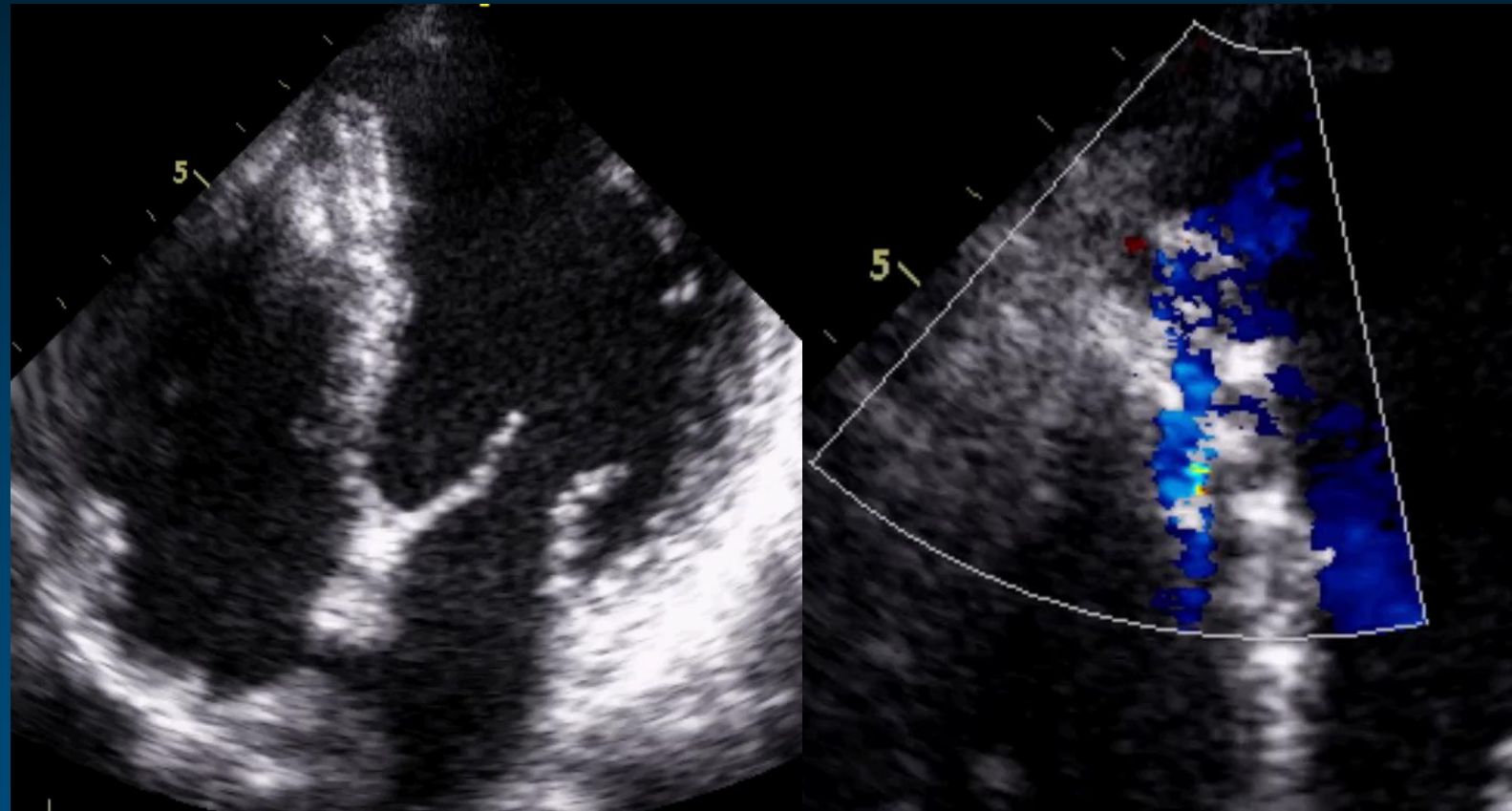
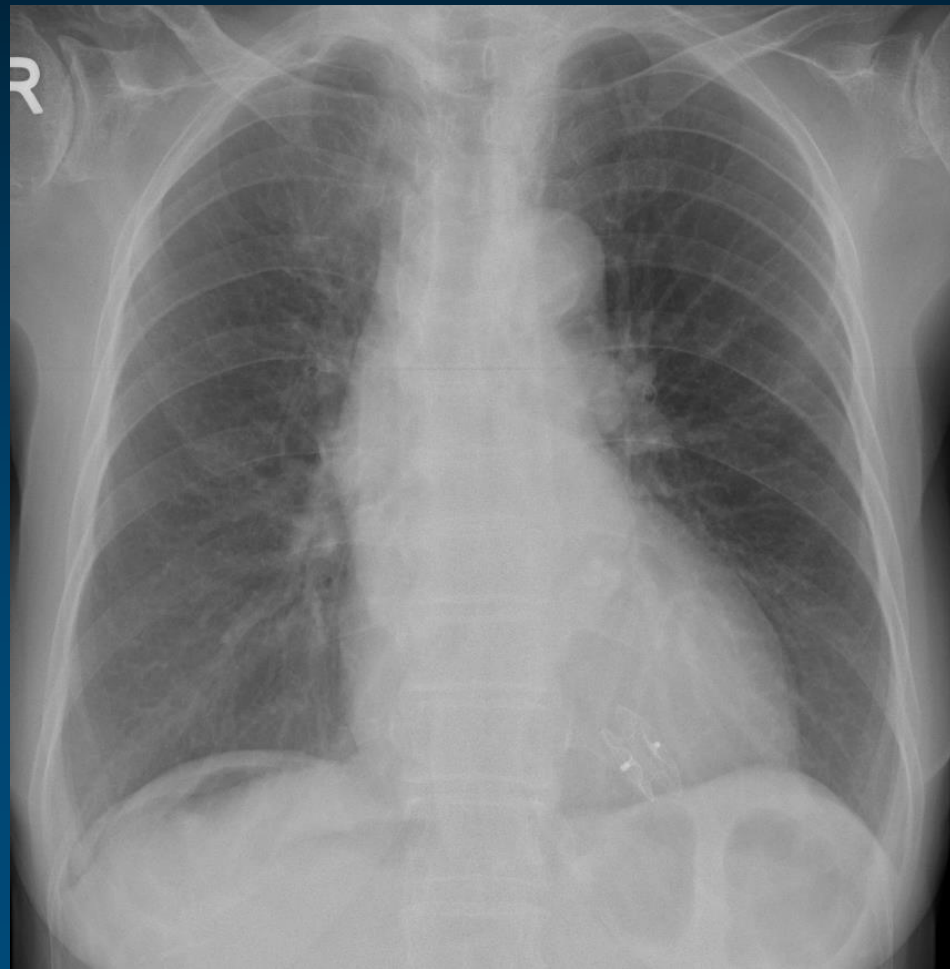


1 month later

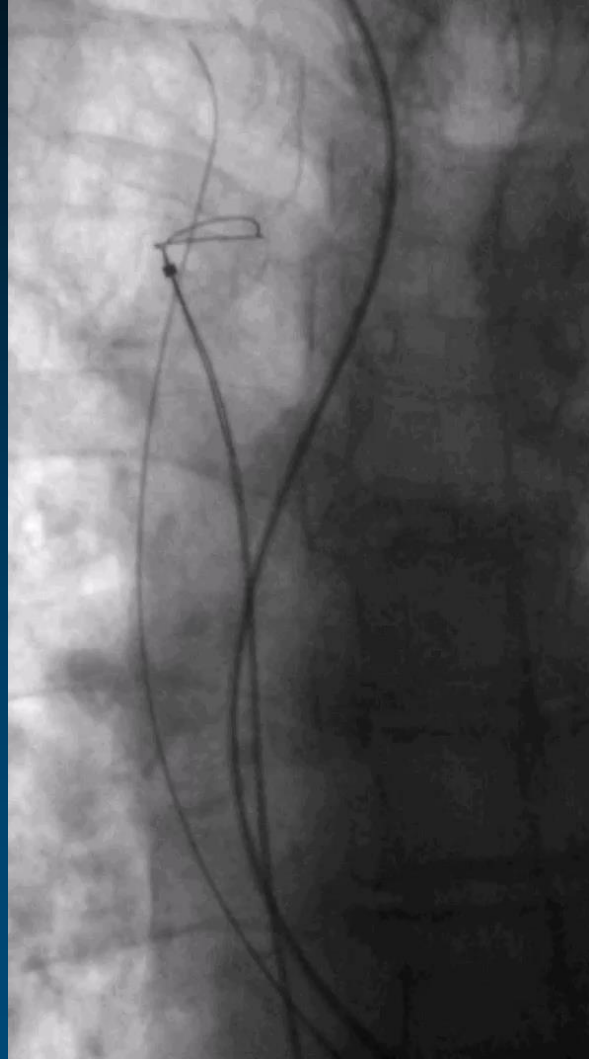
LV EF 40-45%

Still remnant shunt, TR Vmax 3.2m/sec

But, persistent DOE Fc III



Coil Embolization



Radial a + Femoral v



Three coils (11, 9, & 7 mm)

Qp/Qs 2.2 → 2.0

**1 Month later
Broken coil tip in TV**

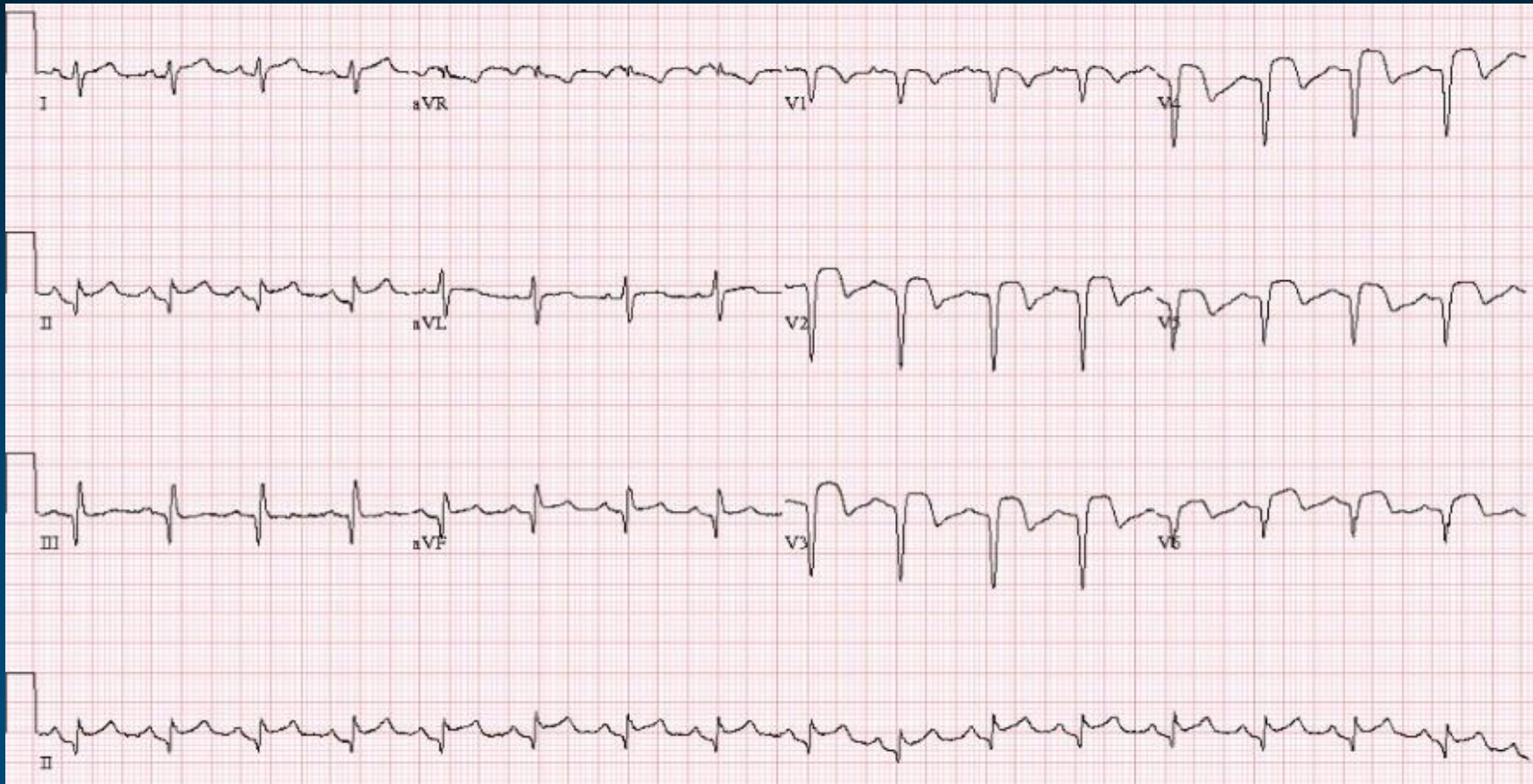


**13 years later
(Now 89 YO woman)**

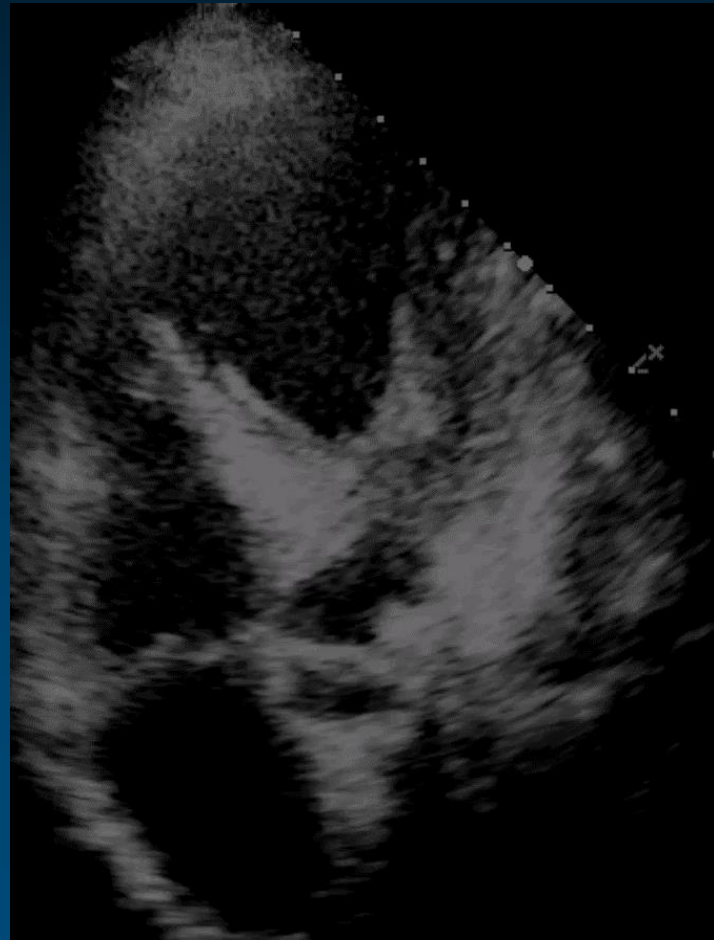


The 3rd case, Infarct VSD

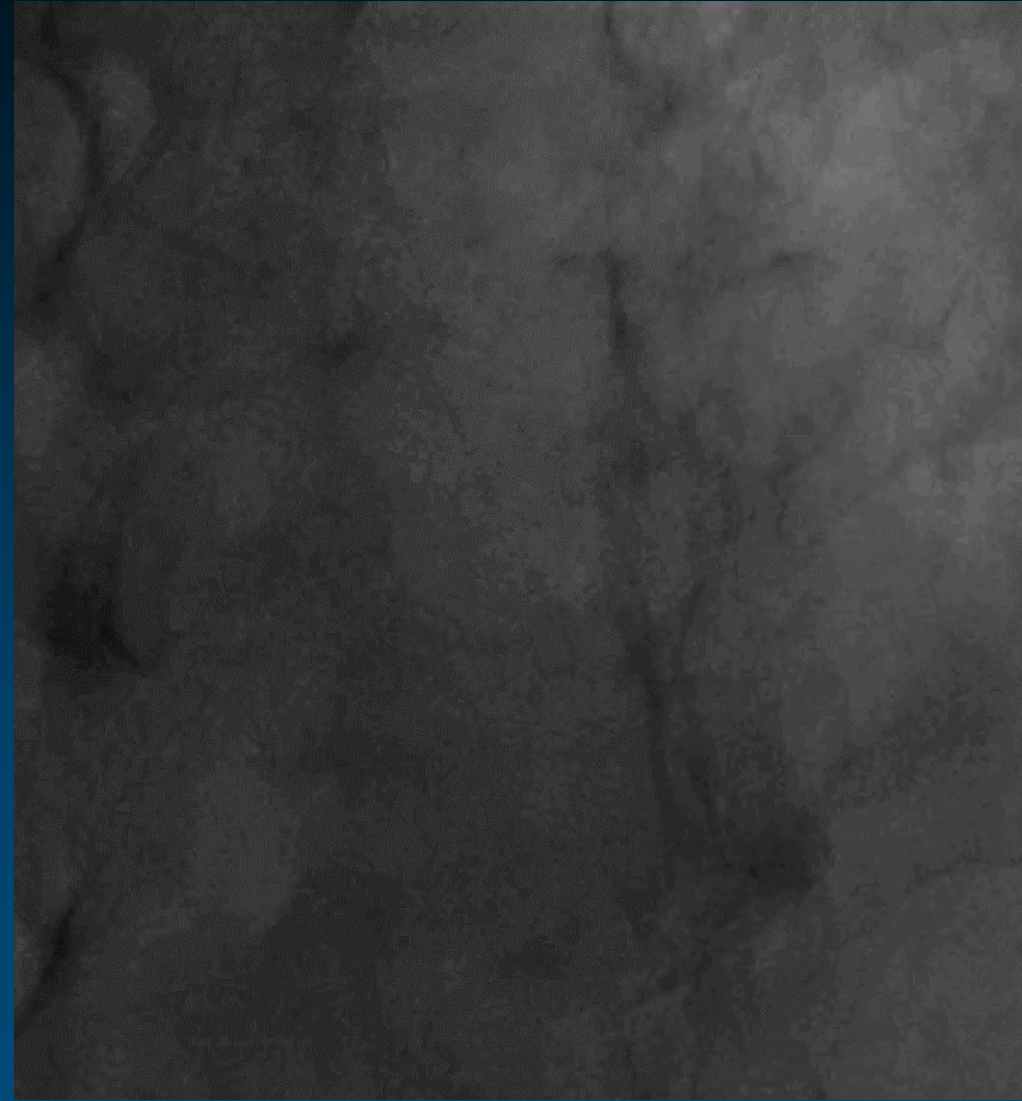
- M/67, Anterior STEMI → Visited 2 days later
- HF with pulmonary edema



**EF 35%, Infarct VSD
Pulmonary edema**

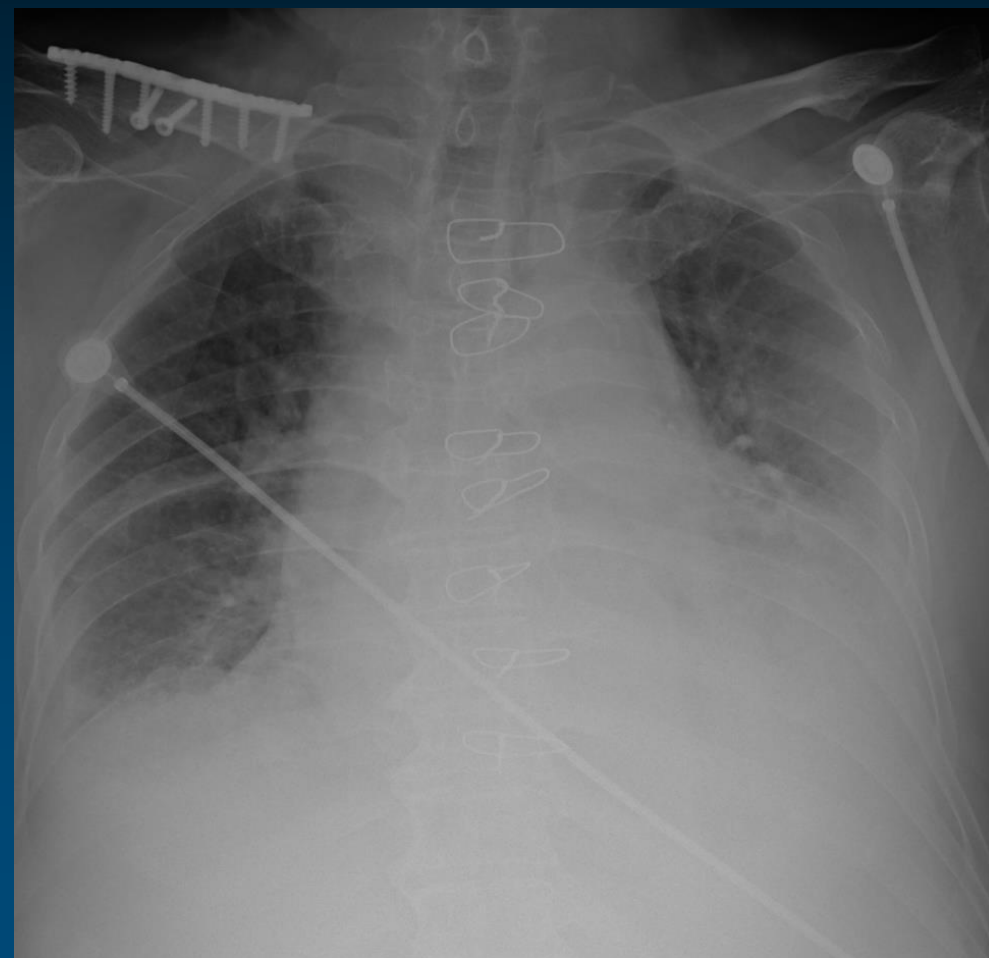
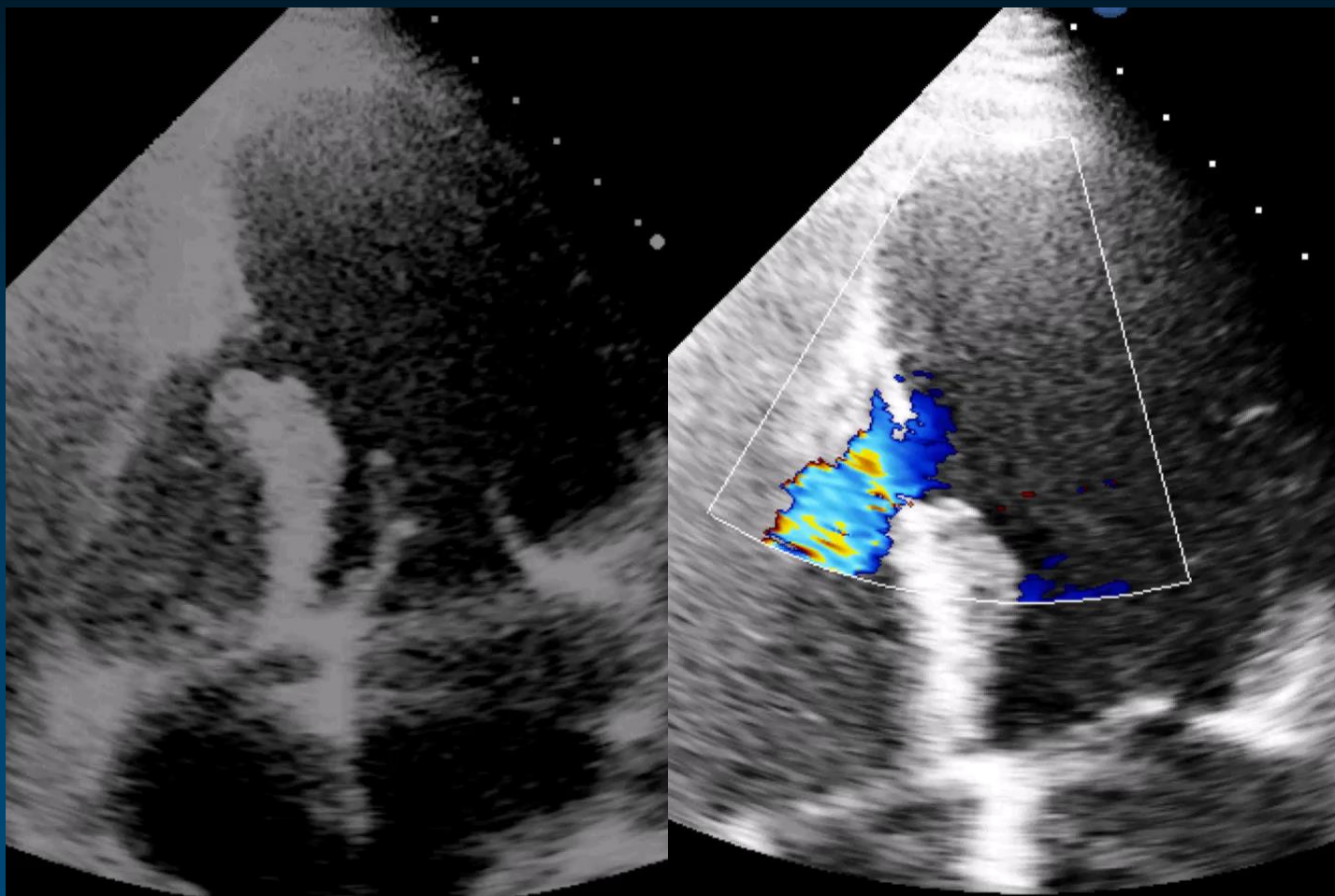


mLAD occlusion

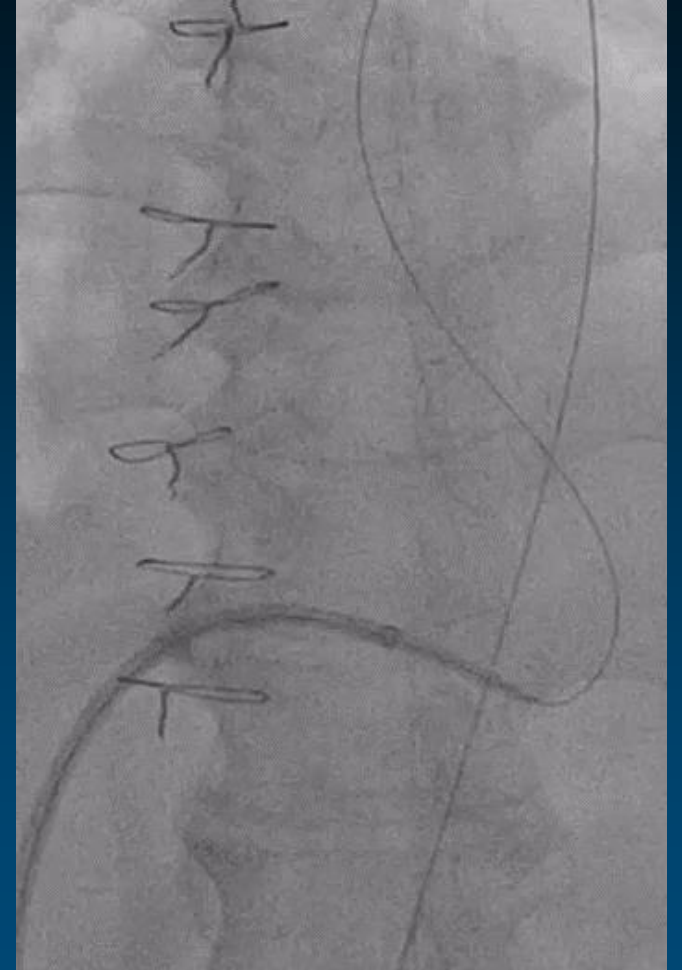
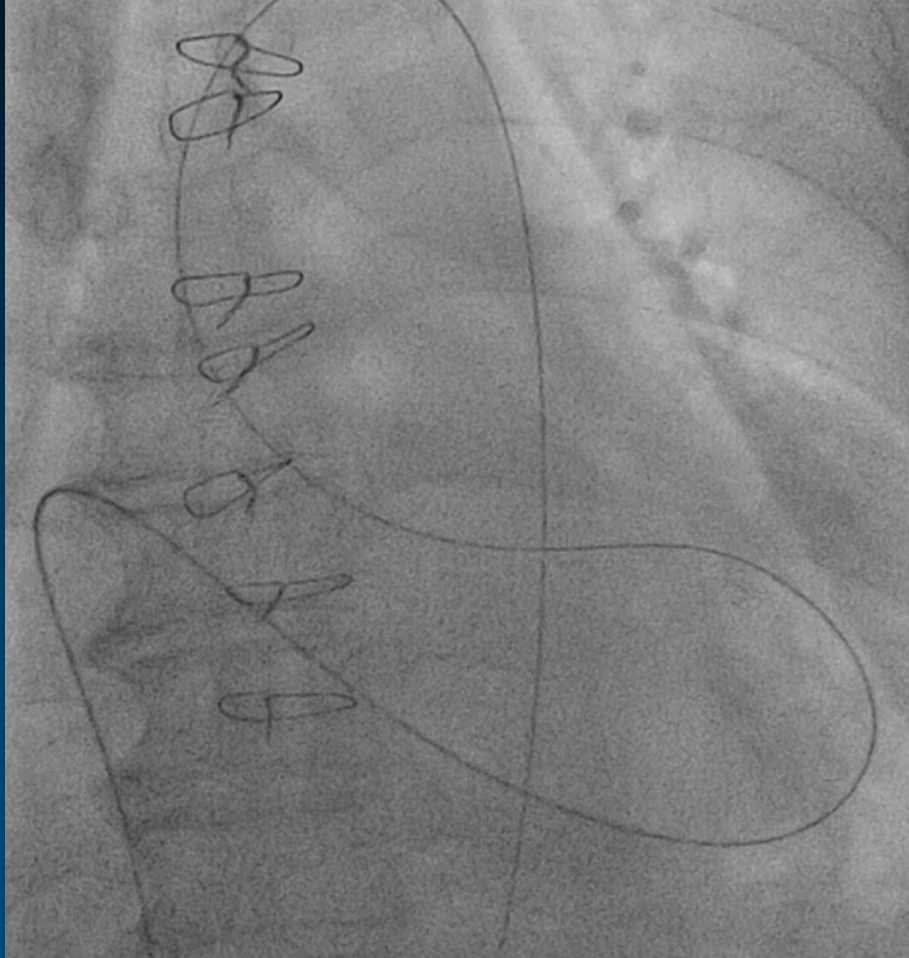


VSD patch closure with ECMO

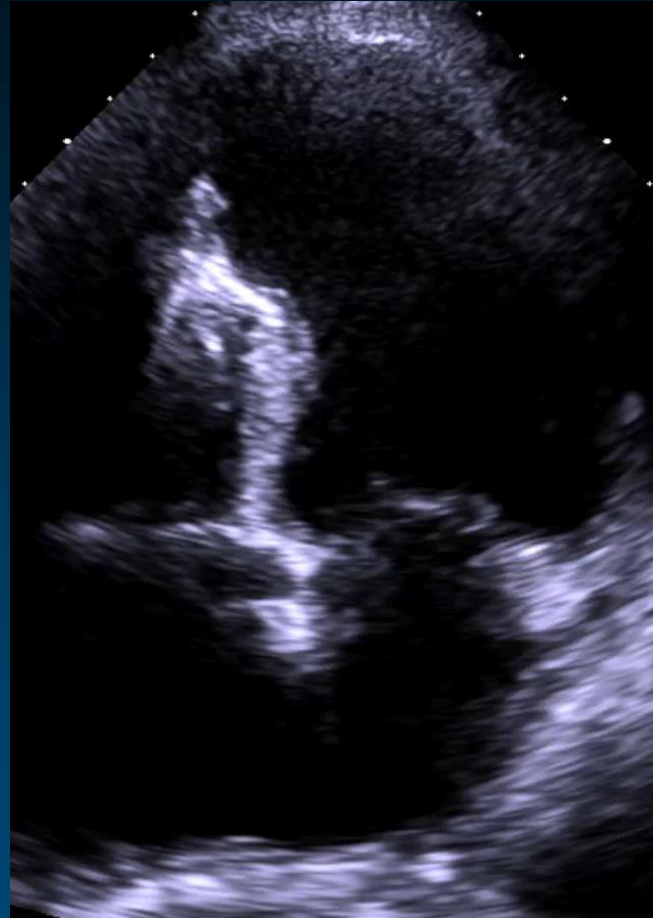
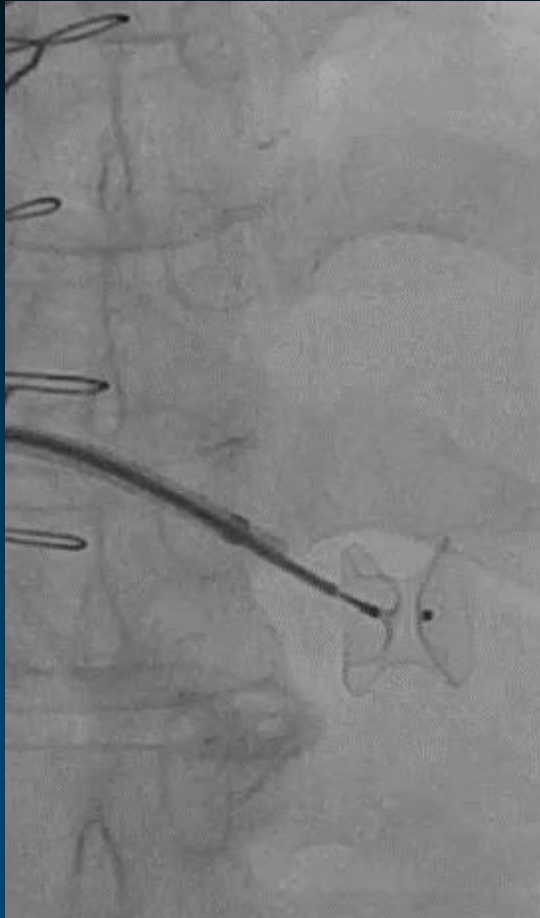
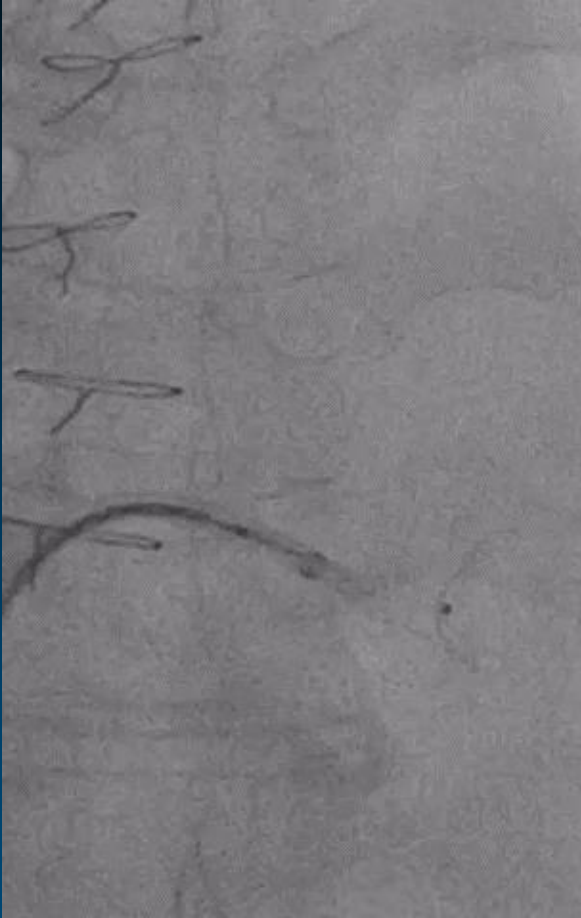
At 2 weeks,
Pulmonary edema
Hepatic congestion



VSD closure with Amplatzer m-VSD 16 mm occluder



VSD closure with Amplatzer m-VSD 16 mm occluder



Small remnant, but happy for 4 yrs

Percutaneous Closure For Infarct VSD

- **Optimize hemodynamics with appropriate support**
- **Surgical vs. Percutaneous closure → should be individualized**
- **Timing for closure → should be individualized**
- **Sizing for device selection → not established yet**
- **Beware of complications**
 - **Device embolization, Remnant shunt, LV rupture, Arrhythmia...**
- **Can be a good alternative option to surgery**