

Hostile Anatomy – Calcified Leaflet and Supravalvular Calcification

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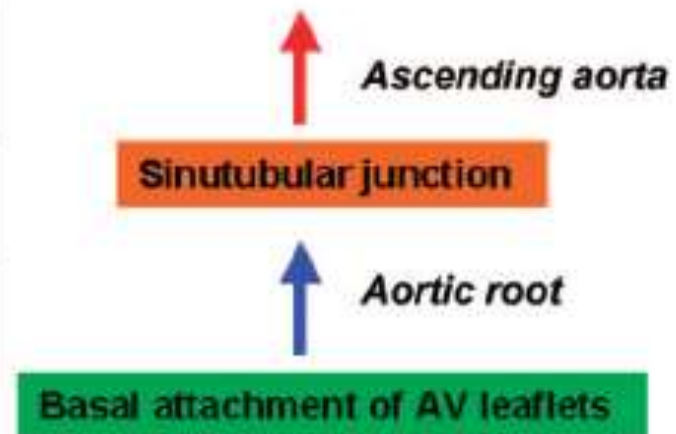
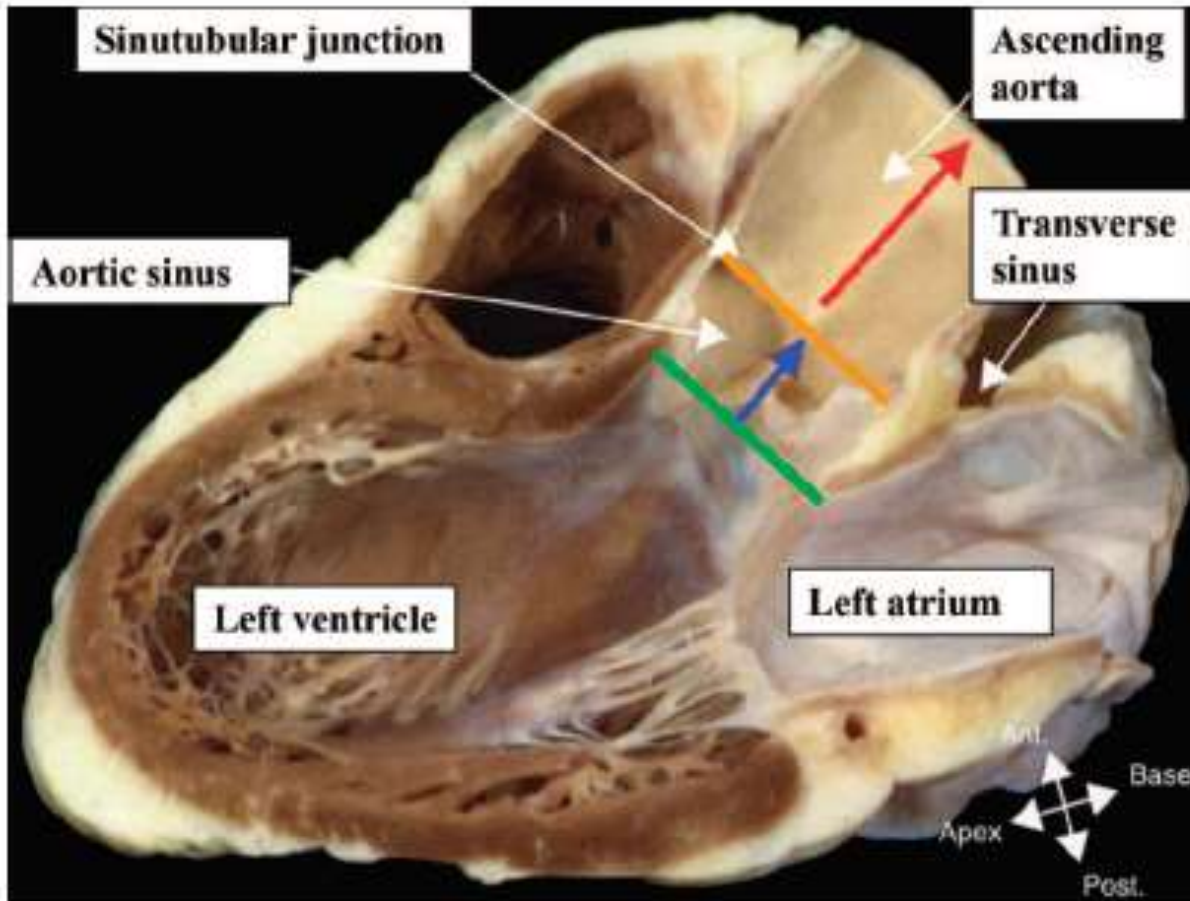
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Disclosure

- None

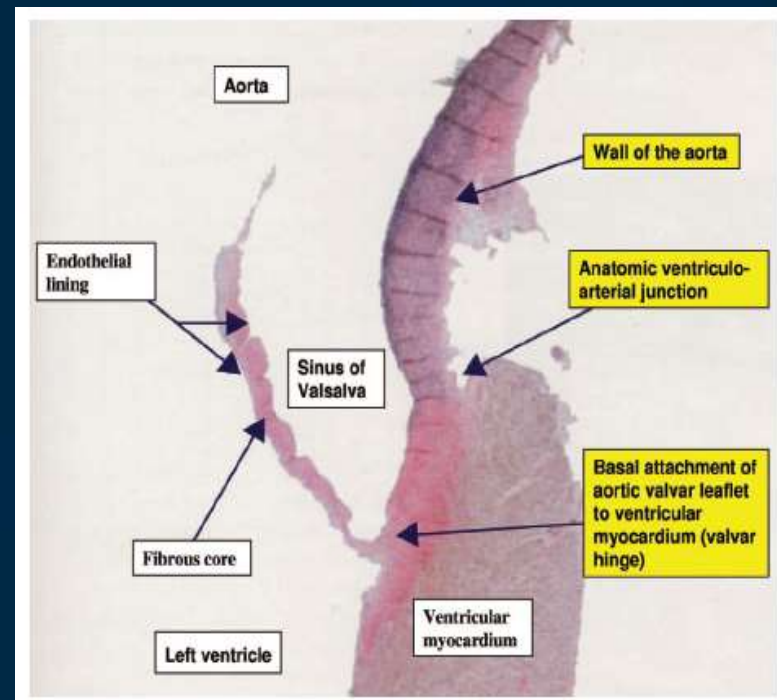
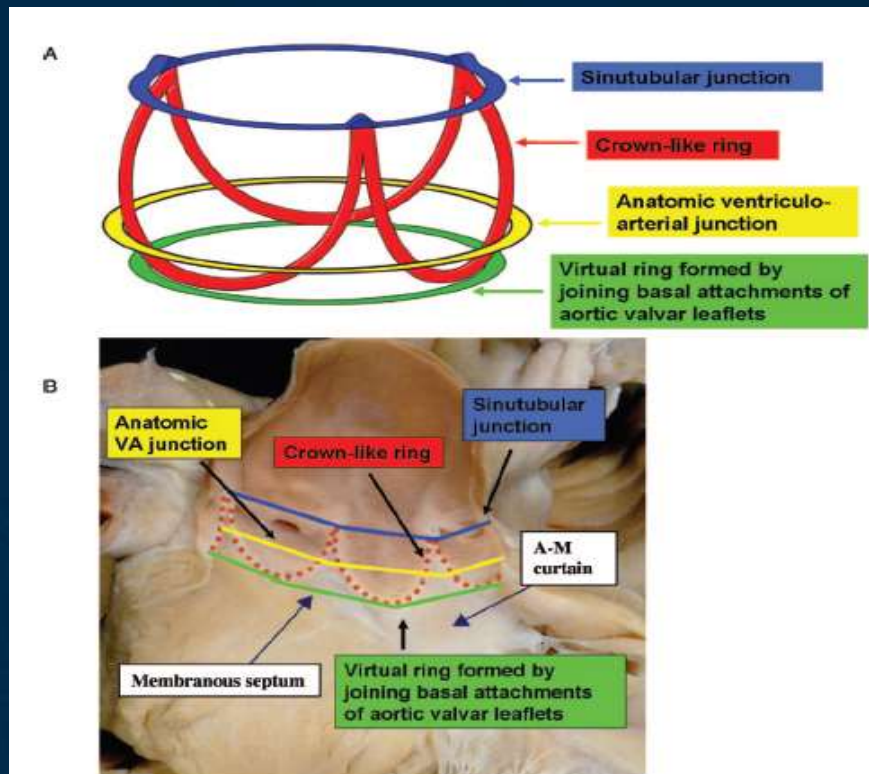
Anatomy of the aortic valvular complex

- Aortic root
 - ✓ Components: sinus of Valsalva, fibrous interleaflet triangles, valvular leaflets



Anatomy of the aortic valvular complex

- Rings within the aortic root (shape: truncated cone, usually)
 - ✓ Crown-like ring
 - ✓ Ring of sinotubular junction: real and true ring
 - ✓ Anatomical ventriculoarterial junction: real and true ring (location of surgical valve suture)
 - ✓ Annulus: virtual ring (dynamic according to cardiac cycle from – 16% to 12%)



Problems of aortic valvular complex calcification

➤ Aortic valvular calcification

- ✓ Paravalvular leakage
- ✓ Conduction abnormalities
- ✓ Annular rupture
- ✓ Coronary ostial occlusion
- ✓ Stroke

➤ LVOT calcification

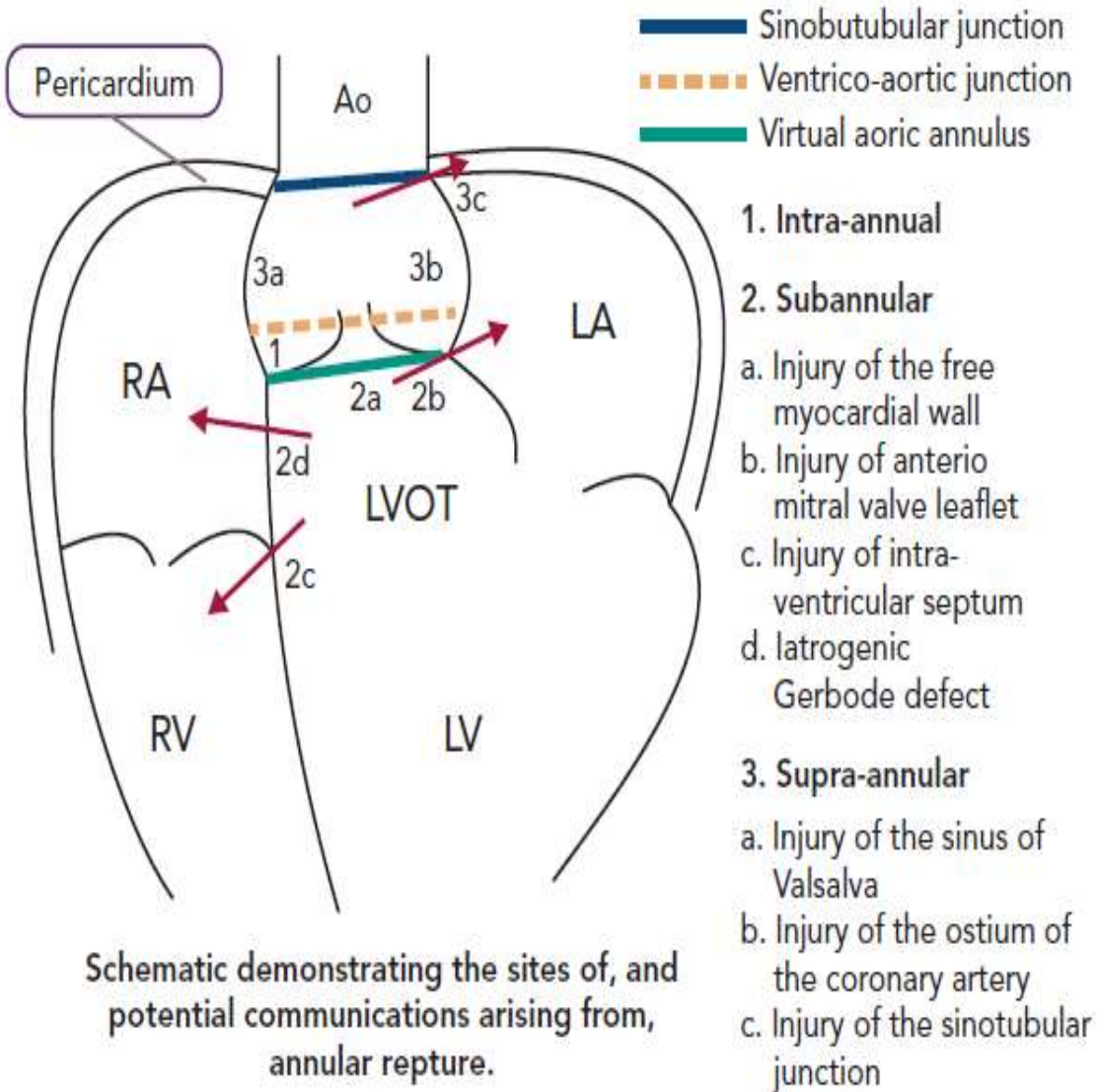
- ✓ Sub-annular rupture

➤ STJ calcification

- ✓ Supra-annular rupture

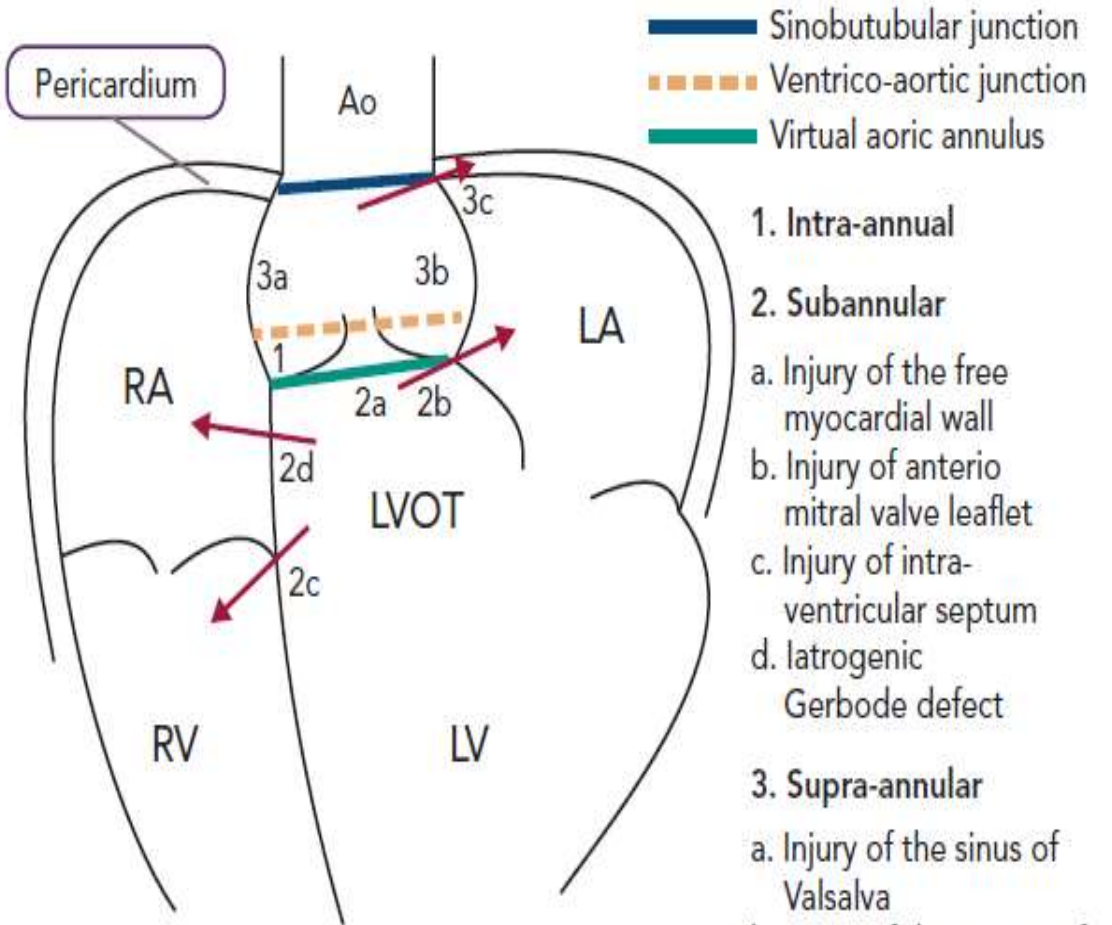
Among these, Rupture is most dangerous and biggest problem

Annular Rupture



Type of Rupture	Treatment
1. Intra-annular	Repair* of the lesion + AVR
2. Subannular	
a. Injury of the free myocardial wall	Reconstruction of the LVOT from inside the LVOT with a pericardial patch using transaortic approach† + AVR
b. Injury of the anterior mitral leaflet	Repair with a pericardial patch ± MVR‡ + AVR
c. Injury of the interventricular septum	Repair* + AVR
3. Supra-annular	
a. Injury of the wall of sinus of Valsalva	Repair* of the lesion + AVR or composite valved graft
b. Injury of a coronary ostium	Composite valved graft or repair of the lesion + AVR ± stenting of a coronary ostium/CABG
c. Injury of the sinotubular junction	Repair* of the lesion ± AVR or supracoronary aortic tube graft replacement ± AVR

Annular Rupture



Schematic demonstrating the sites of, and potential communications arising from, annular rupture.

1. Intra-annular
2. Subannular
 - a. Injury of the free myocardial wall
 - b. Injury of anterior mitral valve leaflet
 - c. Injury of intra-ventricular septum
 - d. Iatrogenic Gerbode defect
3. Supra-annular
 - a. Injury of the sinus of Valsalva
 - b. Injury of the ostium of the coronary artery
 - c. Injury of the sinotubular junction

Type of Rupture	Treatment
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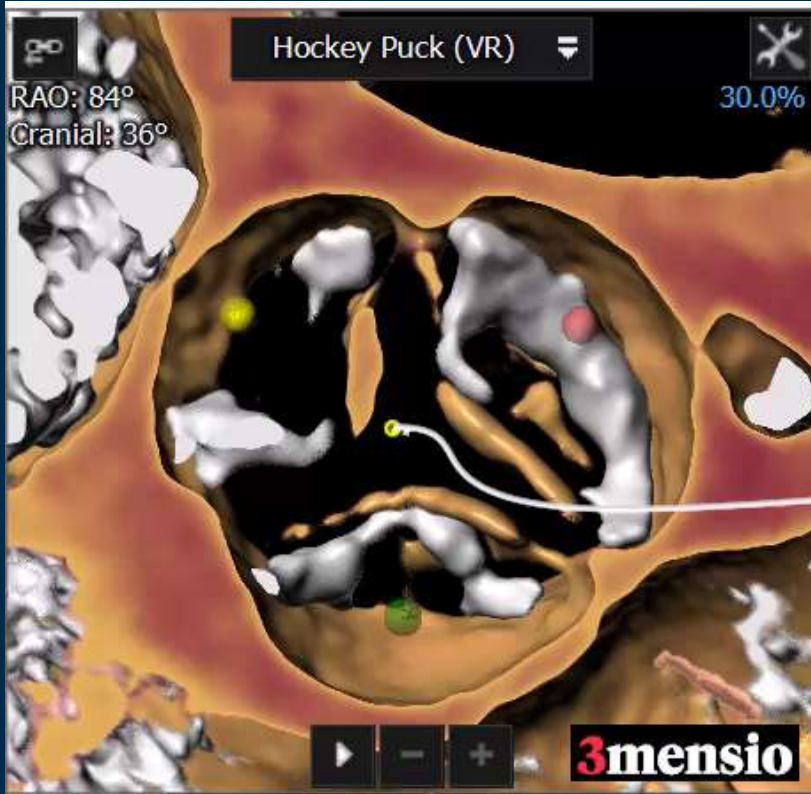
Case 1

- 78/F
- Coronary risk factors: DM, hypertension
- CAG: normal coronary
- STS score: 4.450%
- TTE: severe AS (AVA: 0.6 cm², Vmax: 4.6 m/s, Mean PG: 57 mmHg), EF 64%

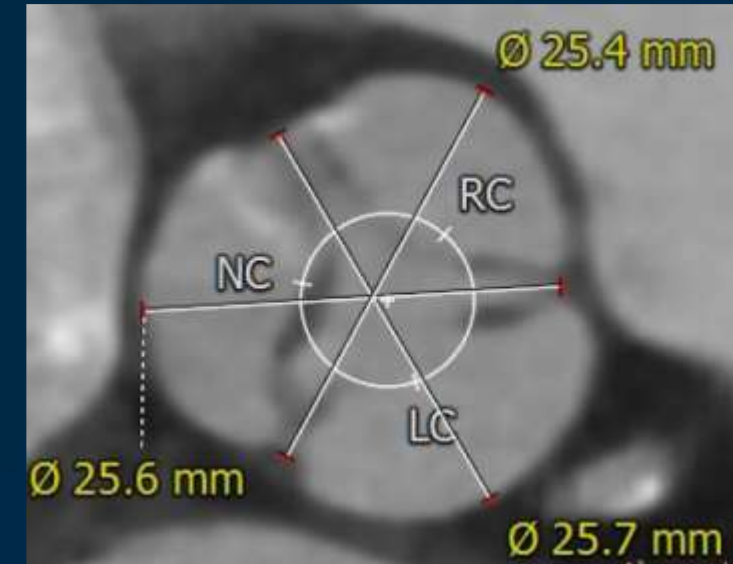


Case 1

➤ CT findings

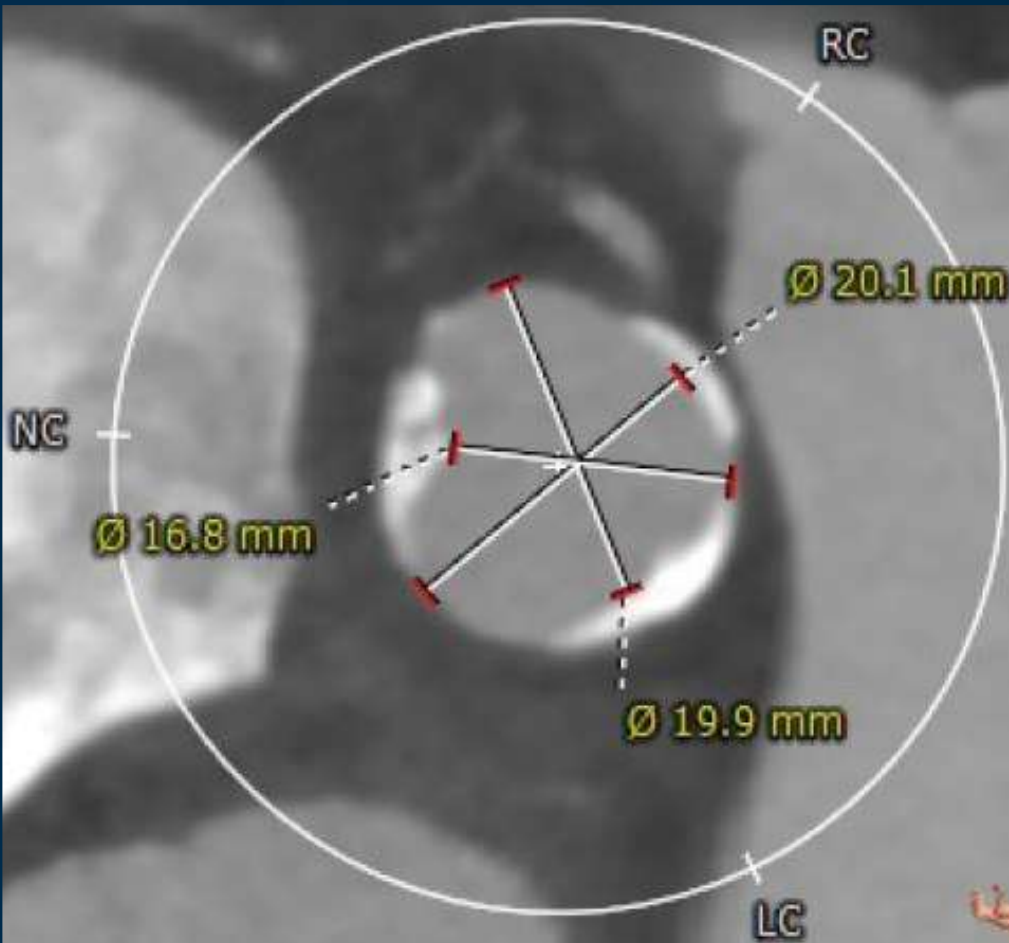


- **Annulus**
 - ✓ Area: 358 mm²
 - ✓ Perimeter: 67.3 mm
 - ✓ Diameter: 22.7 X 21.3
- **SOV diameter**



Case 1

➤ CT findings

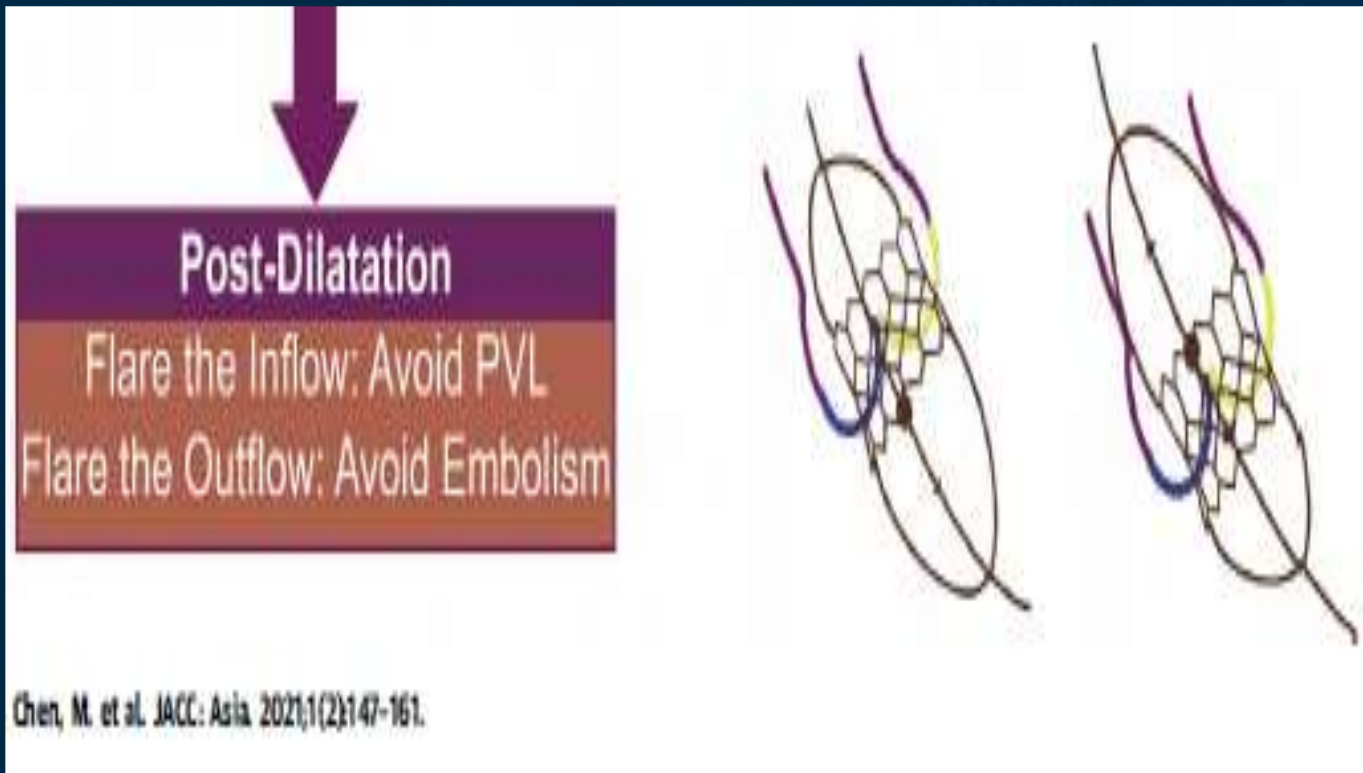
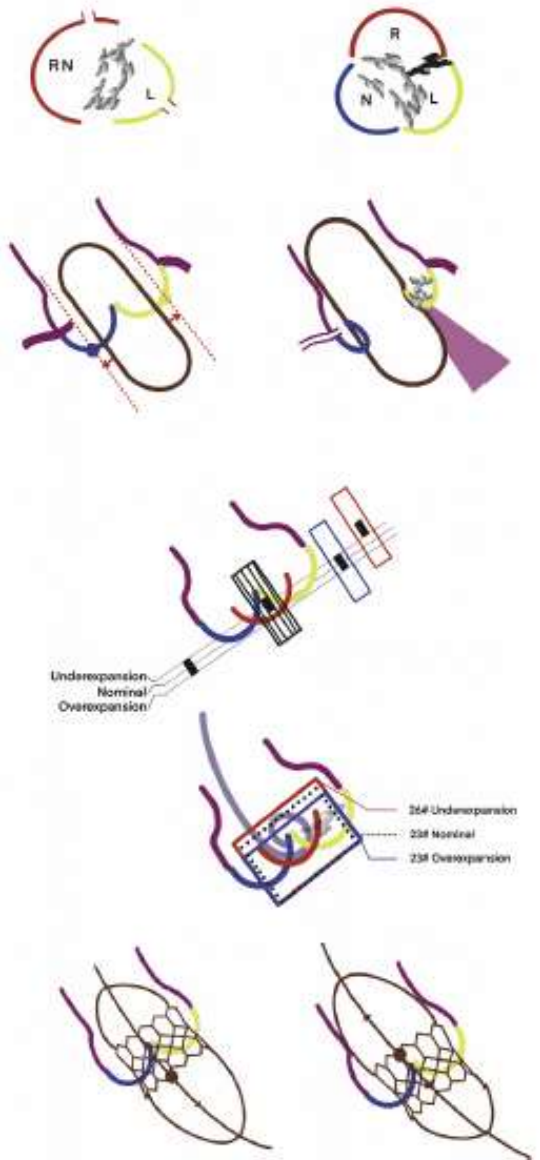
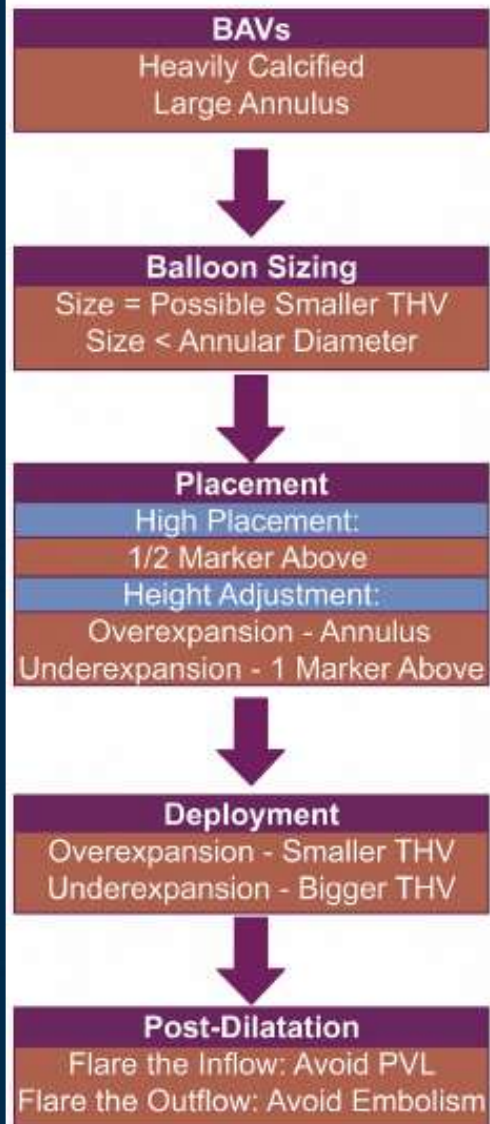


- Problem of this patient
 - ✓ Small STJ
 - ✓ Very ugly calcification of STJ
 - ✓ Small ascending aorta and calcification

- Heart team conference → SAVR is also very high risk for severe calcification from aortic root to aortic arch → **decide to perform TAVI by flare technique**

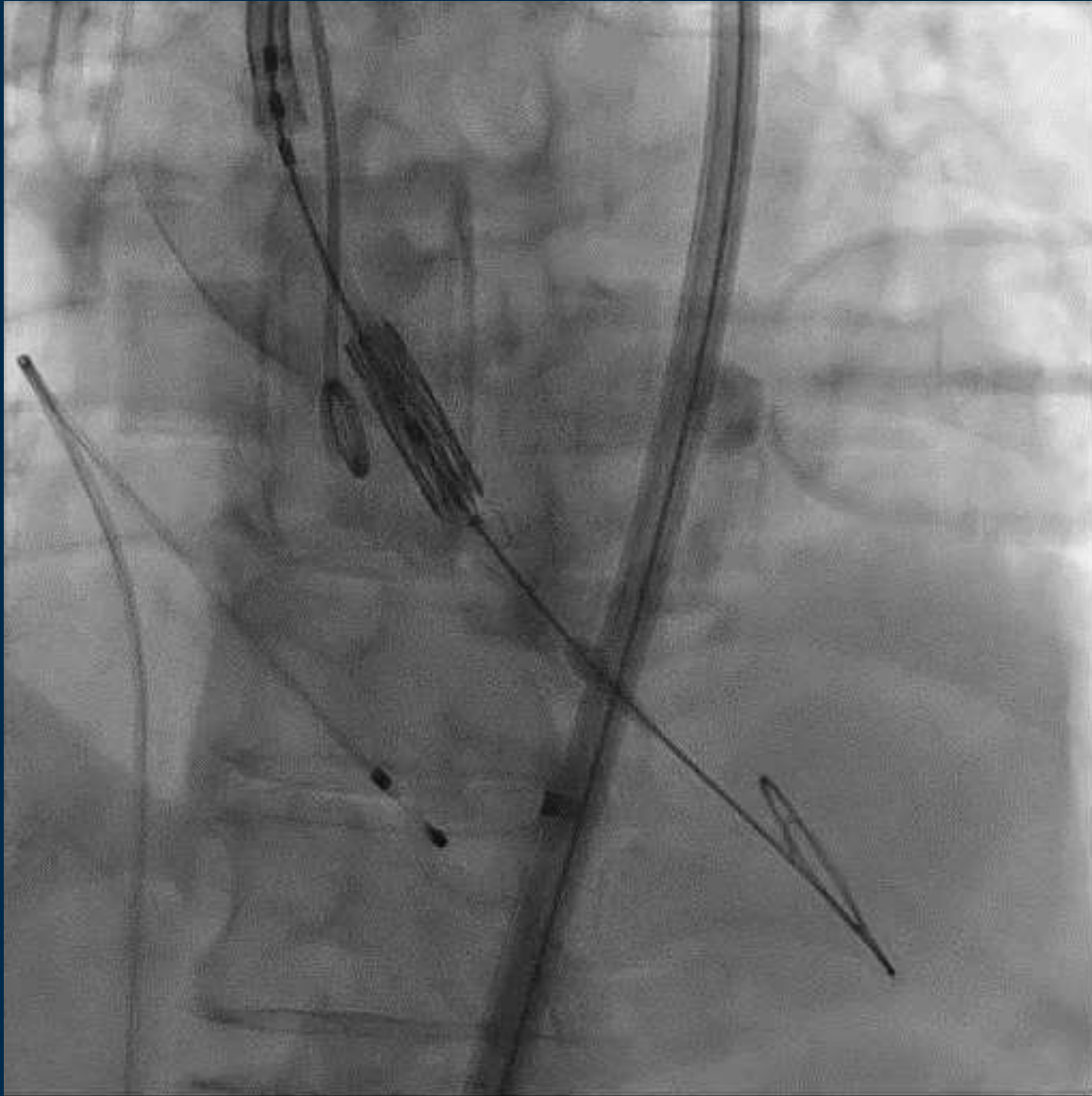
Case 1

CENTRAL ILLUSTRATION Algorithm for Balloon-Expandable Valve in BAV

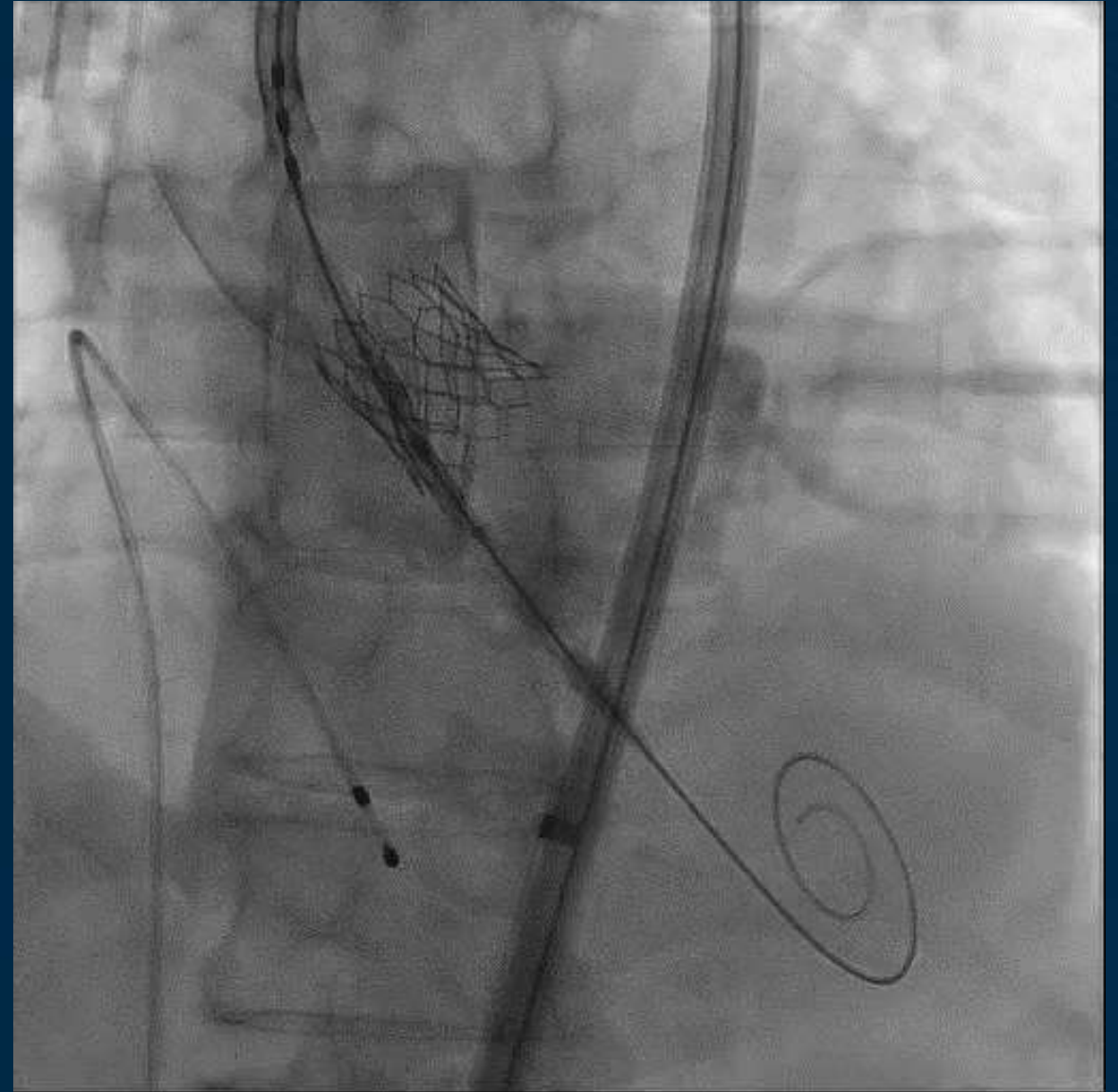


Flare the inflow to avoid juxta-STJ rupture

Case 1

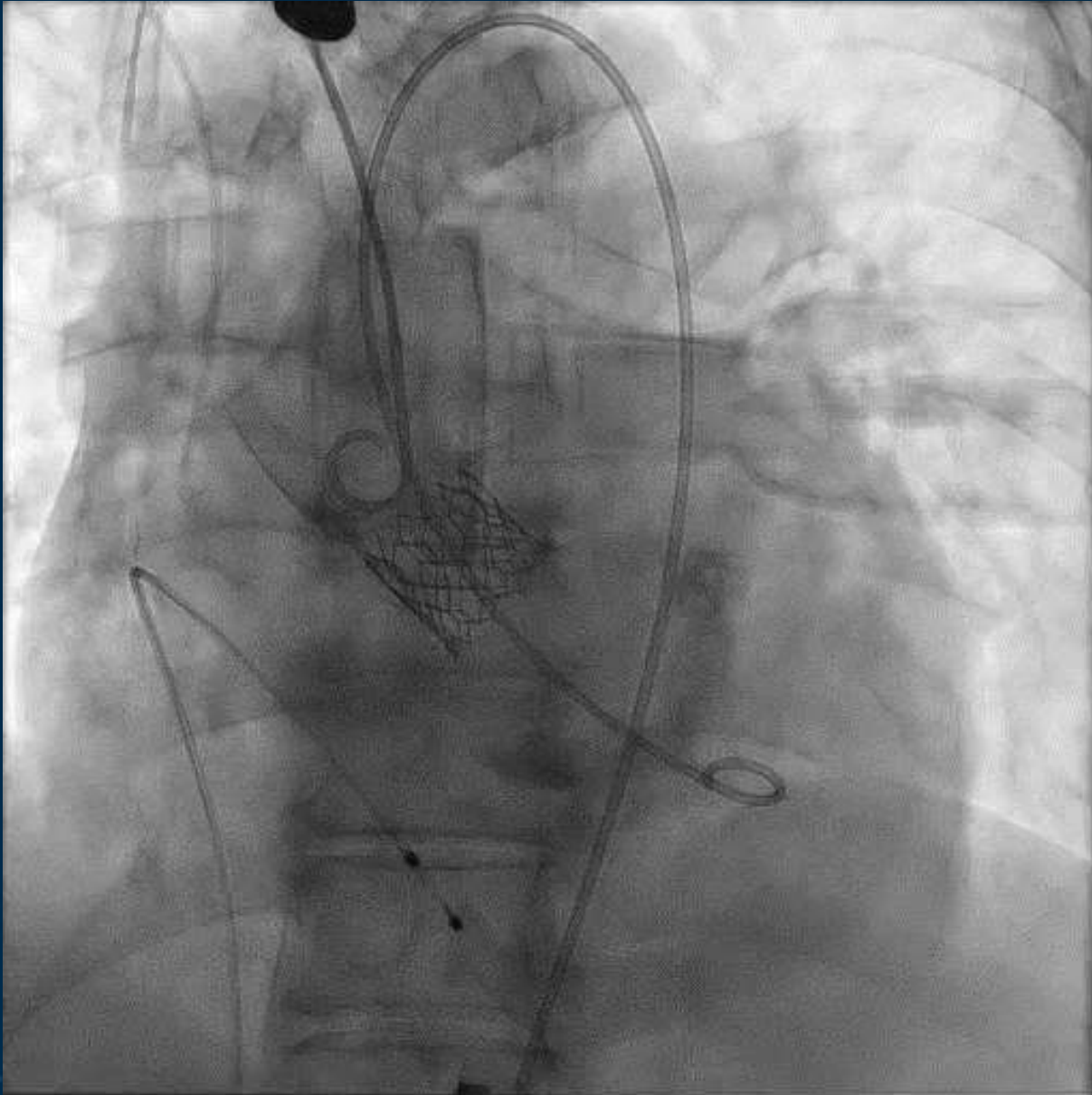


First inflation according to STJ diameter



Inflow flare according to annulus area

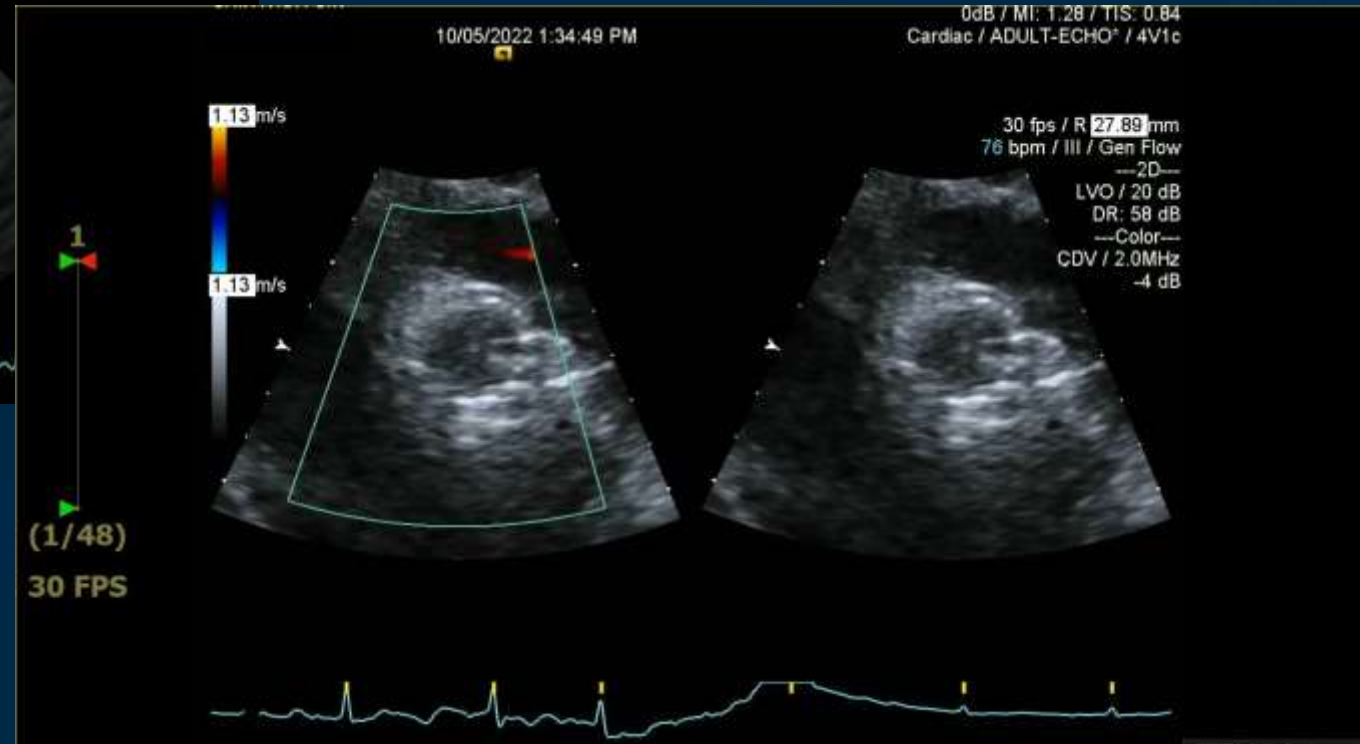
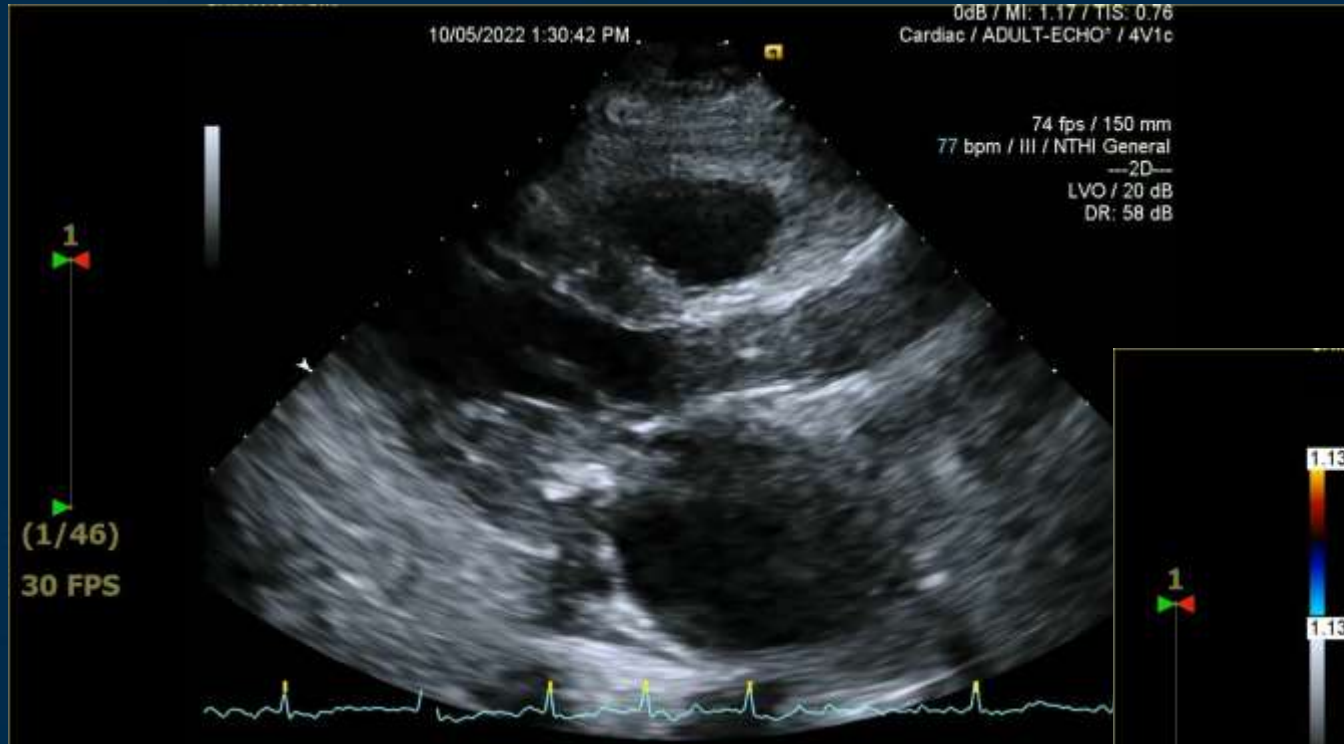
Case 1



- **Final aortogram**
 - ✓ **Trivial PVL**
 - ✓ **No supra-annular rupture**

Case 1

➤ Follow up TTE at 3 months after TAVR



Case 2

- 63/F
- Coronary risk factors: DM, hypertension
- PCI was done at mRCA
- STS score: 1.929
- TTE: severe AS (AVA: 0.5 cm², Vmax: 4.4 m/s, Mean PG: 50 mmHg), EF 41%



Case 2

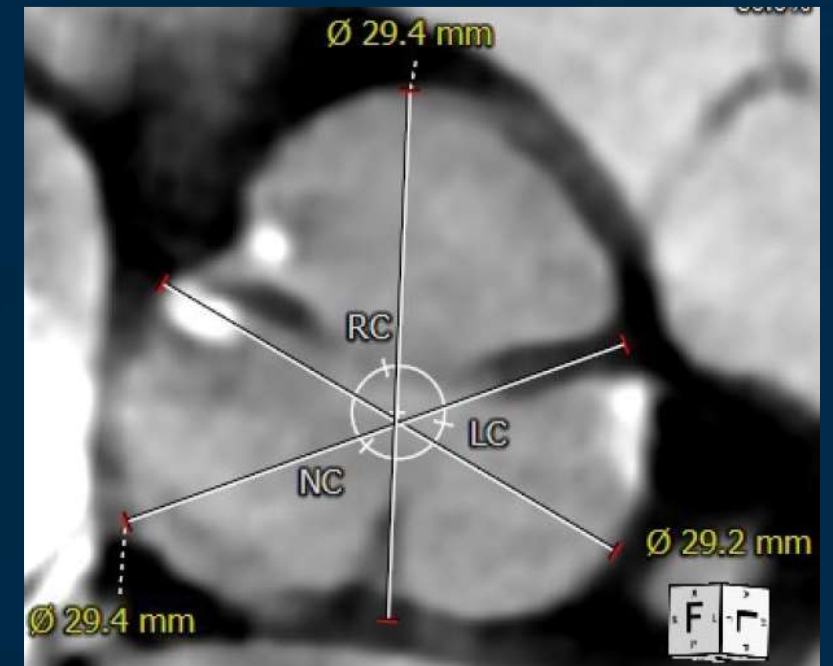
➤ CT findings



➤ Annulus

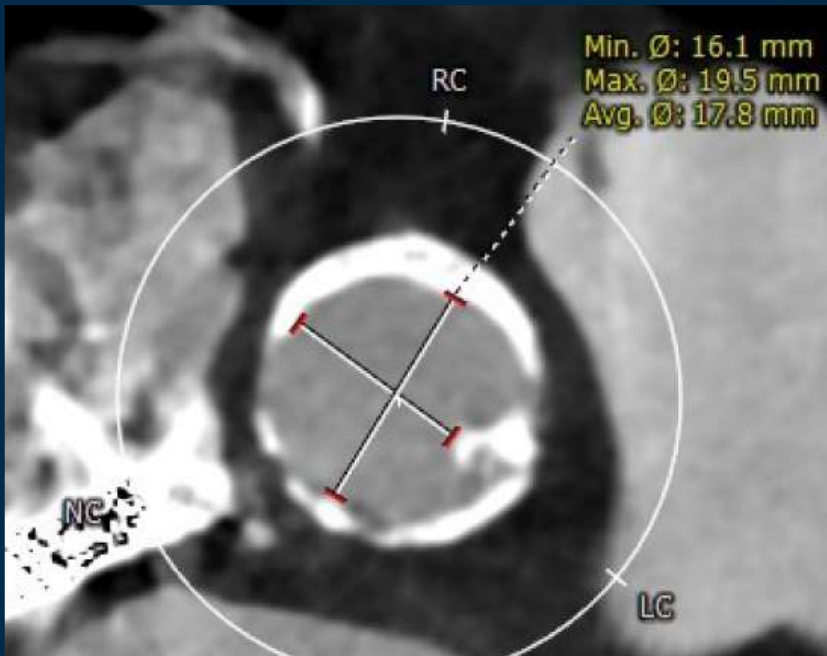
- ✓ Area: 456 mm²
- ✓ Perimeter: 76.2 mm
- ✓ Diameter: 22.7 X 25.7

➤ SOV diameter



Case 2

➤ CT findings



- Problem of this patient
 - ✓ Small STJ
 - ✓ Very ugly calcification of STJ
 - ✓ Small ascending aorta and calcification
- Heart team conference → SAVR is also very high risk for severe calcification from aortic root to aortic arch → **decide to perform TAVI by flare technique**

Case 2

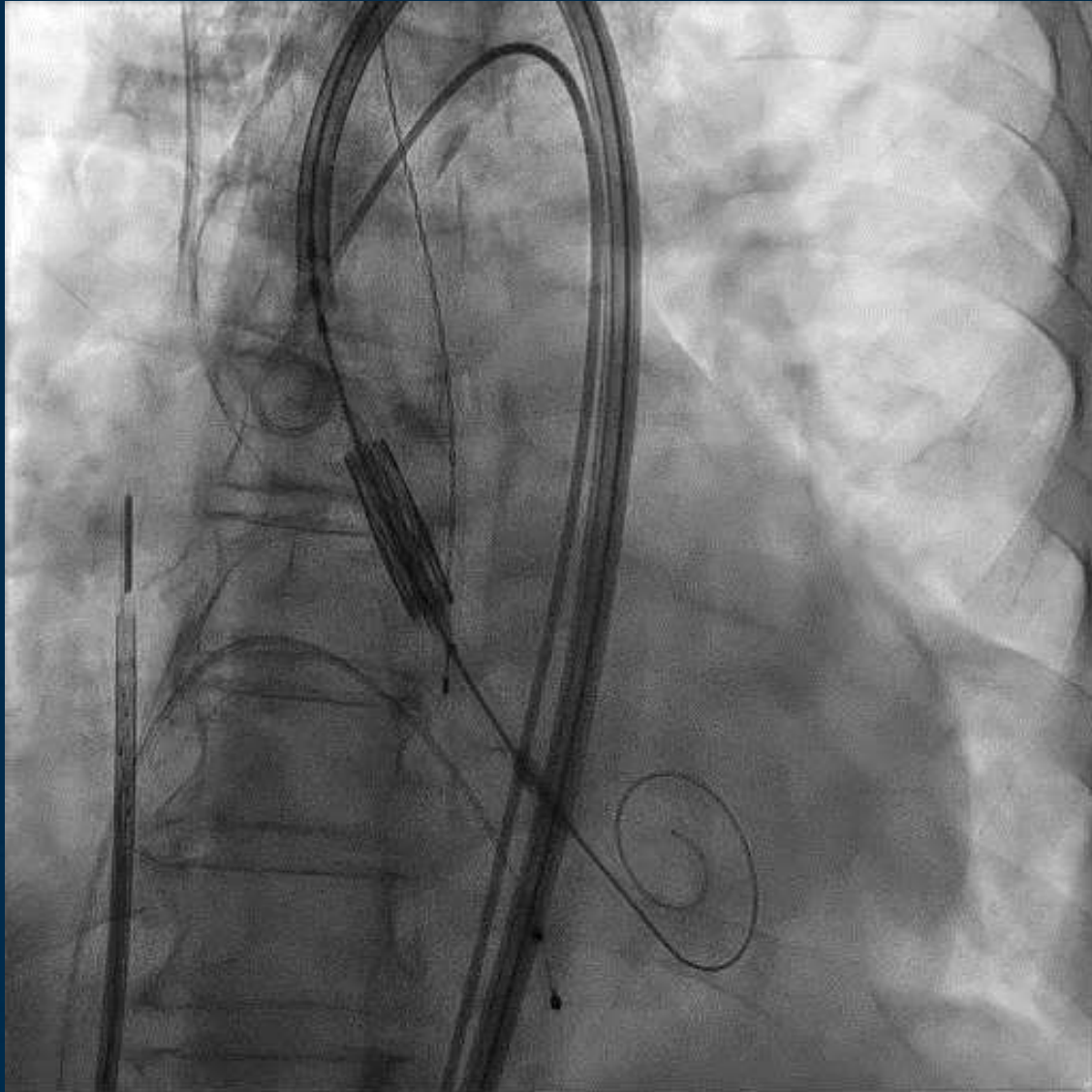
Pre-TAVI ICE, short axis



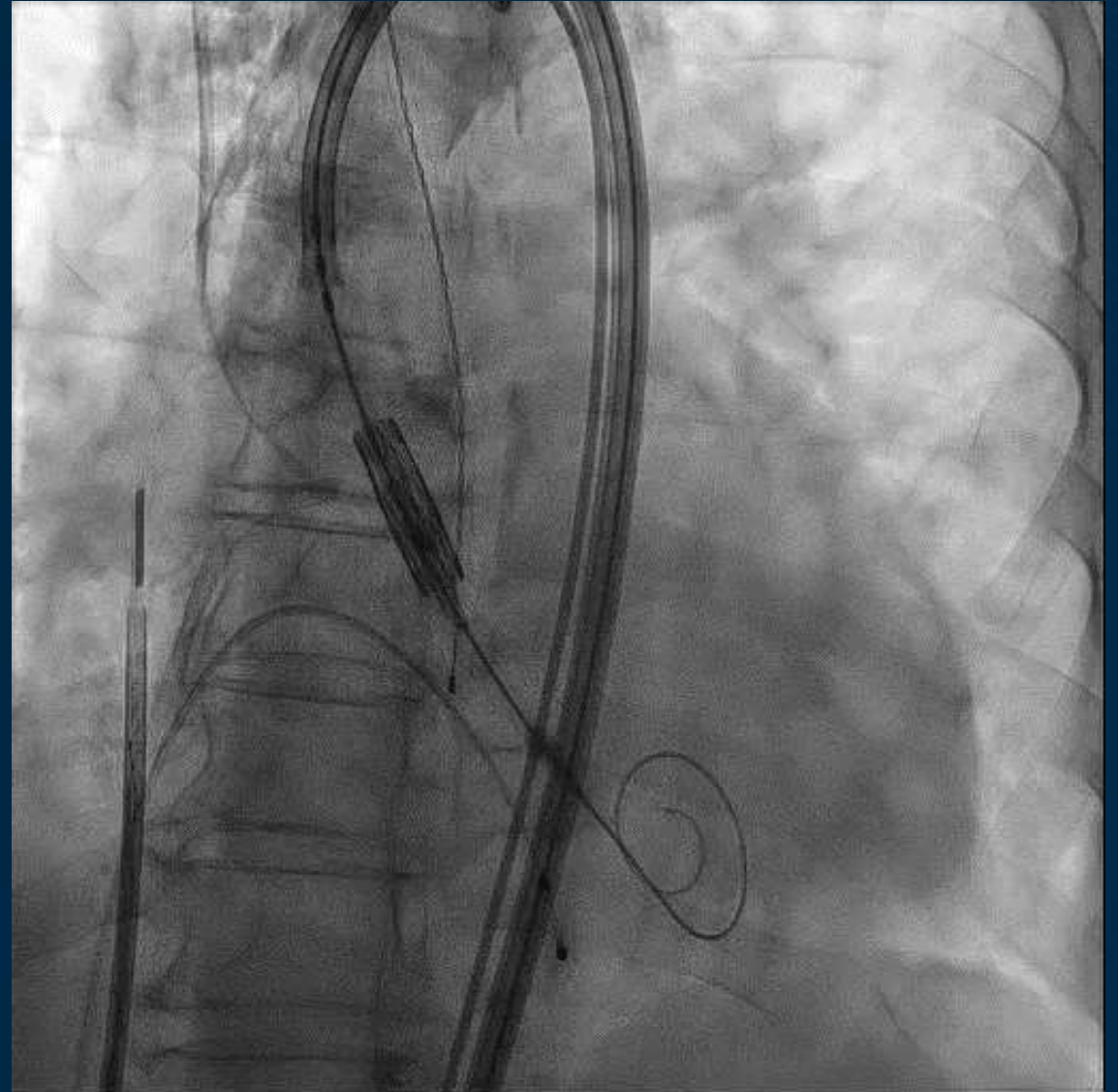
Pre-TAVI ICE, long axis, very ugly calcification on STJ



Case 2

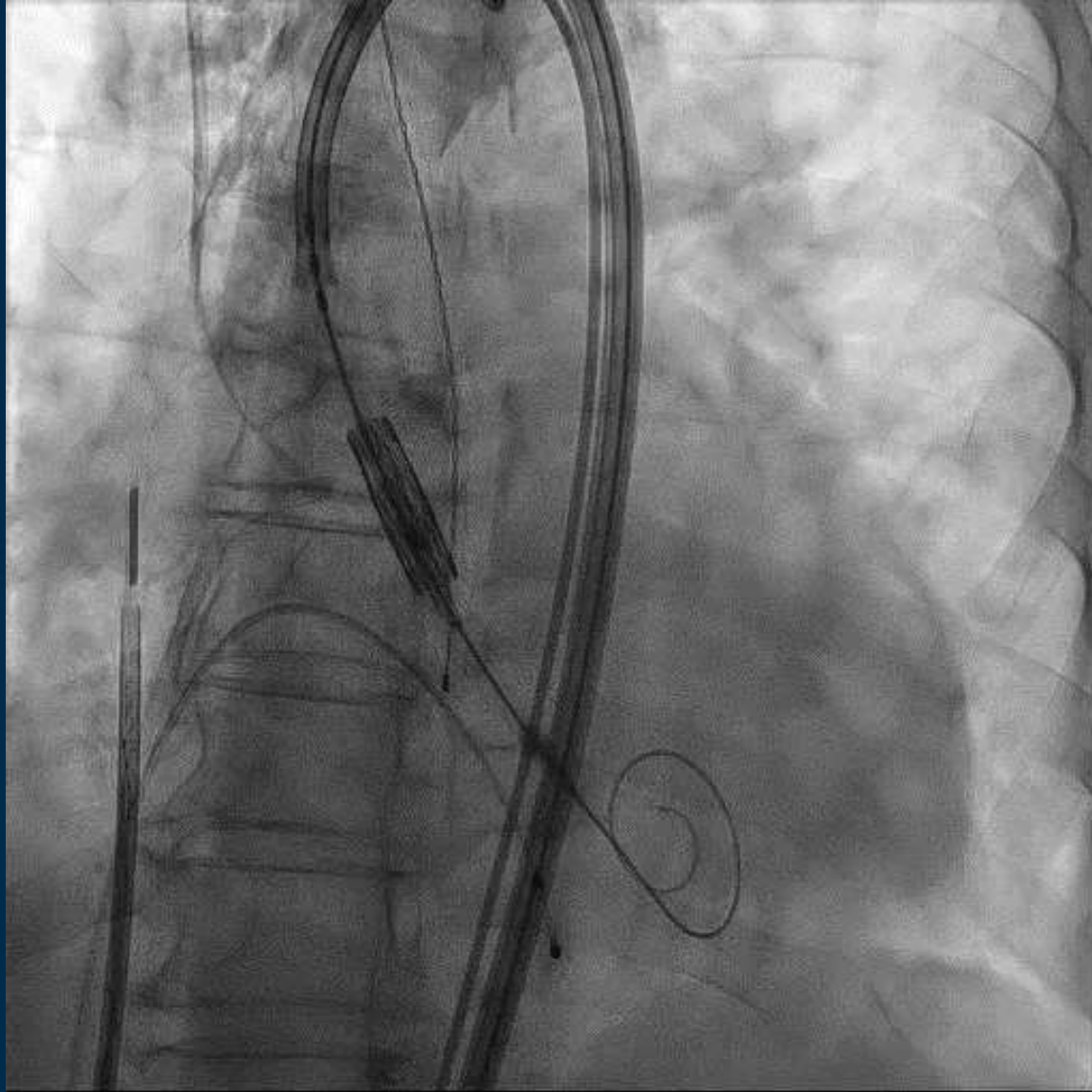


Check the valve location

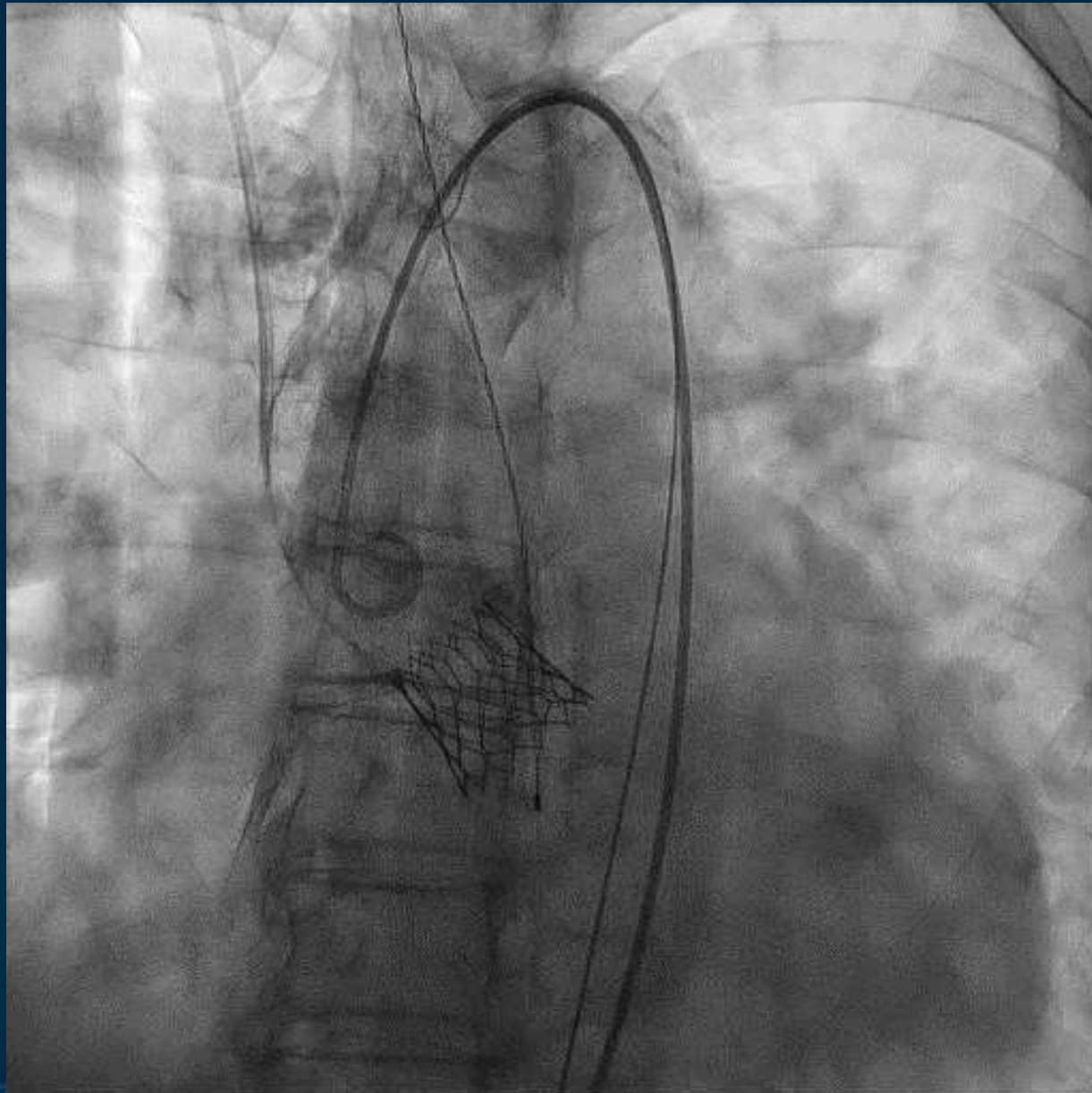


One step Inflow flare according to annulus area

Case 2



Case 2



➤ **Final aortogram**

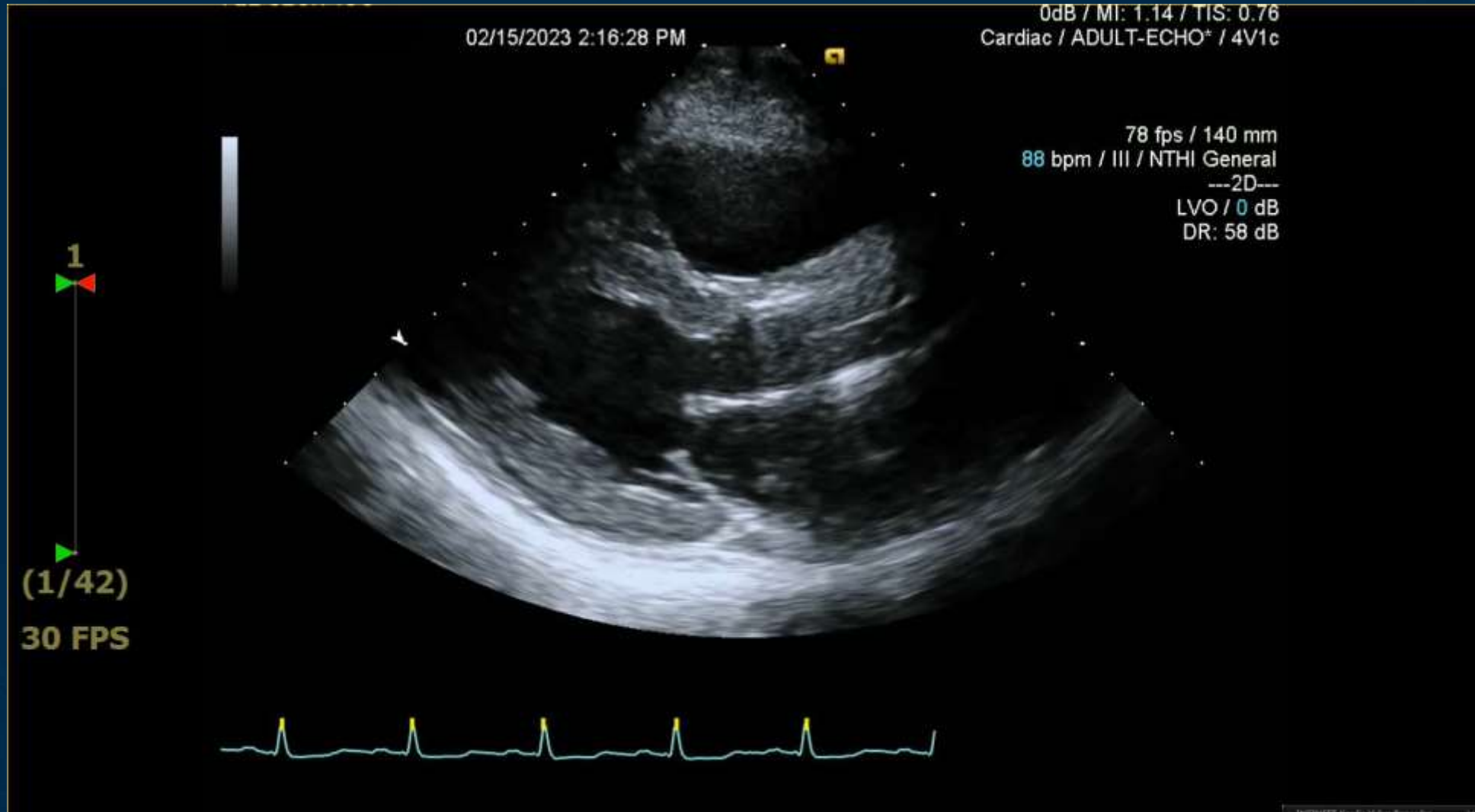
- ✓ Trivial PVL
- ✓ No supra-annular rupture

➤ **ICE**

- ✓ No PVL
- ✓ Good valve opening

Case 2

➤ Follow up TTE at 3 months after TAVR



Conclusion

- **Calcification is enemy in the era of TAVR**
- **Leaflet calcification can induce**
 - ✓ **PVL: can reduce by using S3 ultra**
 - ✓ **Conduction abnormalities: can reduce by S3 ultra and high implantation with minimal oversizing**
 - ✓ **Coronary obstruction: can reduce by using guiding catheter and wire protection**
- **Supra-annular calcification**
 - ✓ **Very high risk of SAVR**
 - ✓ **And very high risk of STJ rupture and aortic dissection**
 - ✓ **However, overcome the risk of STJ rupture and aortic dissection by using flare technique**