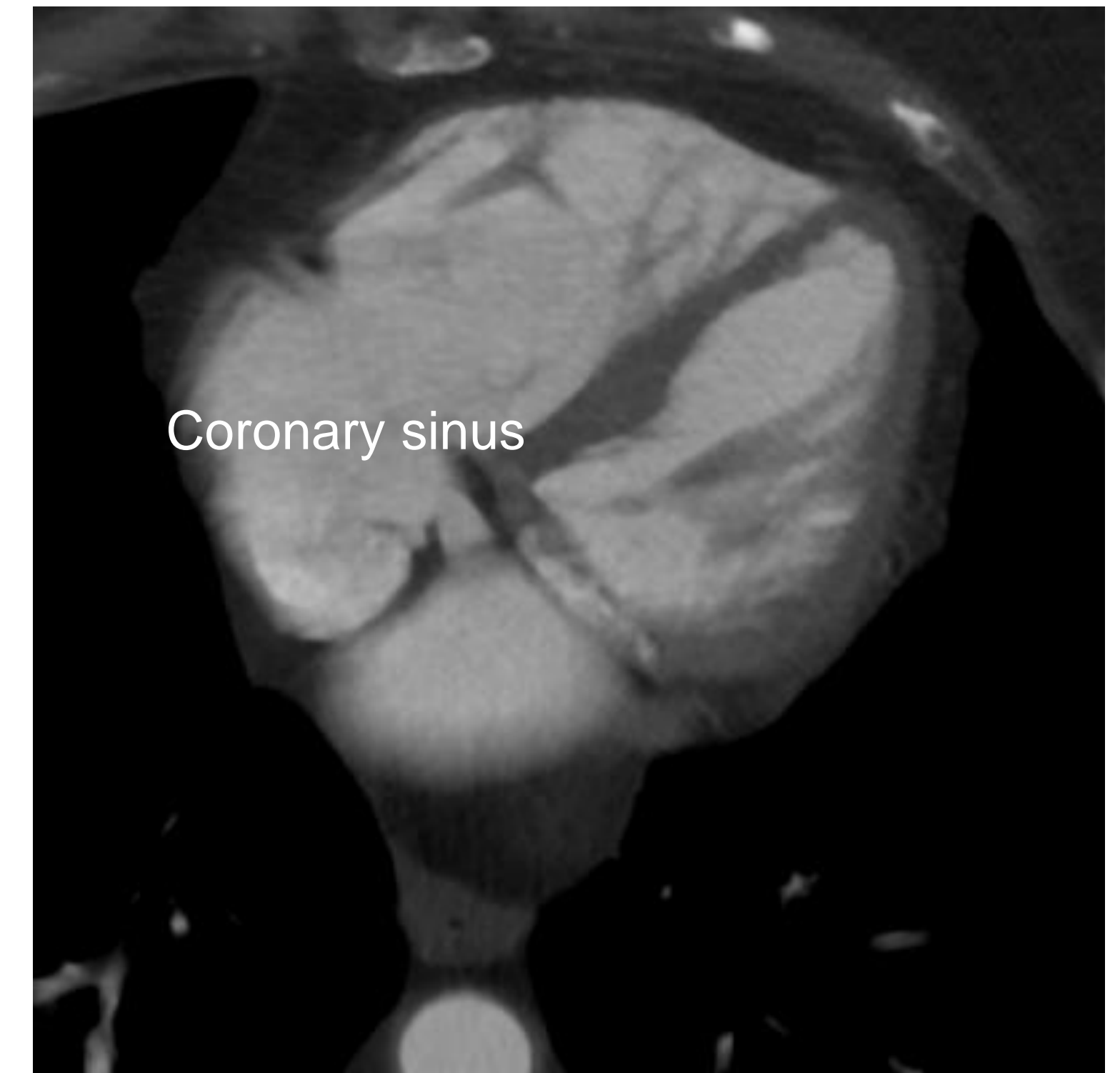
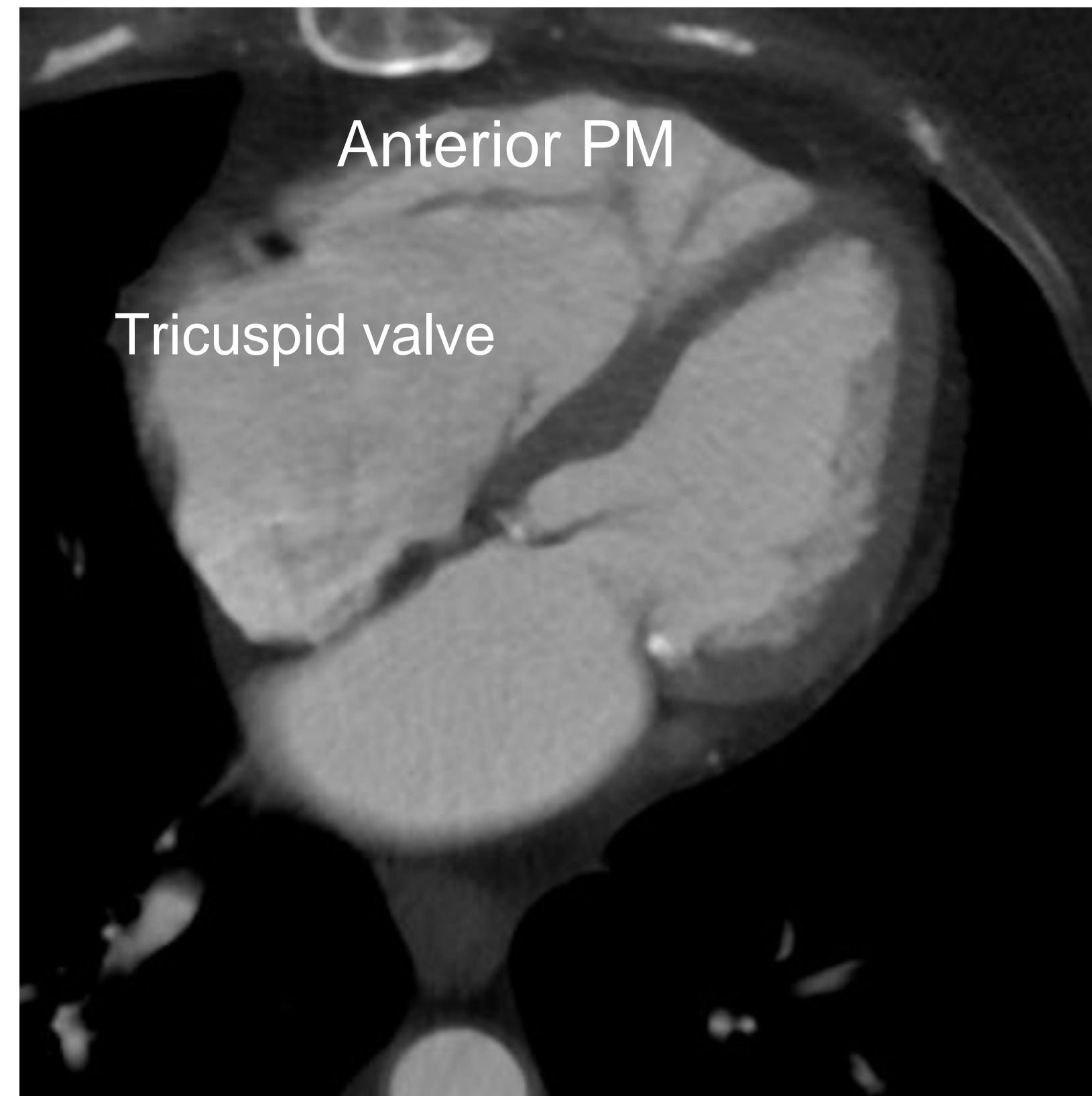


Tricuspid valve: anatomical assessment and key information for surgical and percutaneous procedures

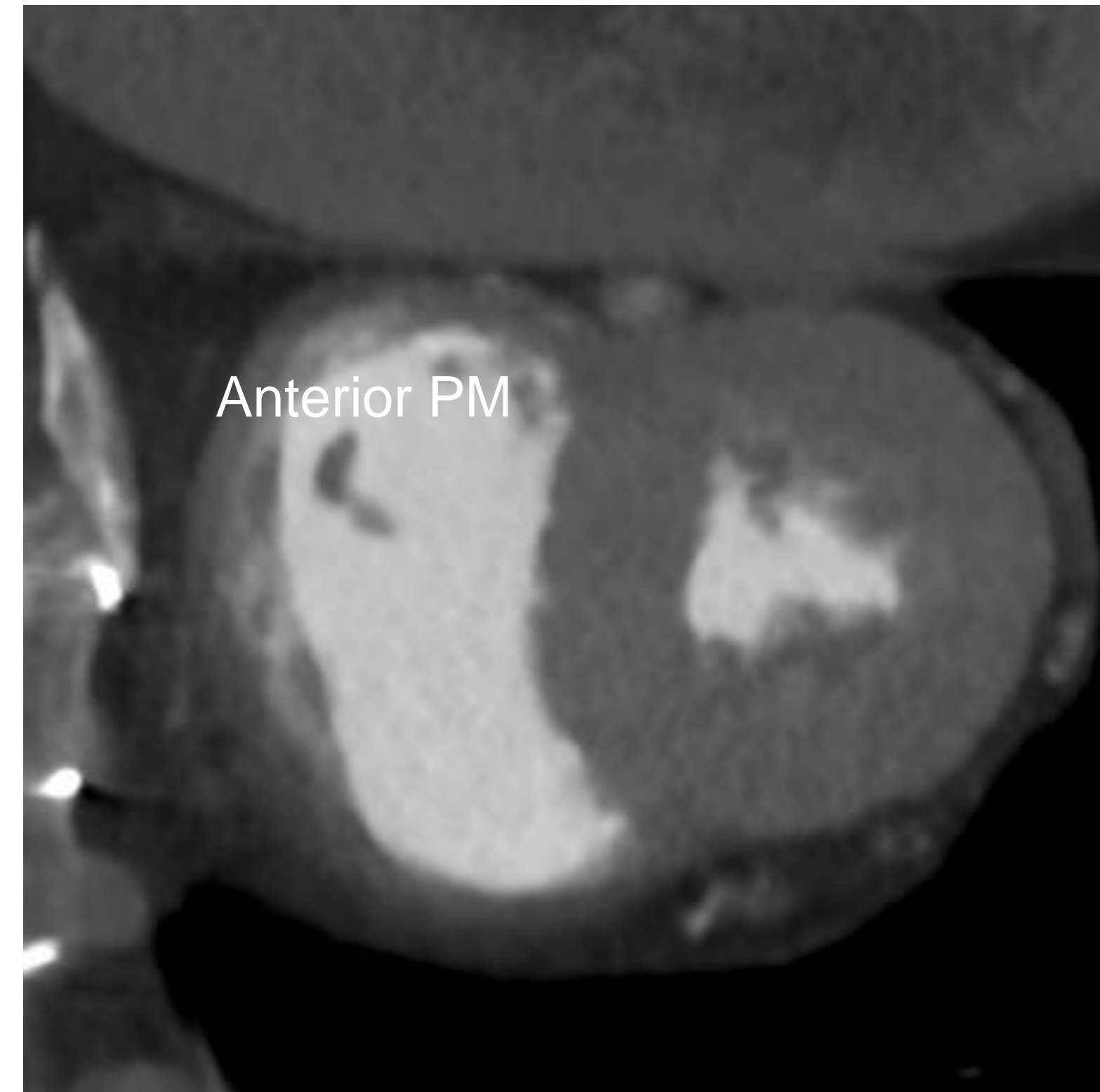
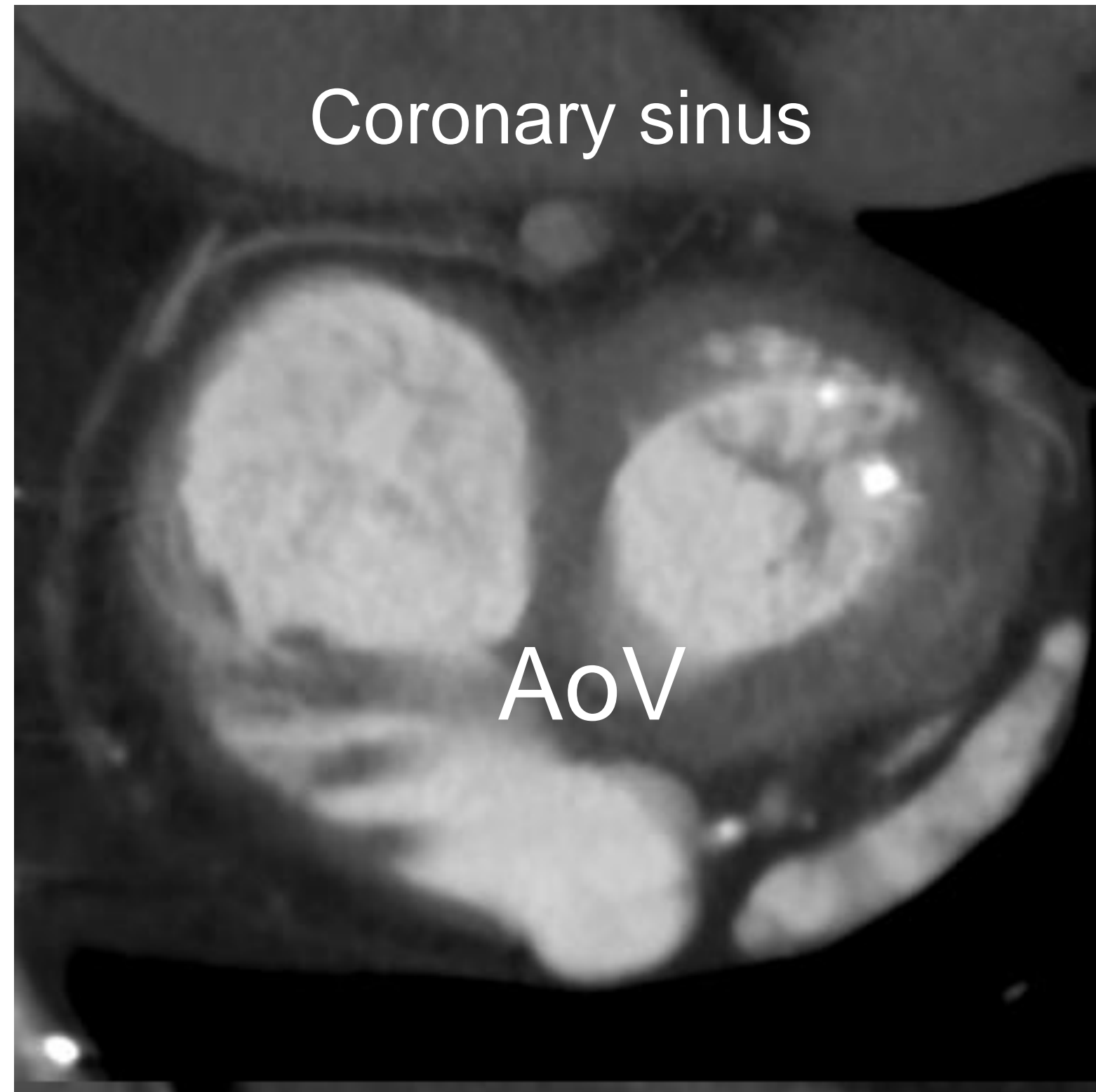


CH. Pedro Li
Hospital de Sant Pau
Barcelona

Anatomical position of tricuspid valve



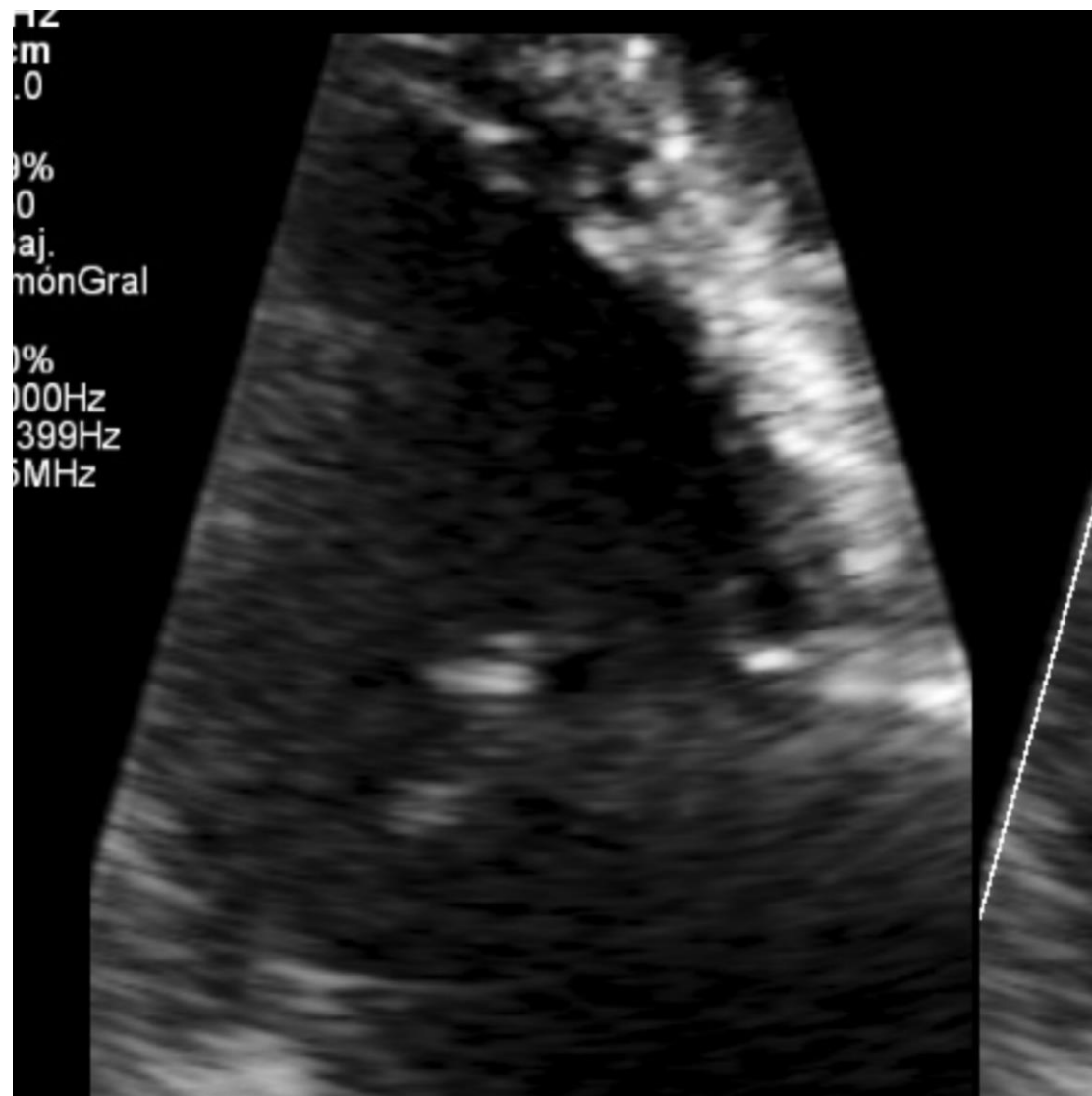
Transgastric echo view



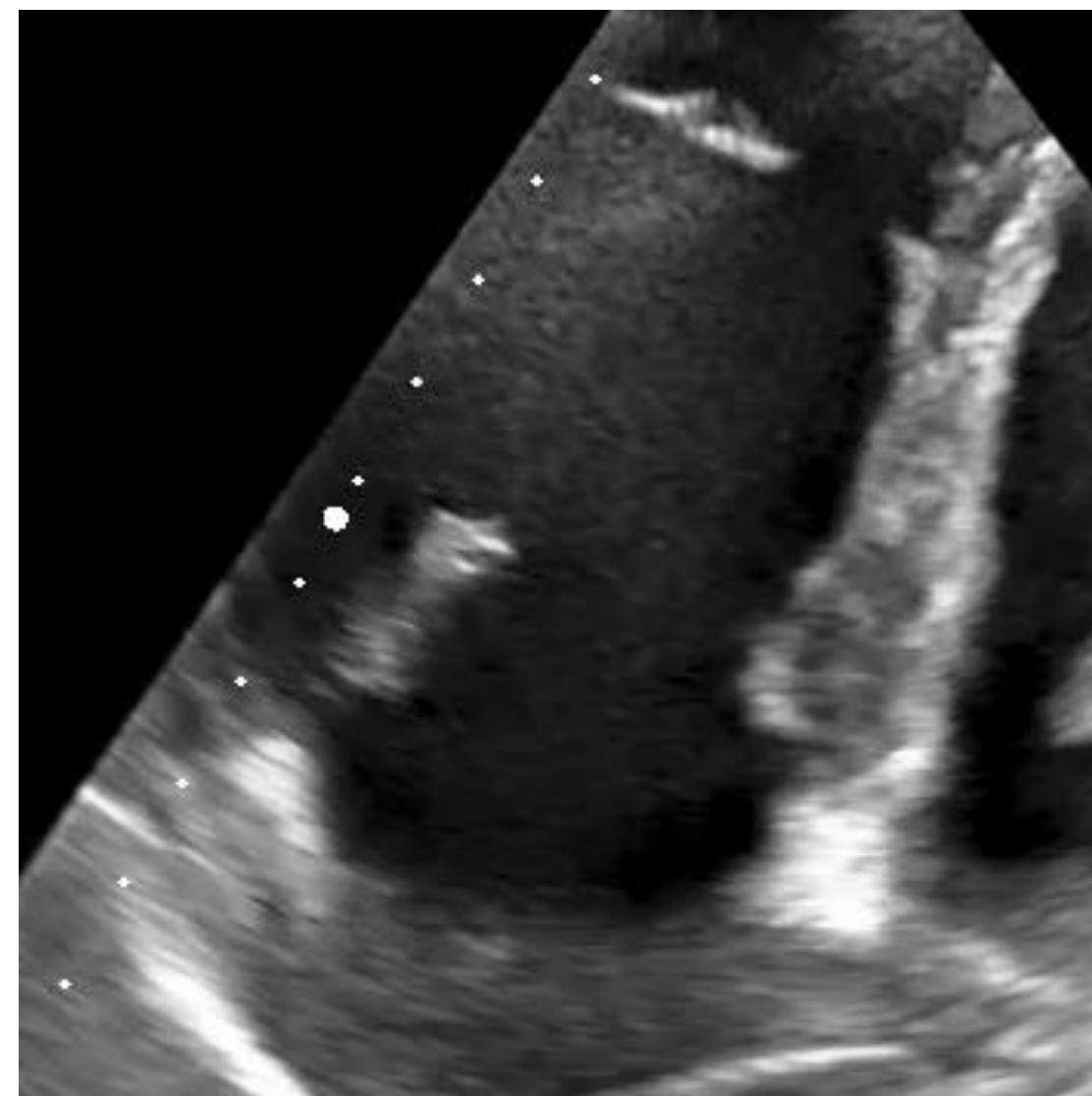
Key information for TR repair

TR mechanism

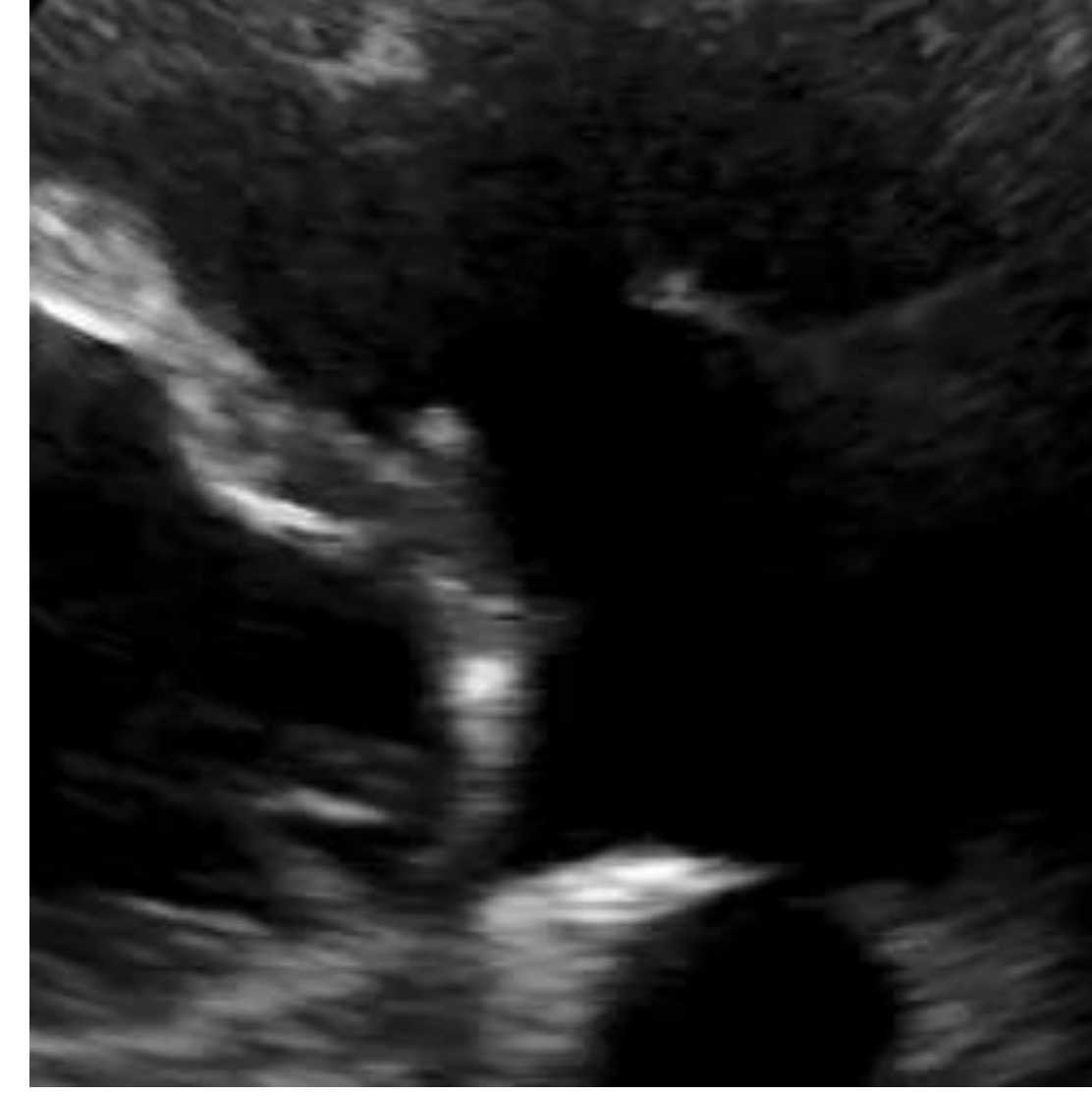
Leaflet mobility
Leaflet tethering
Annular dilatation
Ventricular dilatation



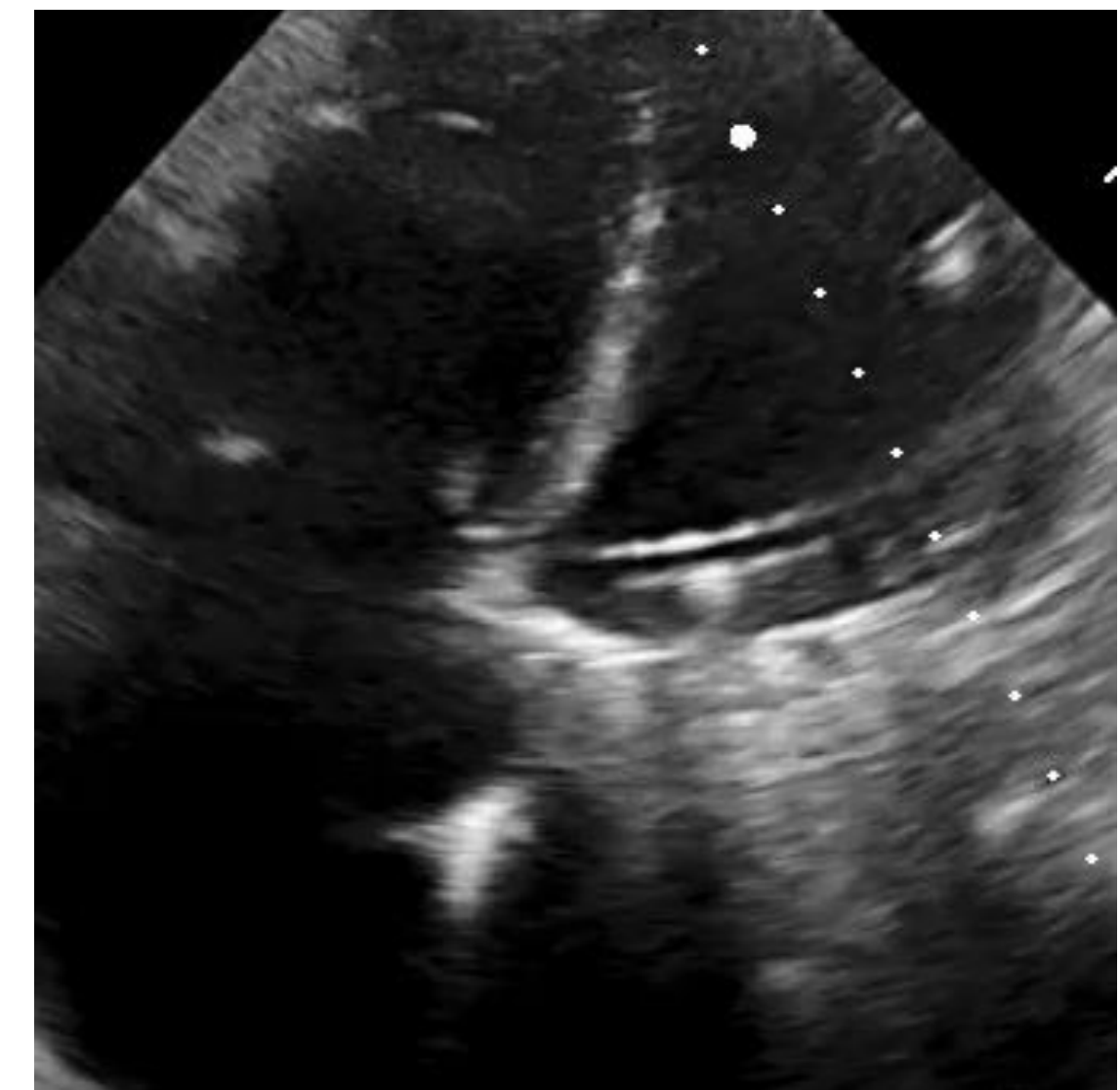
Carpentier I



Carpentier II



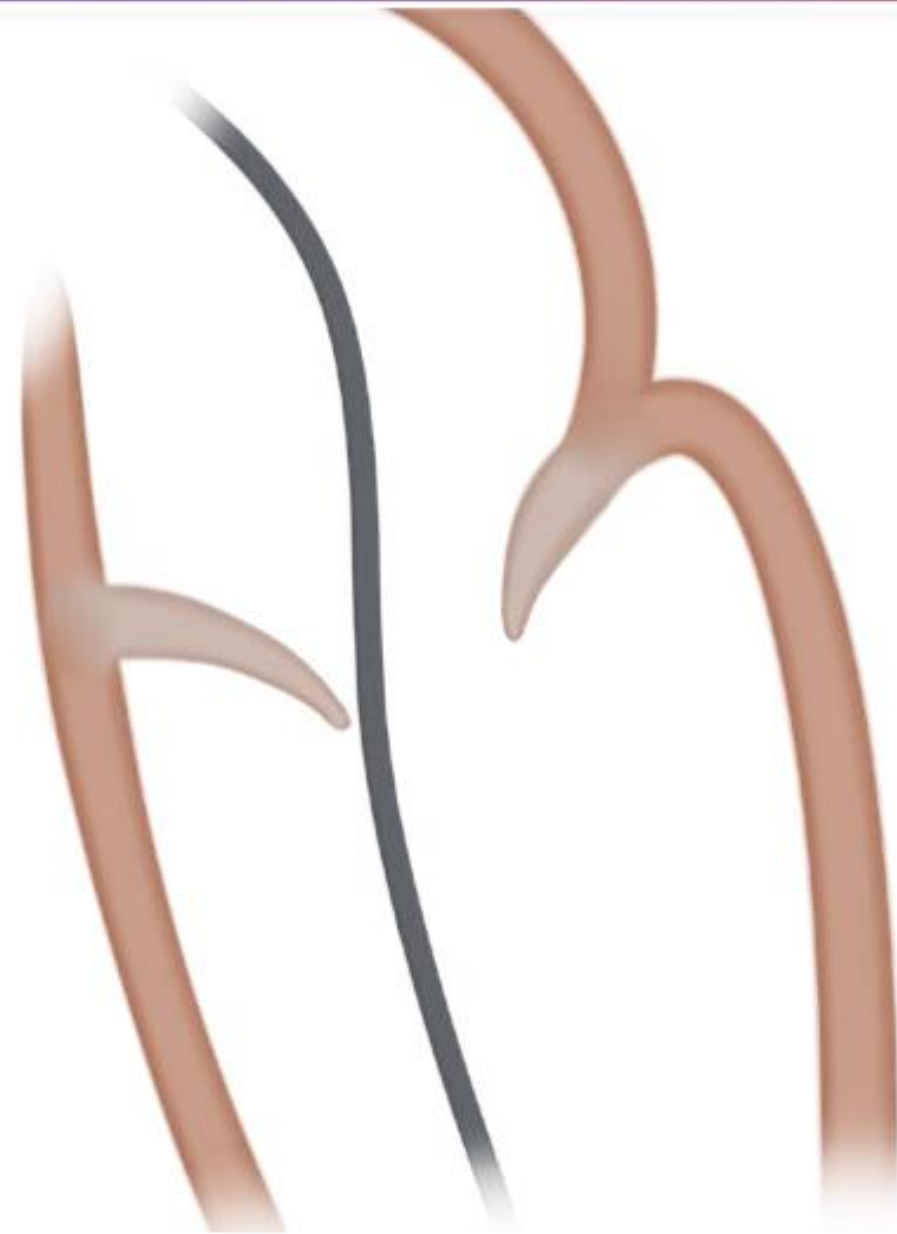
Carpentier IIIA



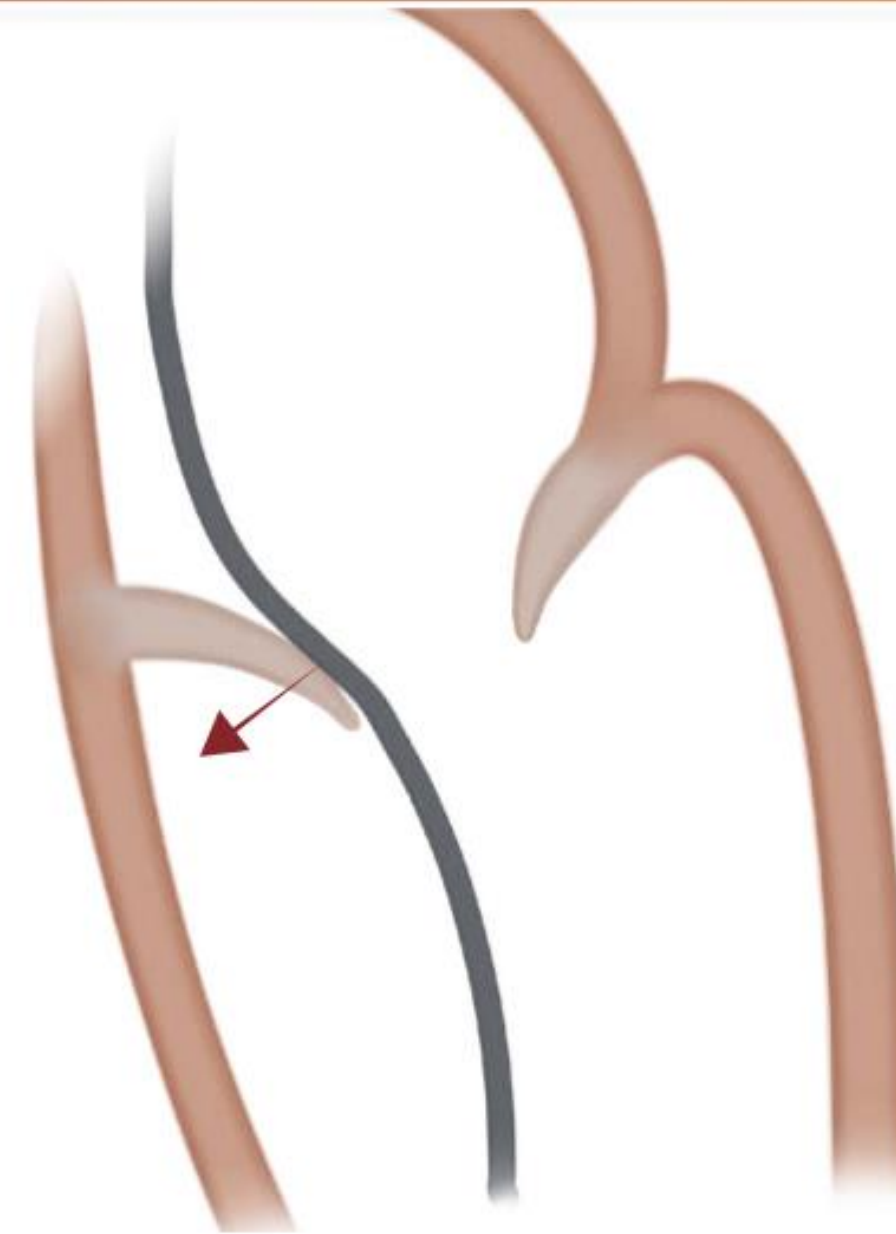
Carpentier IIIB

Leads and TR

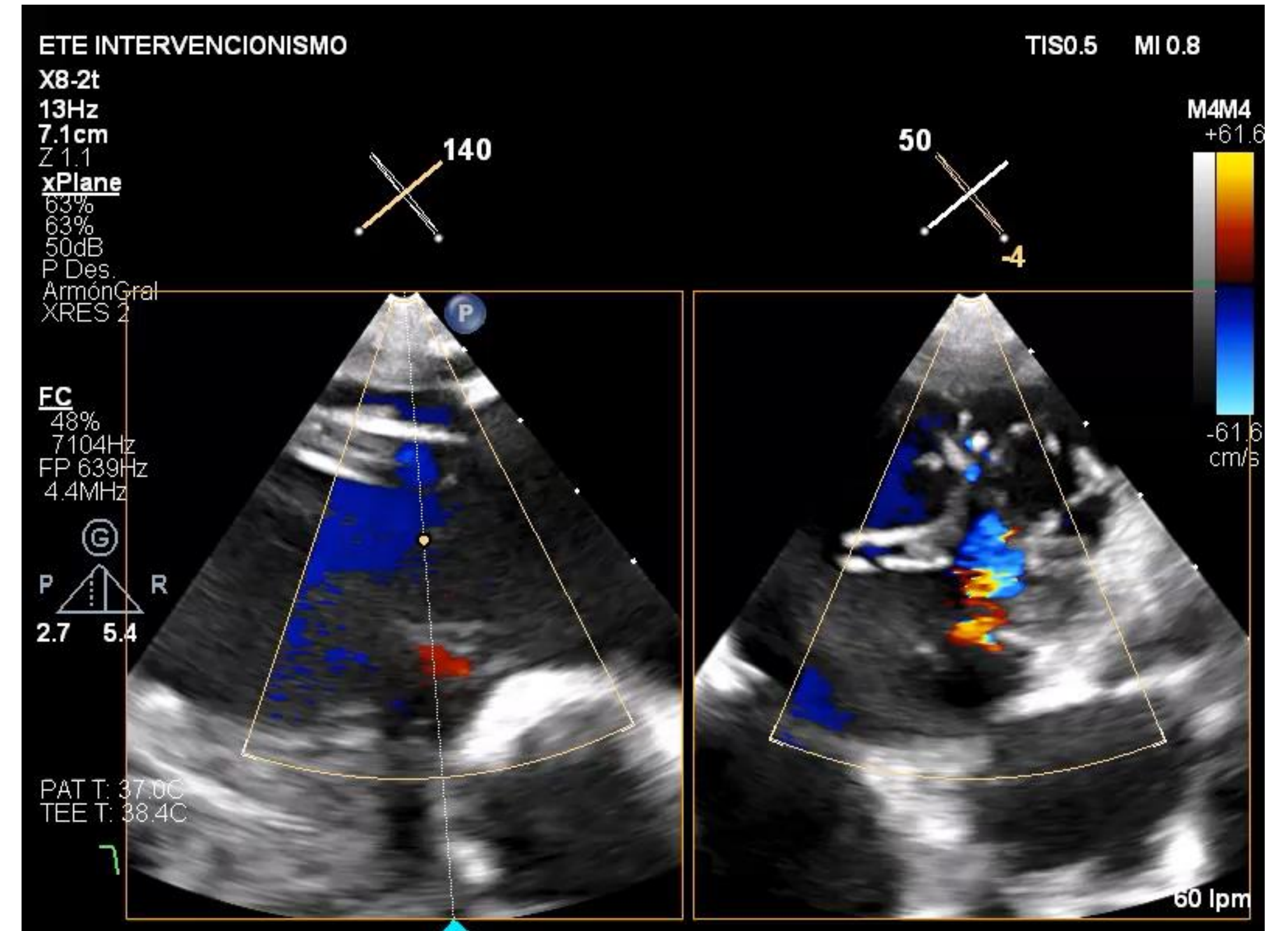
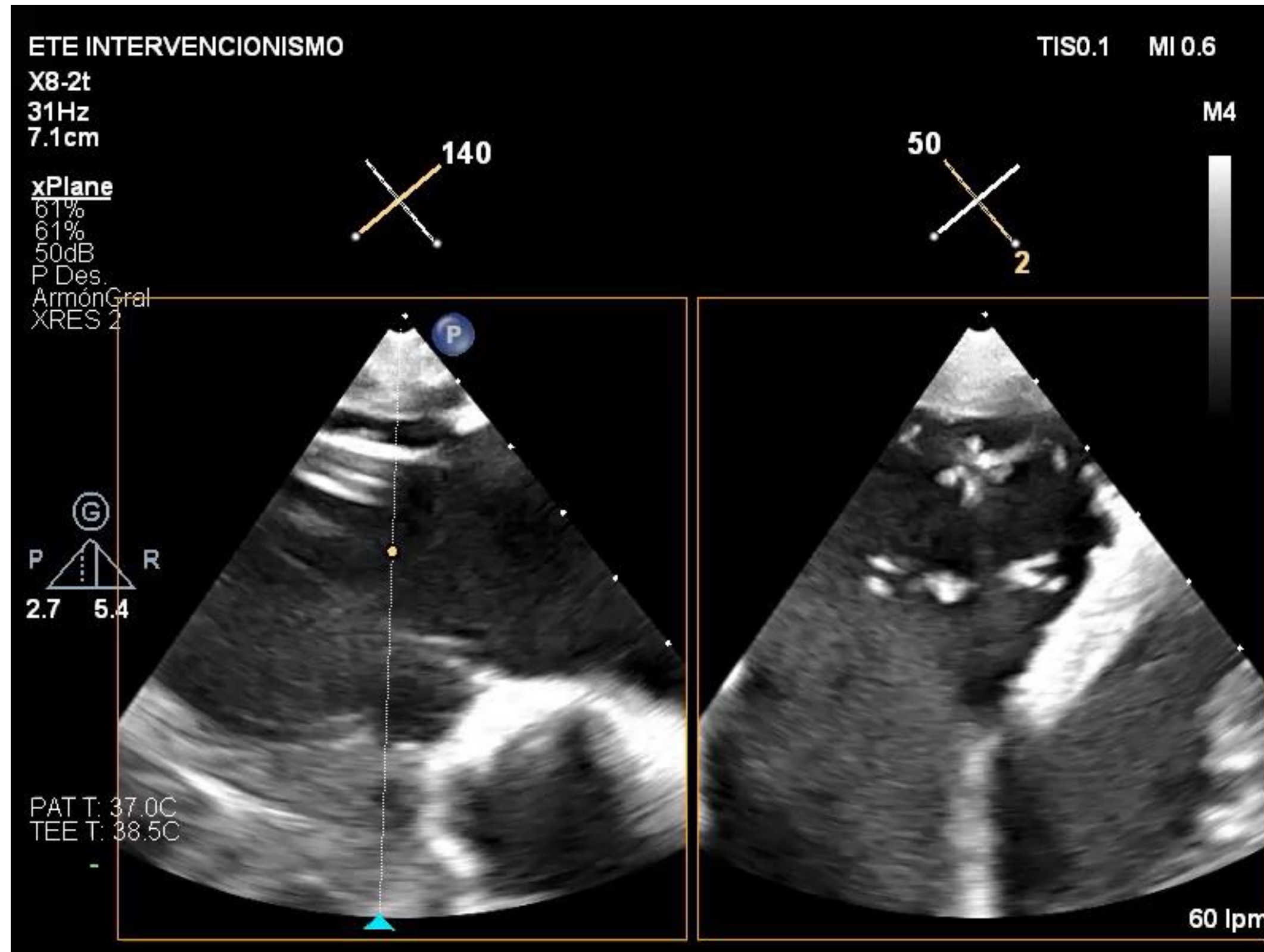
Lead-associated TR



Lead-related TR

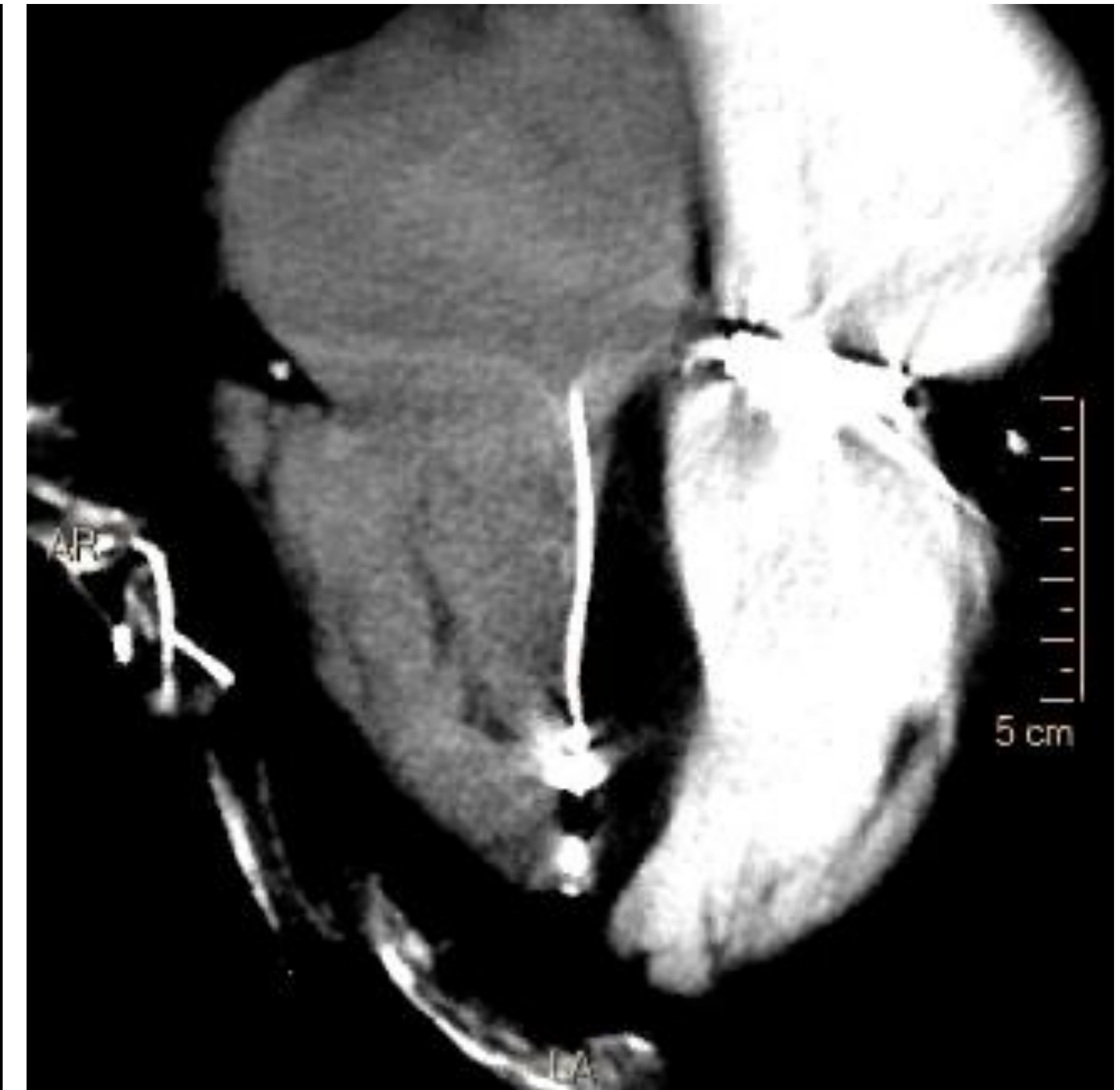
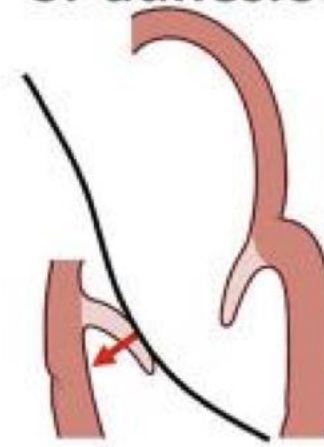


Lead-associated TR

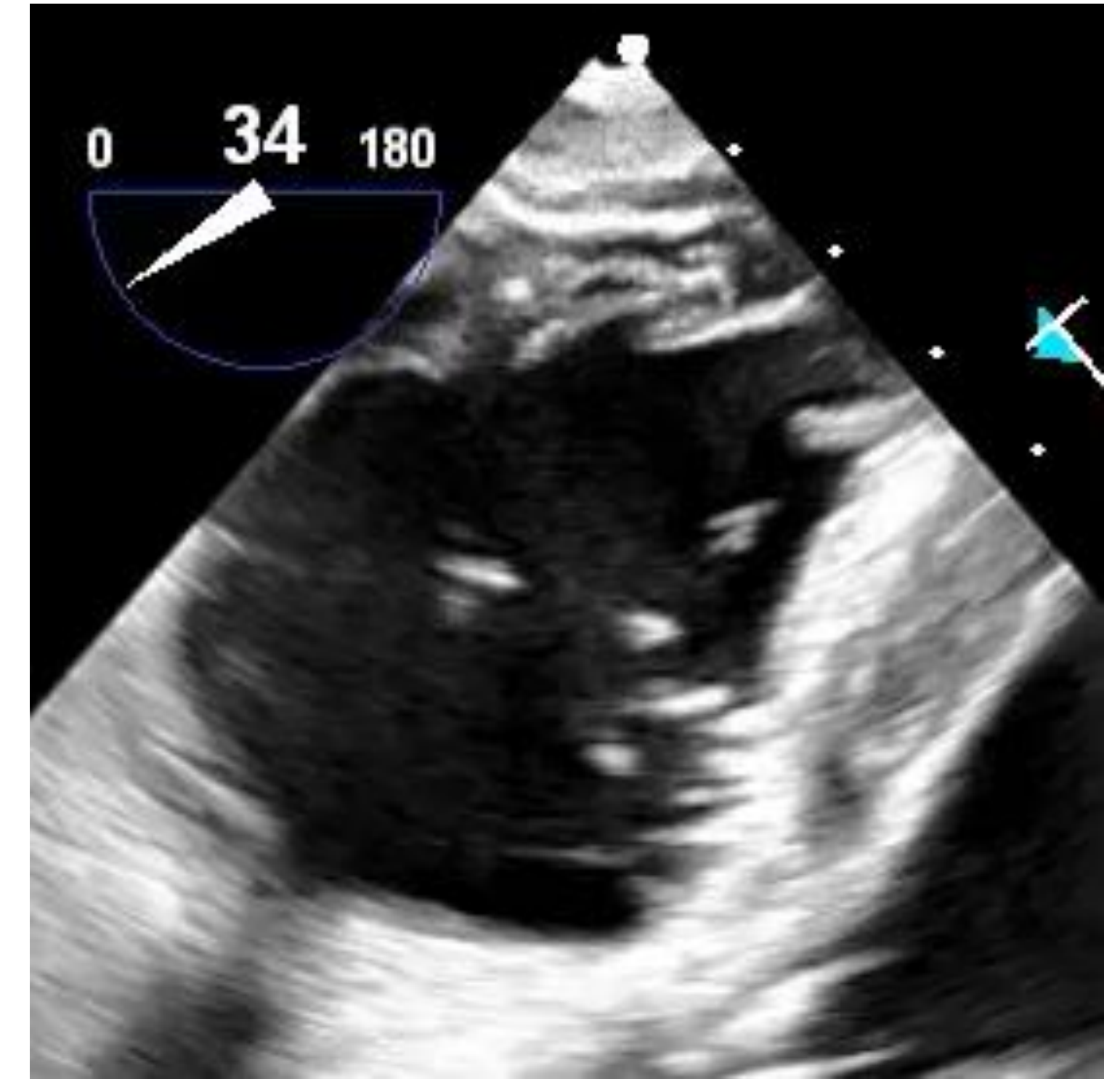
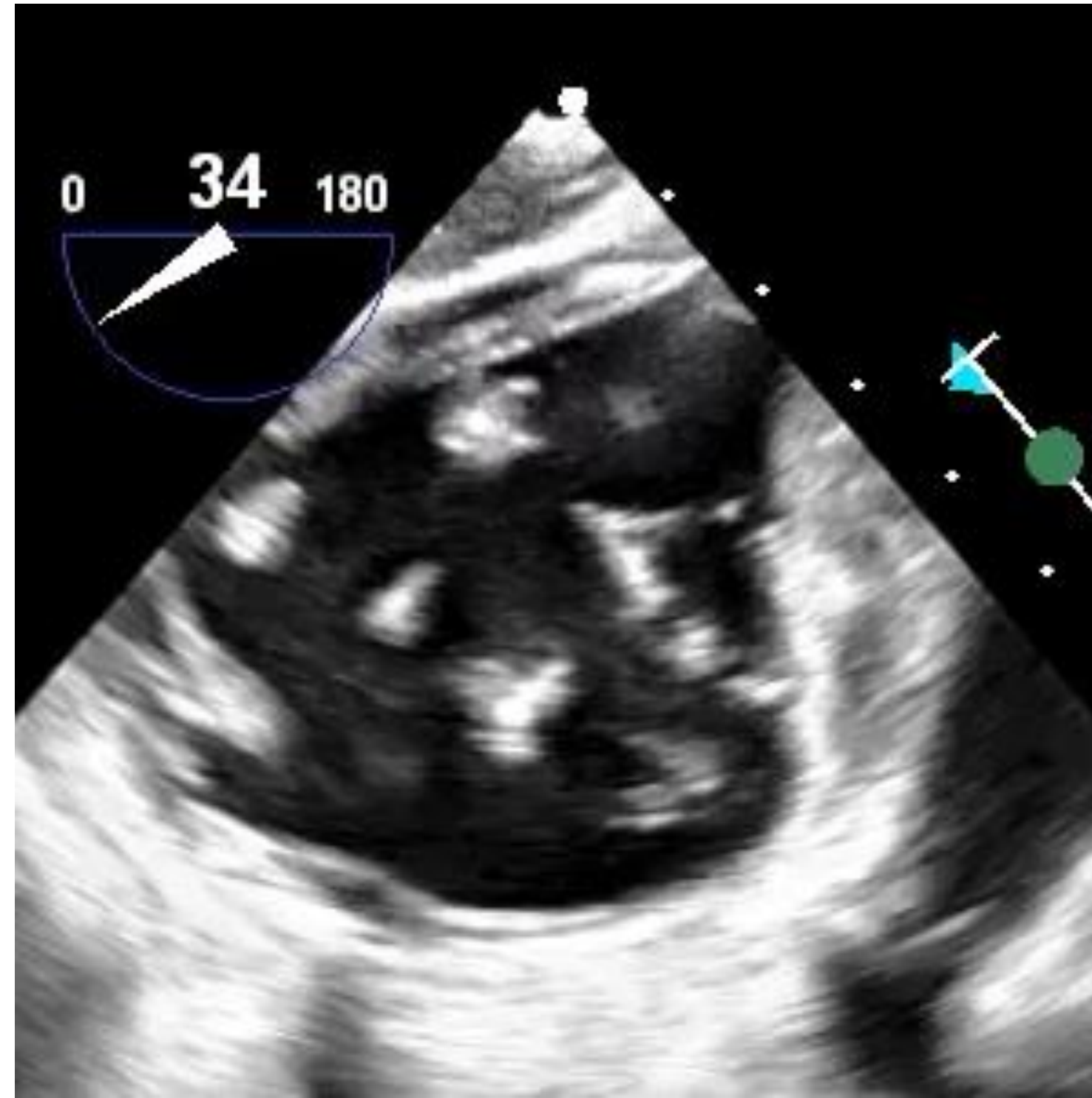
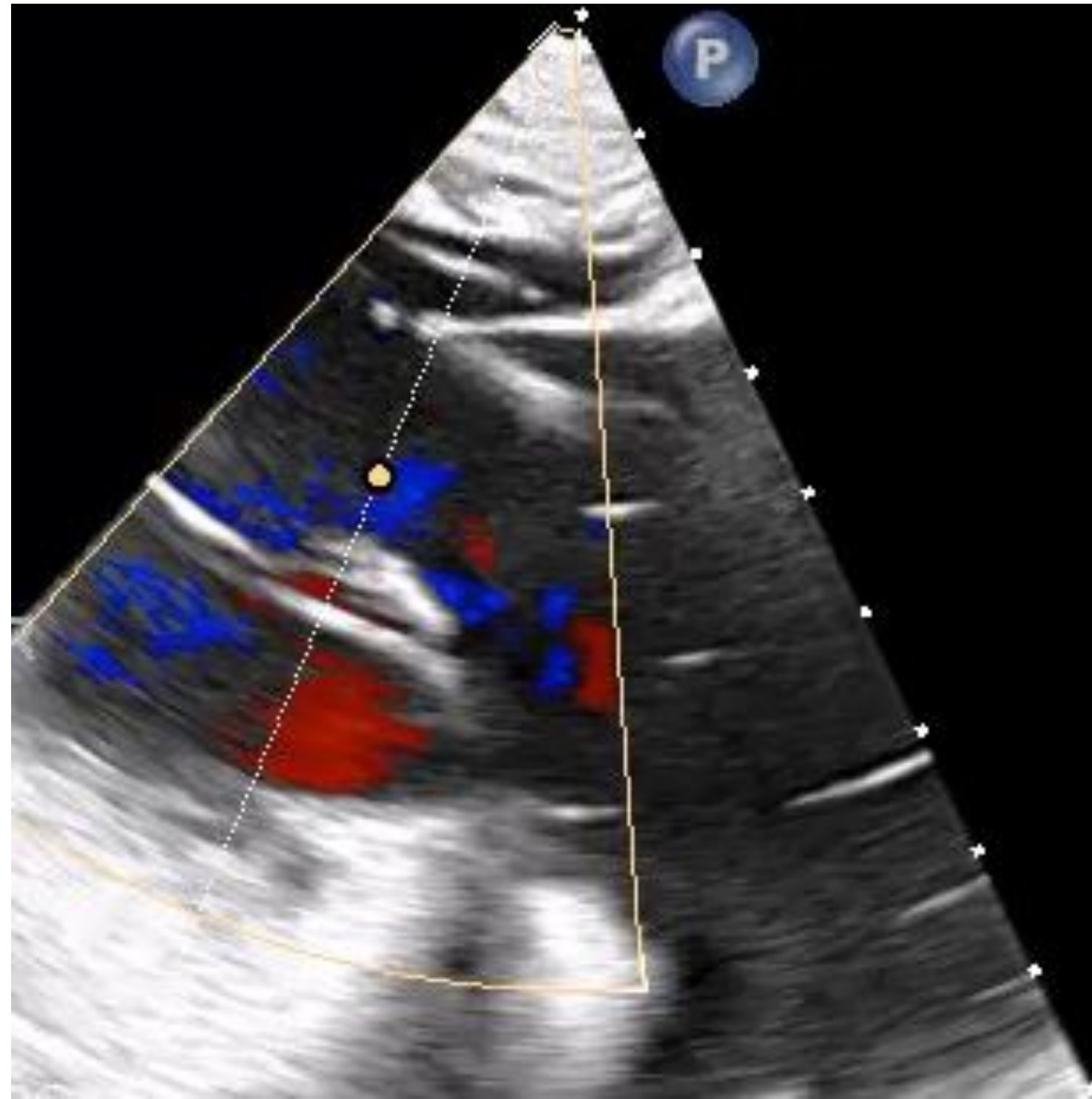
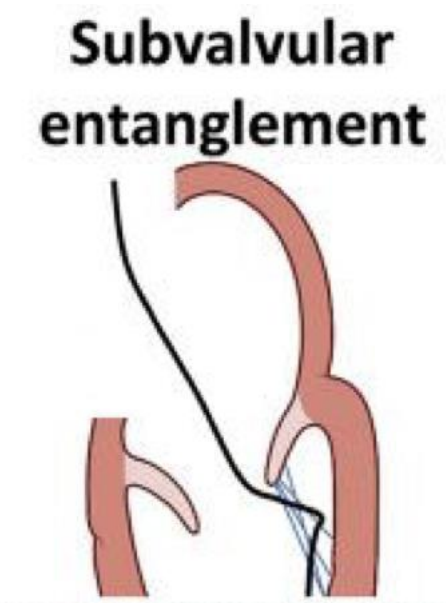


Lead-related TR: impingement

Leaflet impingement
or adhesion



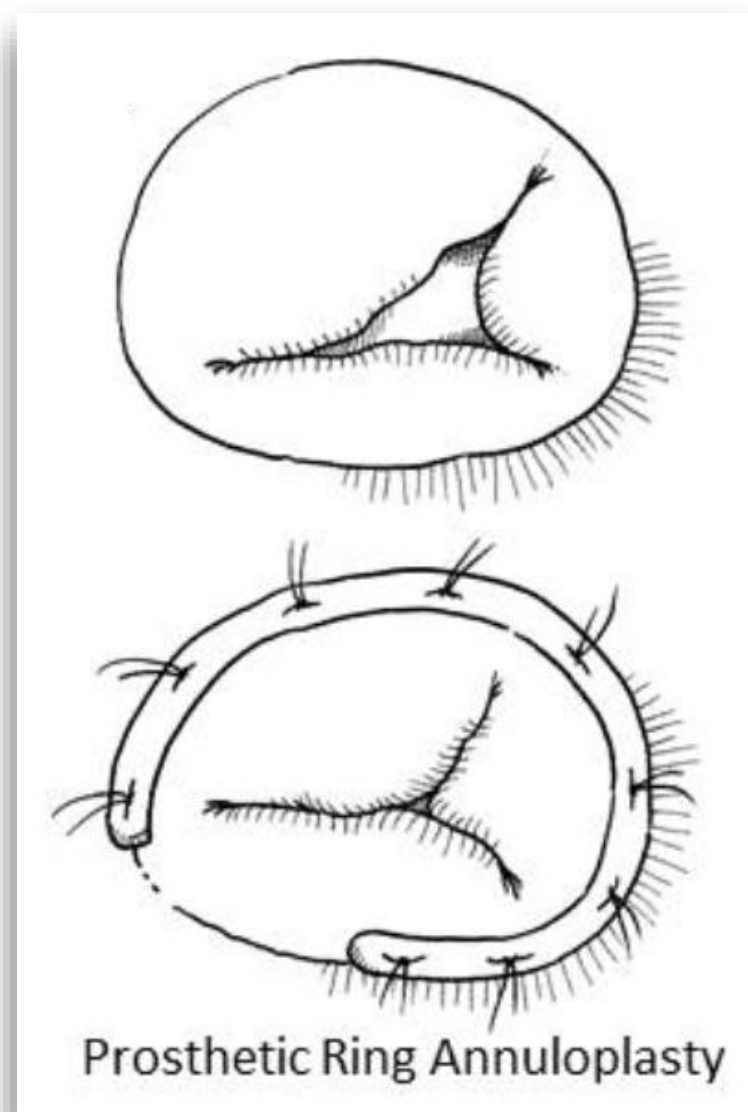
Lead-related TR: entanglement



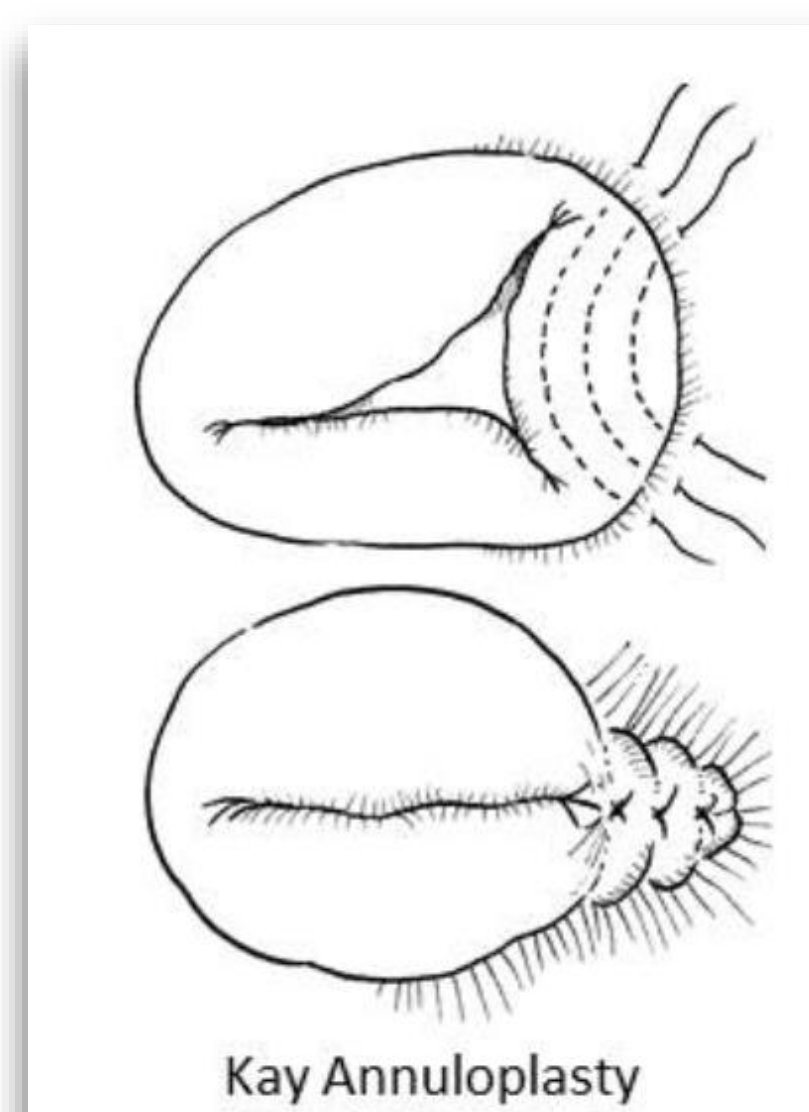
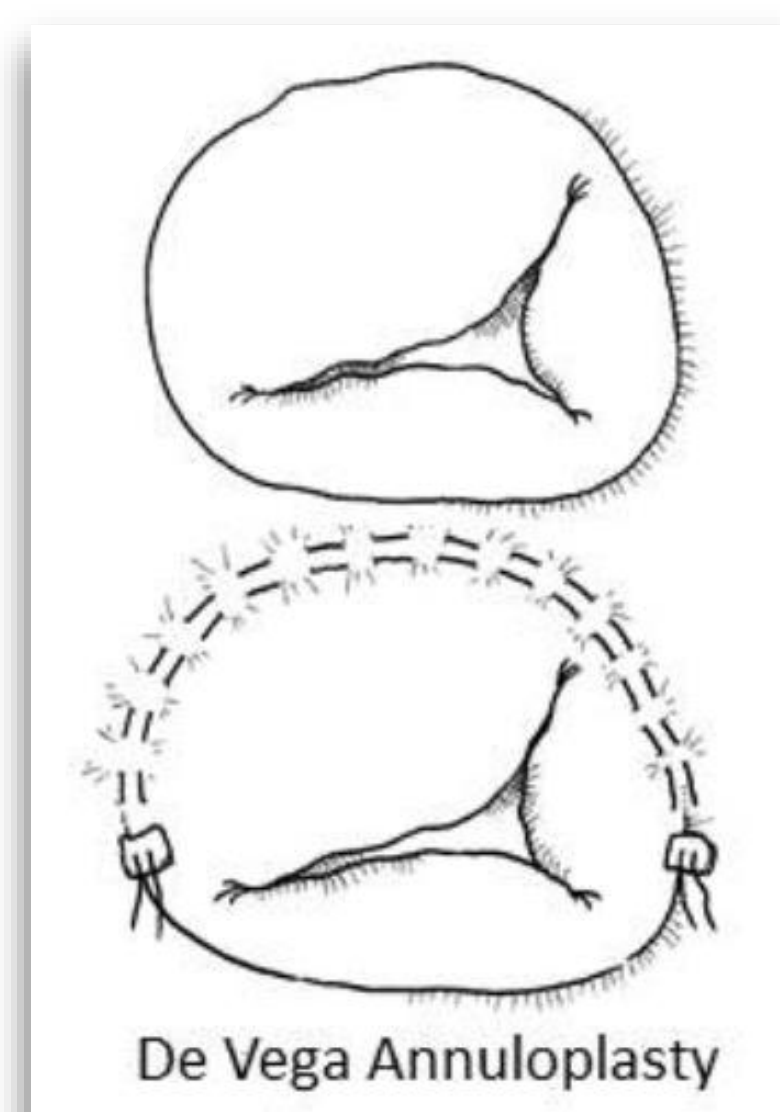
Tricuspid anatomical considerations for surgery

Surgical repair techniques

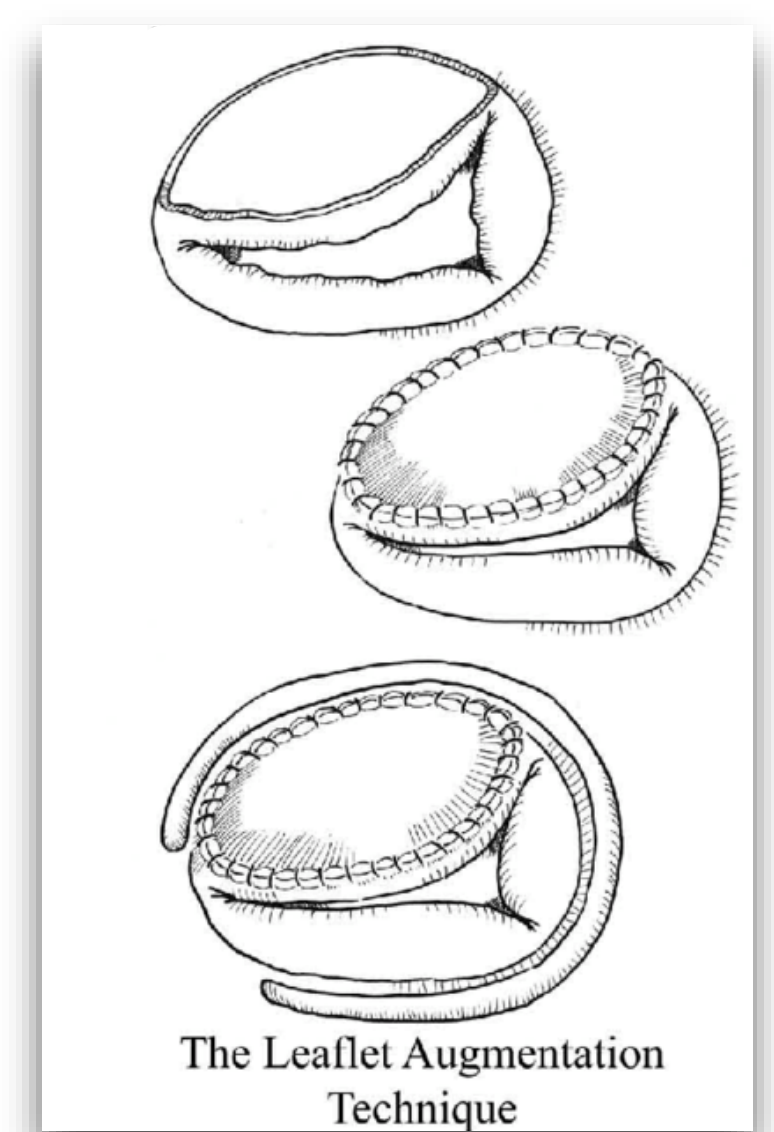
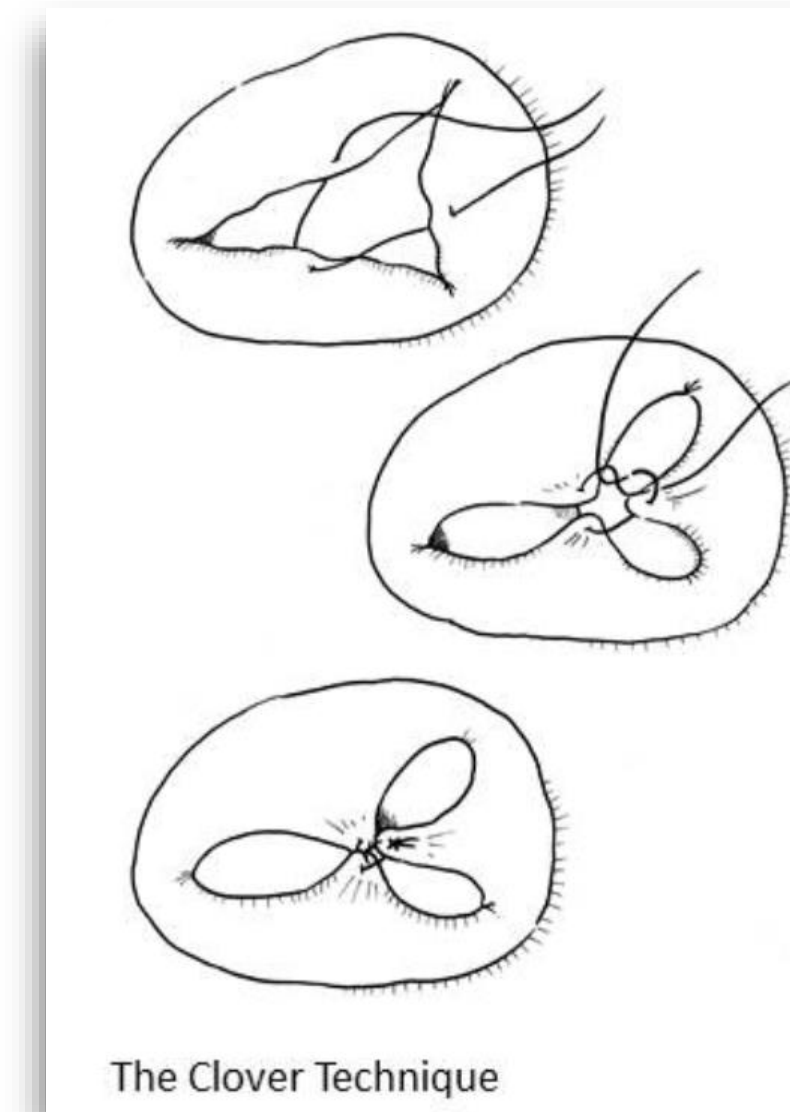
Ring annuloplasty



Suture annuloplasty



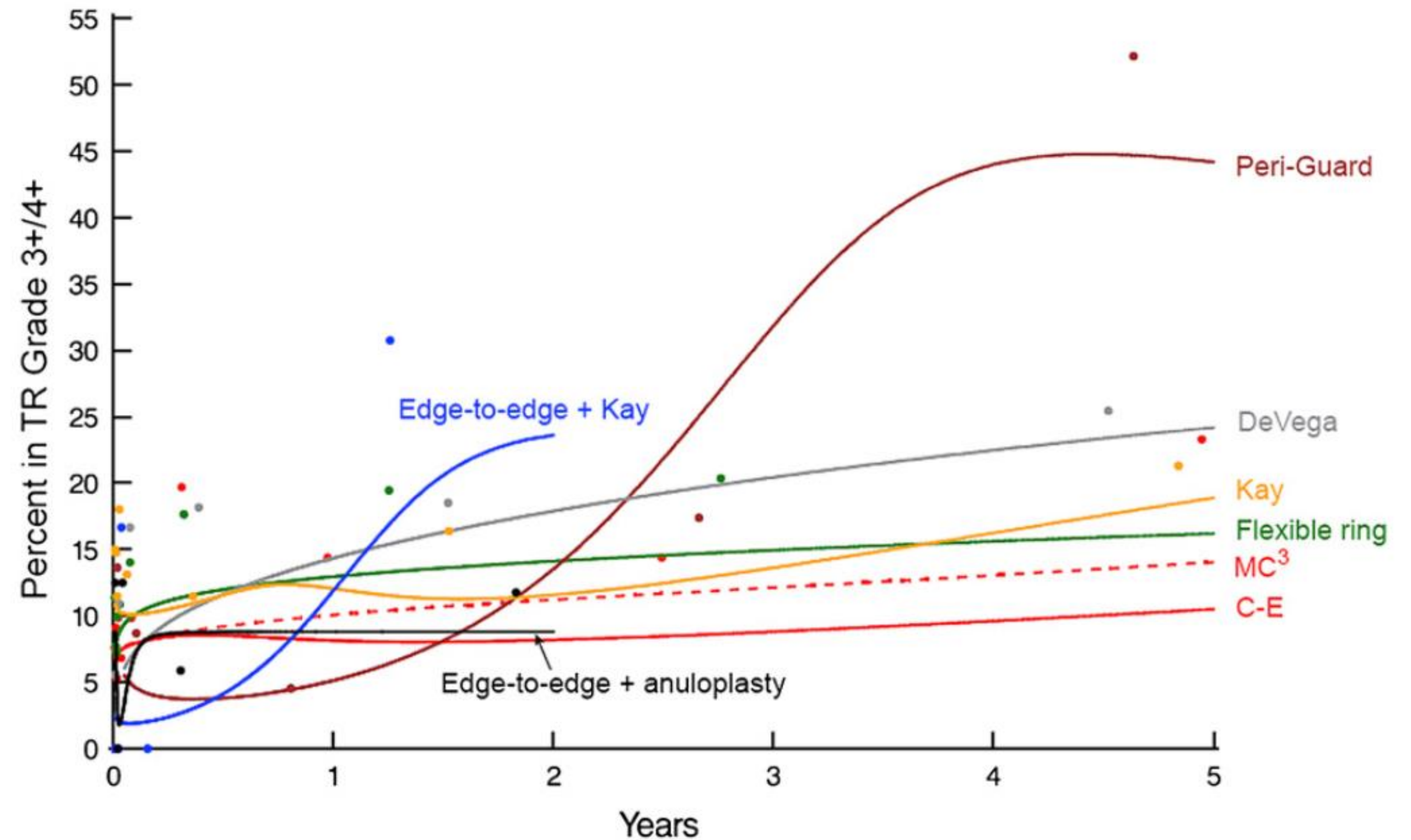
Leaflets approach



Surgical repair

2277p.
67% + Mitral
7.9% + Aortic
25% + combined Mi+Ao

1990-2008
Cleveland Clinic



Tricuspid assessment for surgical repair

Recommendations on secondary tricuspid regurgitation

Surgery is recommended in patients with severe secondary tricuspid regurgitation undergoing left-sided valve surgery.^{423–427}

I

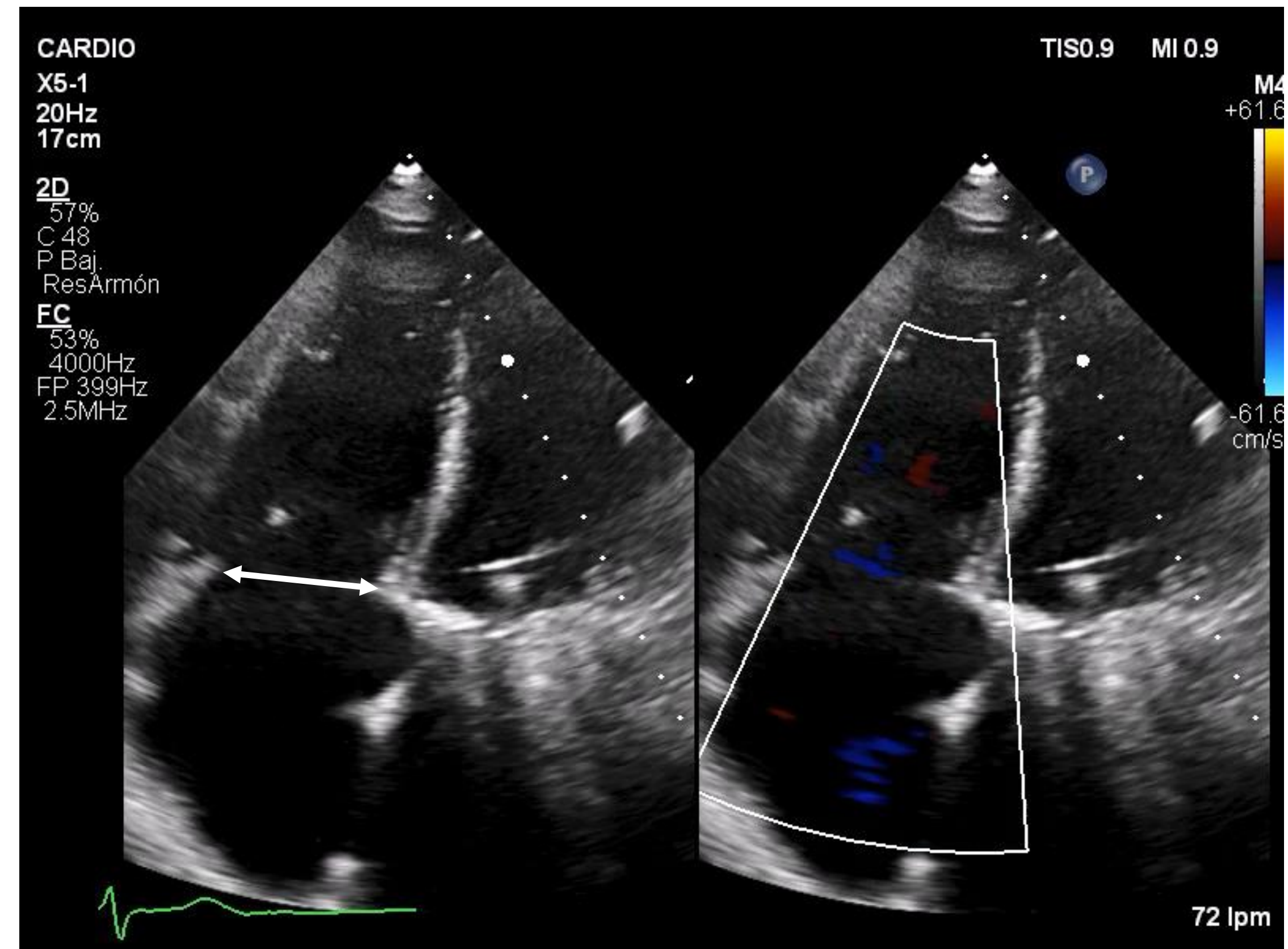
B

Surgery should be considered in patients with mild or moderate secondary tricuspid regurgitation with a dilated annulus (≥ 40 mm or > 21 mm/m² by 2D echocardiography) undergoing left-sided valve surgery.^{423,425–427}

IIa

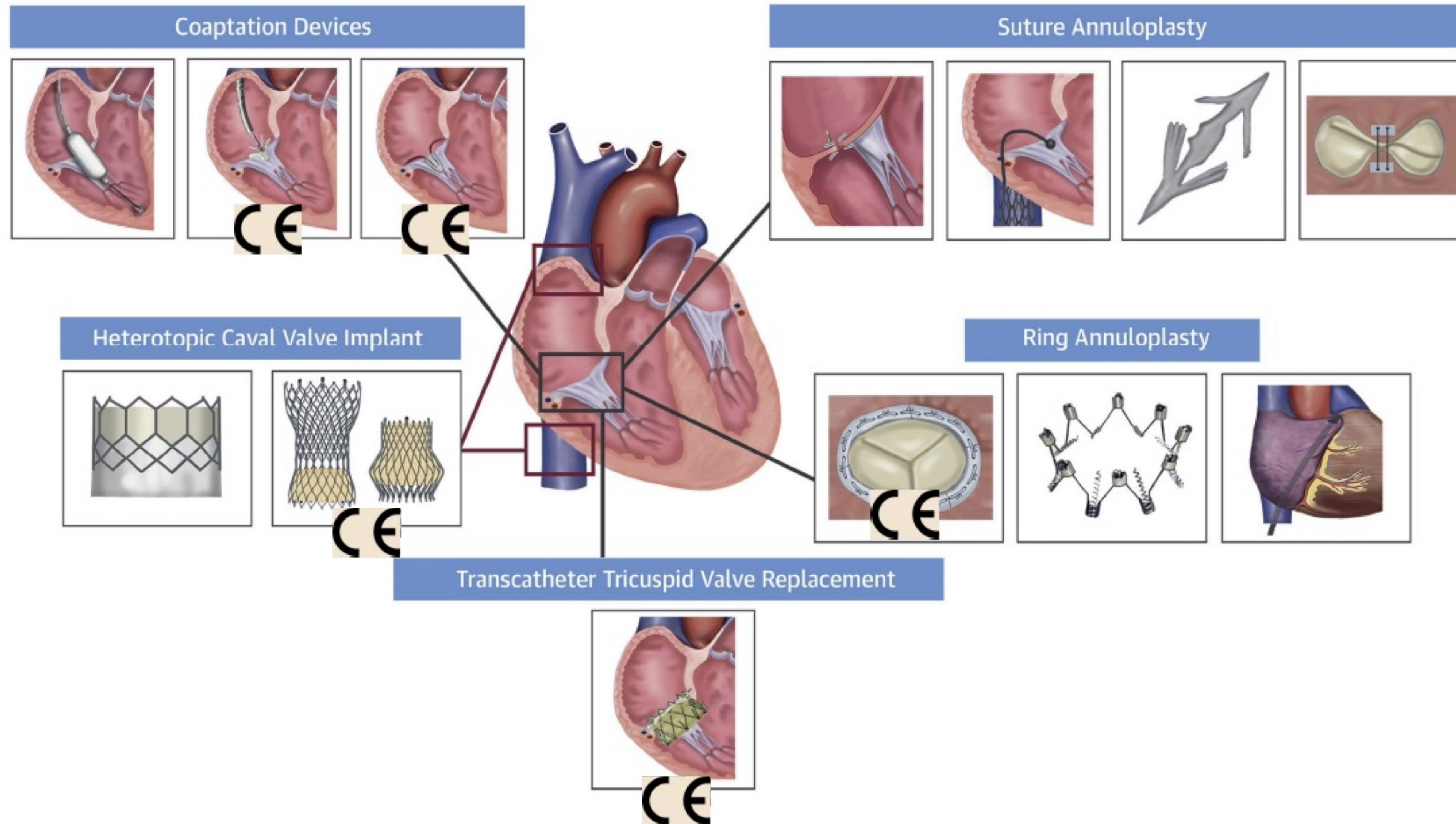
B

Whenever possible, annuloplasty with **prosthetic rings** is preferable to valve replacement,^{423,430,436} which should only be considered when the tricuspid valve leaflets are tethered and the annulus severely dilated. In presence of a cardiac implantable electronic device lead, the technique used should be adapted to the patient's condition and the surgeon's experience.⁴³⁷

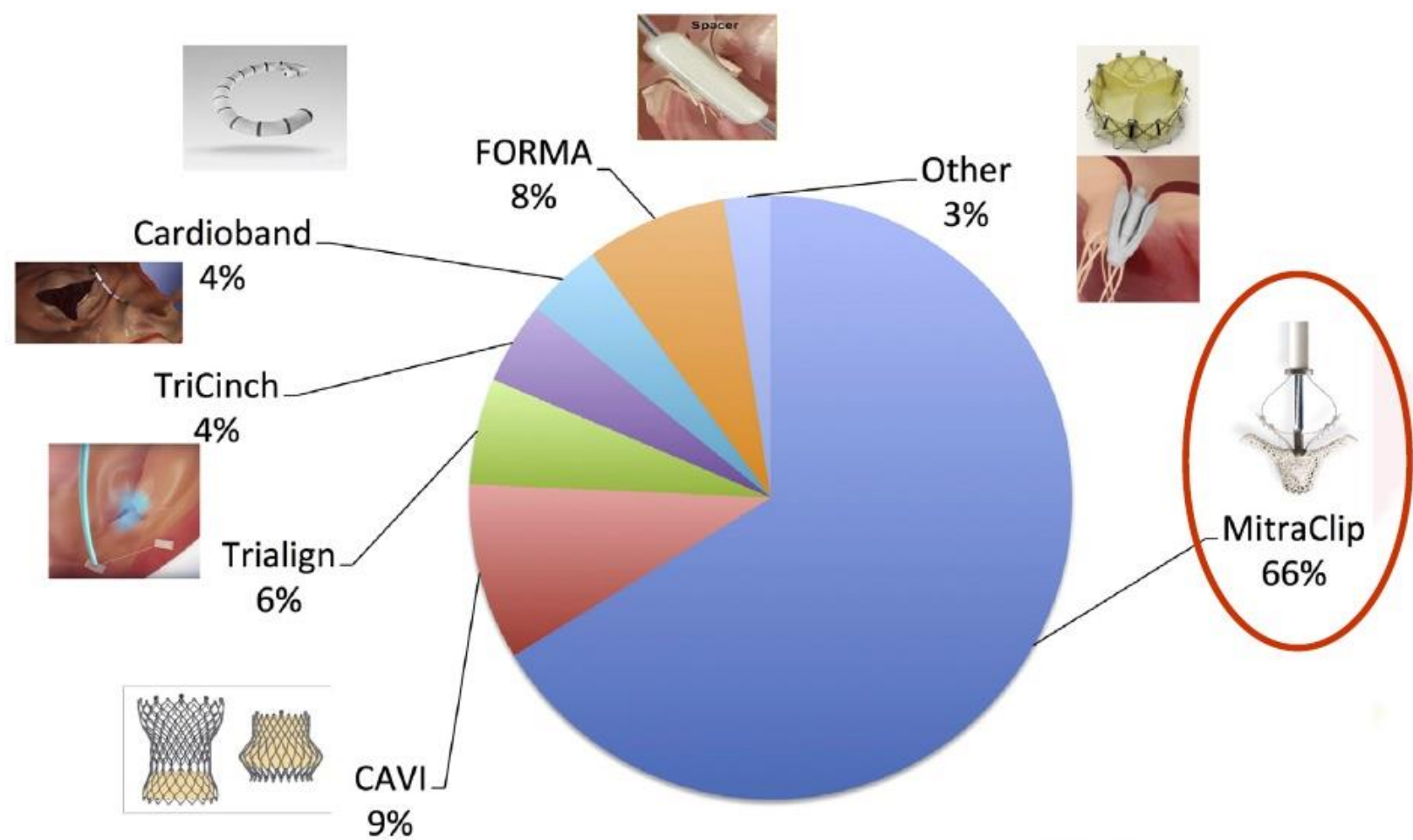


Tricuspid anatomical considerations for transcatheter therapies

Transcatheter therapies



TRIVALVE Registry - “REAL LIFE”



Taramaso et al JACC int 2019

Type of TTVI 2019 (n=249)	
TEER	66%
Annuloplasty	14%
CAVI	9%
Others	11%

Type of TTVI 2022 (n=556)	
TEER	78.2%
Annuloplasty	9.4%
TTVR	2.3%
Others	10.1%

Scotti et al Eur Heart J. 2022

Anatomical considerations for TEER



SGC insertion
intro RA
Navigation

CDS
advancement
into RA and
Steering
Navigation

Axial
Alignment
of CDS

Device Arms
Orientation

Leaflet
capture

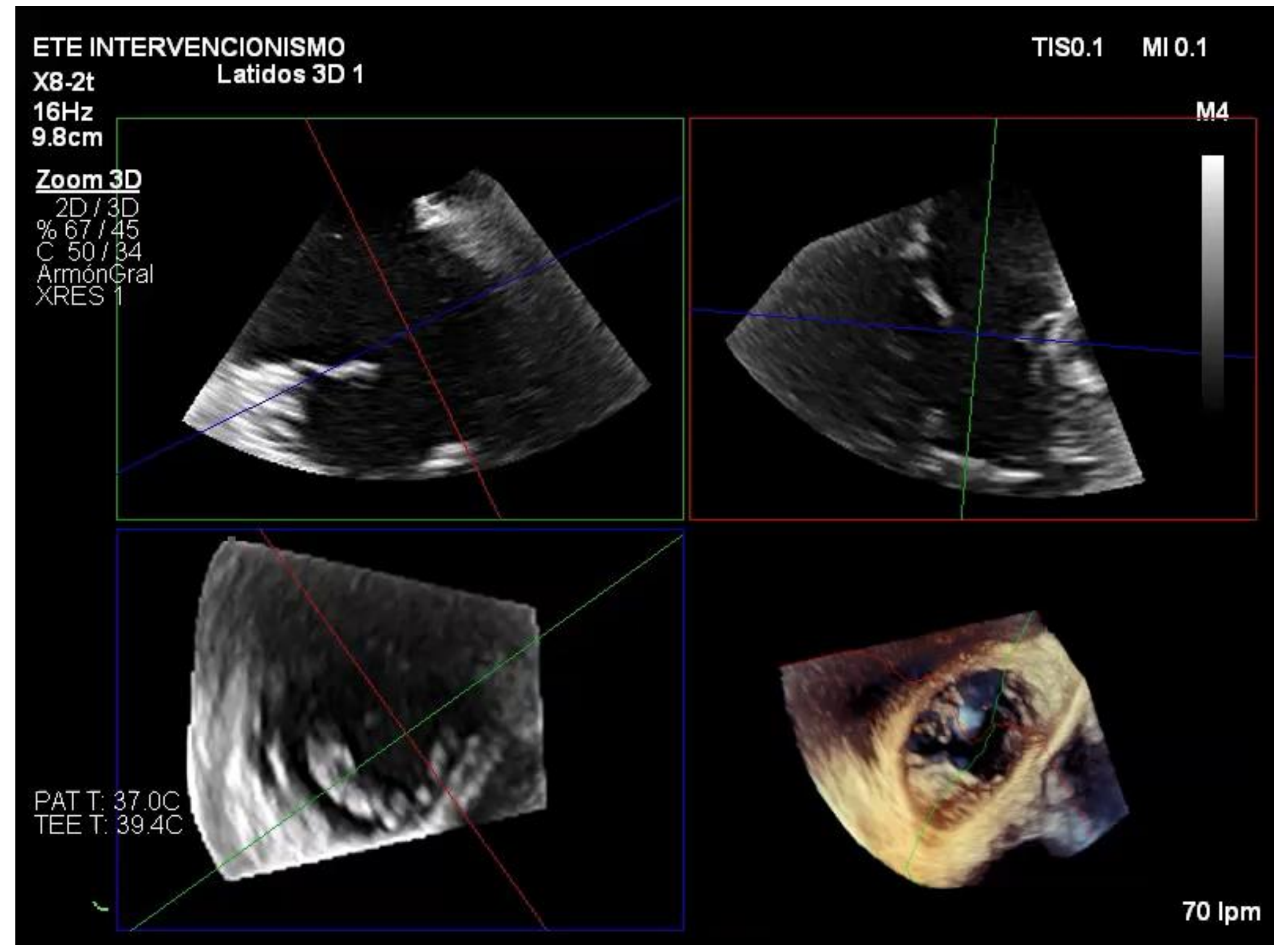
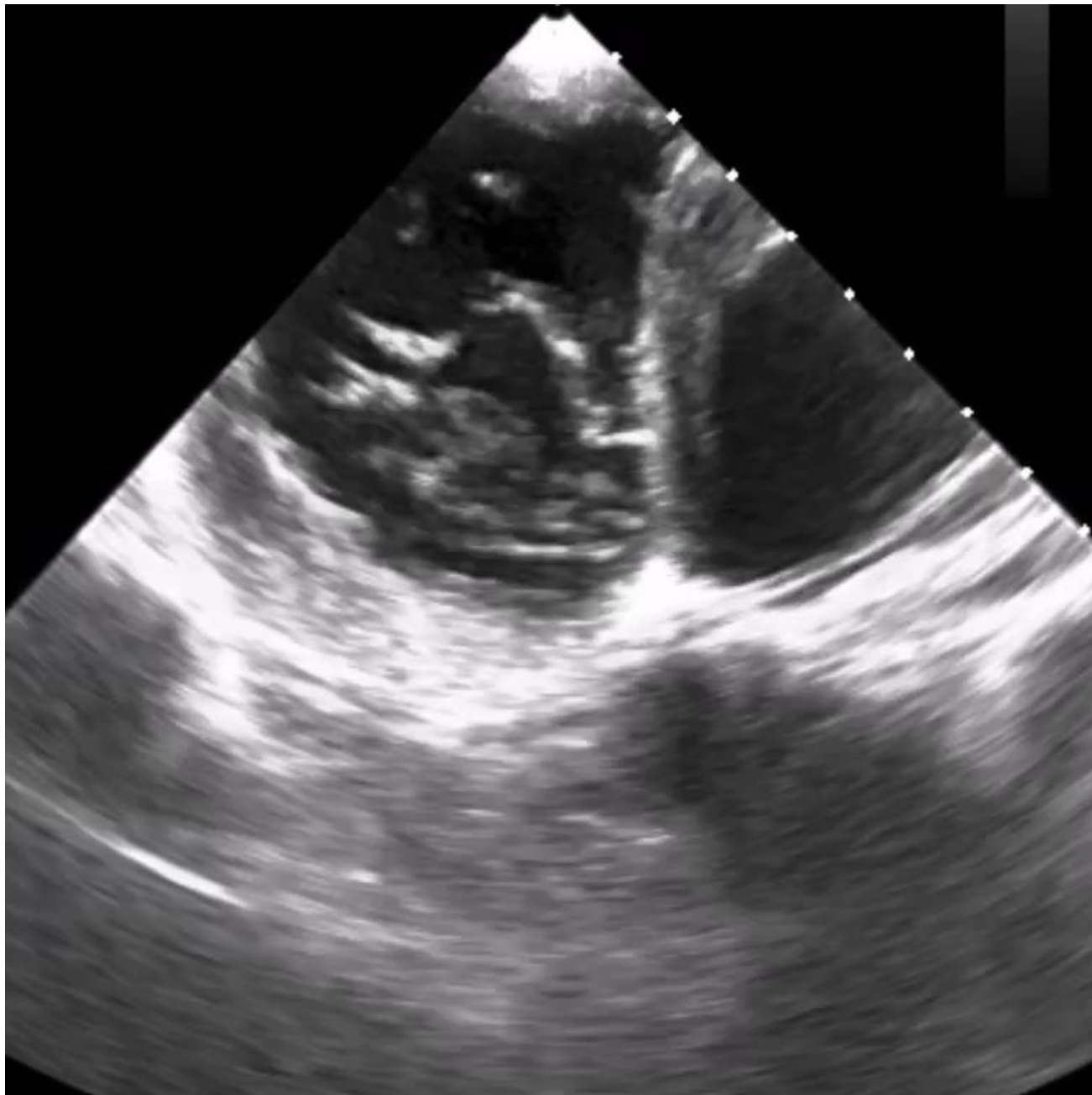
Result
evaluation
before and after
deployment

System
Removal

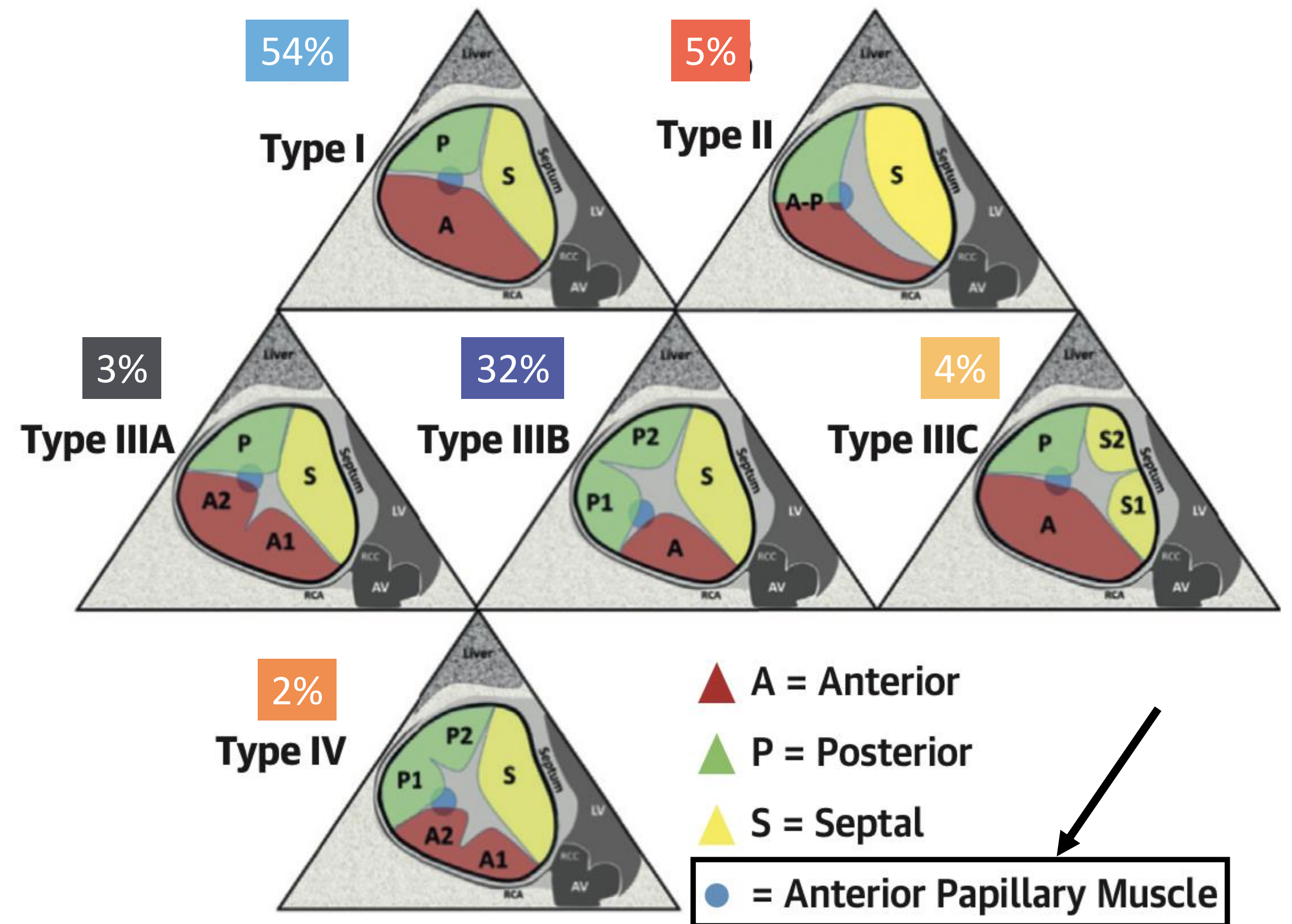
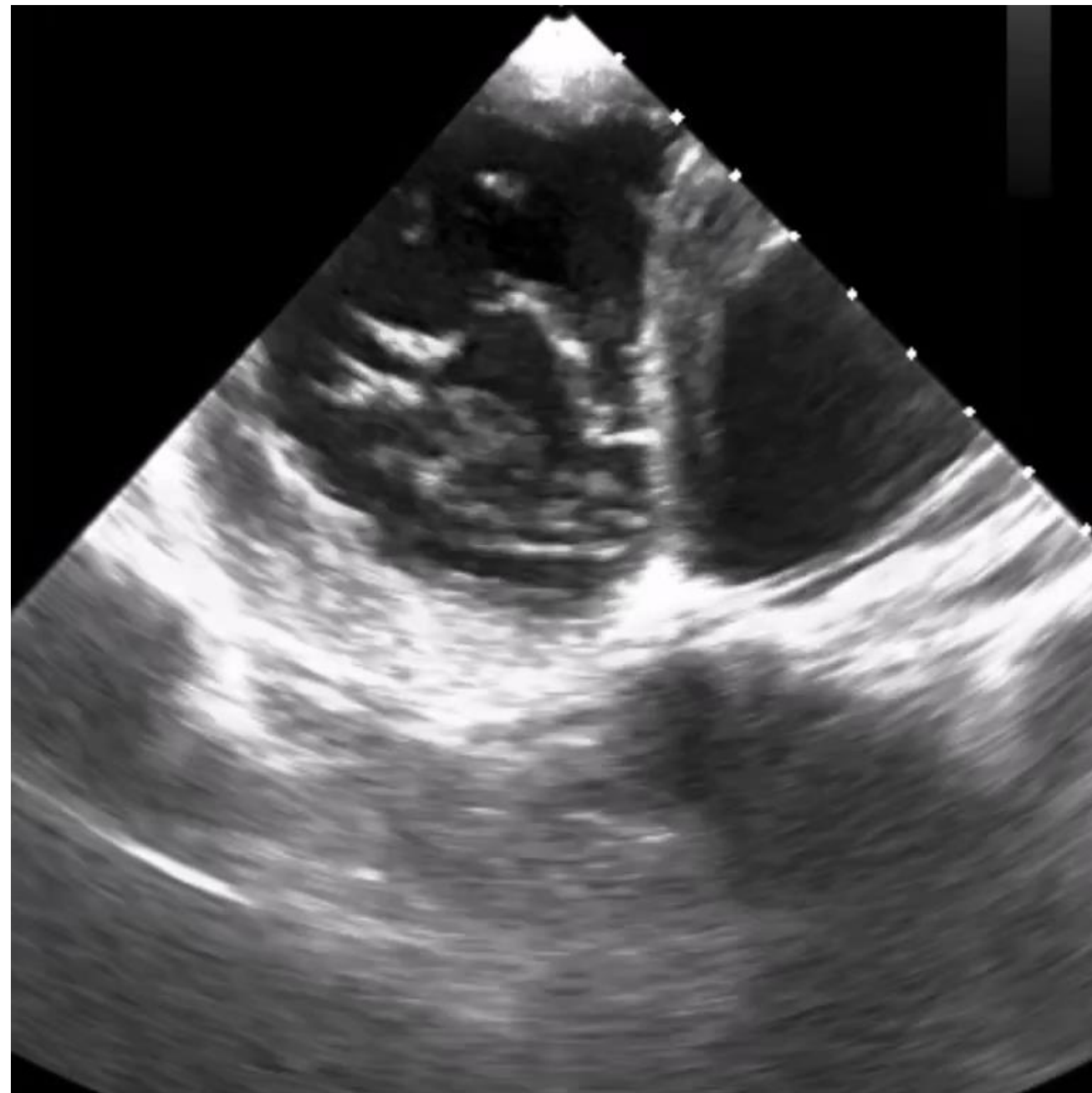
Anatomical considerations for TEER

	Ideal pathoanatomy for optimal tricuspid TEER outcomes	Challenging pathoanatomy for optimal tricuspid TEER outcomes	Relative pathoanatomic contraindications for tricuspid TEER
Leaflet length and mobility	<u>Good leaflet lengths (≥ 7 mm)</u> and primary TR with prolapse only (no flail), or secondary TR with normal appearing leaflet mobility	Primary TR with leaflet prolapse or flail gap < 10 mm, or secondary TR with reduced leaflet mobility but tethering height < 9 mm	Severe leaflet thickening (i.e. rheumatic) or shortening (length < 7 mm) or destruction (i.e. perforation) or large flail gap (≥ 10 mm), severe leaflet tethering (tethering height ≥ 9 mm)
Coaptation gap	Significant TR with small coaptation <u>gap (< 7 mm)</u>	Moderate coaptation gap (> 7 to < 8.5 mm)	Large coaptation gap (≥ 8.5 mm)
TR location and severity	Central TR jet within the <u>anteroseptal</u> commissure with clear grasping zones	Central TR jet extending into multiple commissures (i.e. in patients with > 3 leaflets) with possible grasping zone	Non-central or very eccentric jets or jets originating from multiple commissures (i.e. in patients with > 3 leaflets) with dense chordae (i.e. no clear grasping zone), with massive or torrential disease (i.e. VC width ≥ 14 mm, EROA by PISA $> 60\text{--}70$ mm ²)

Aligned measurements

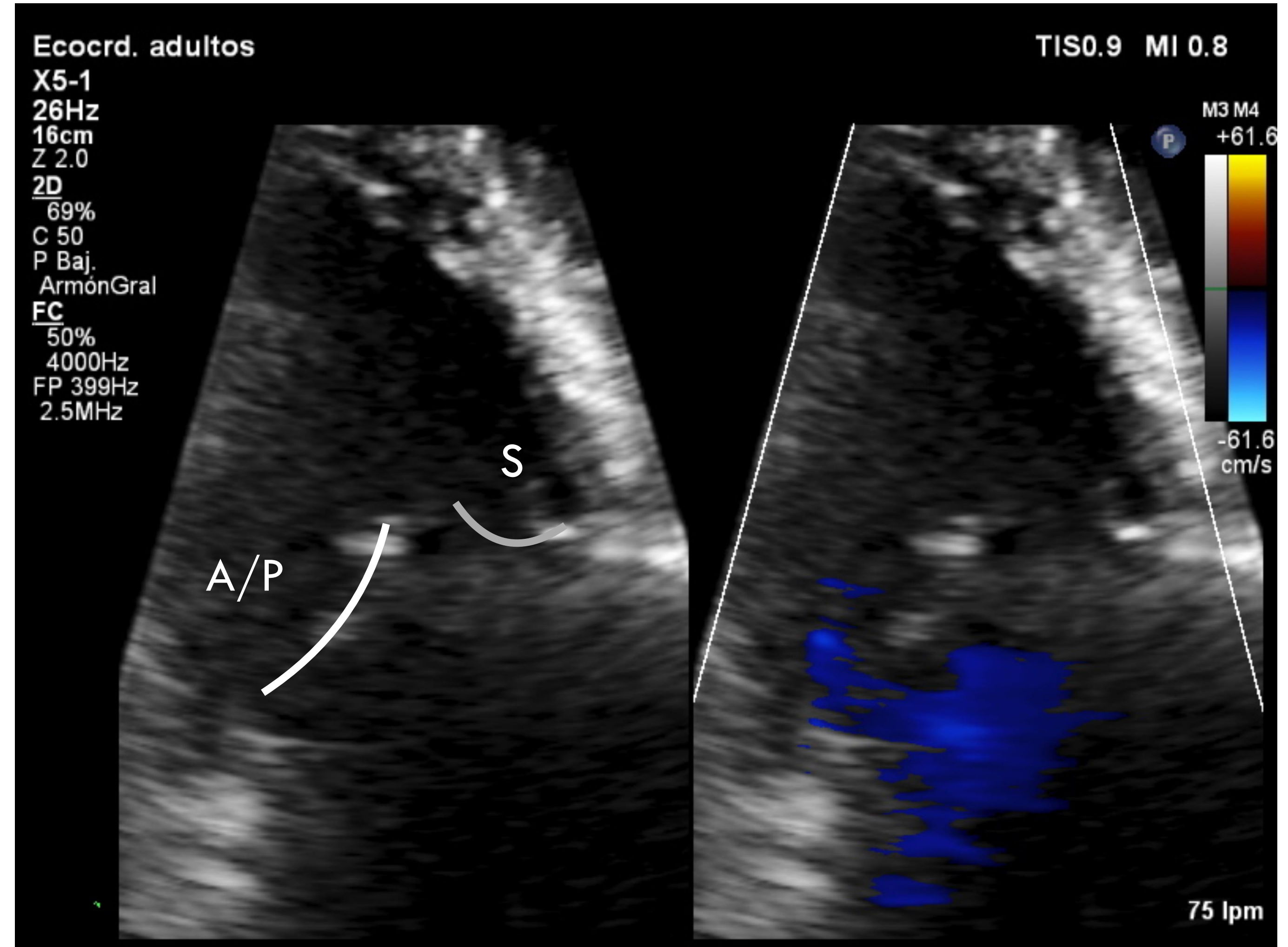
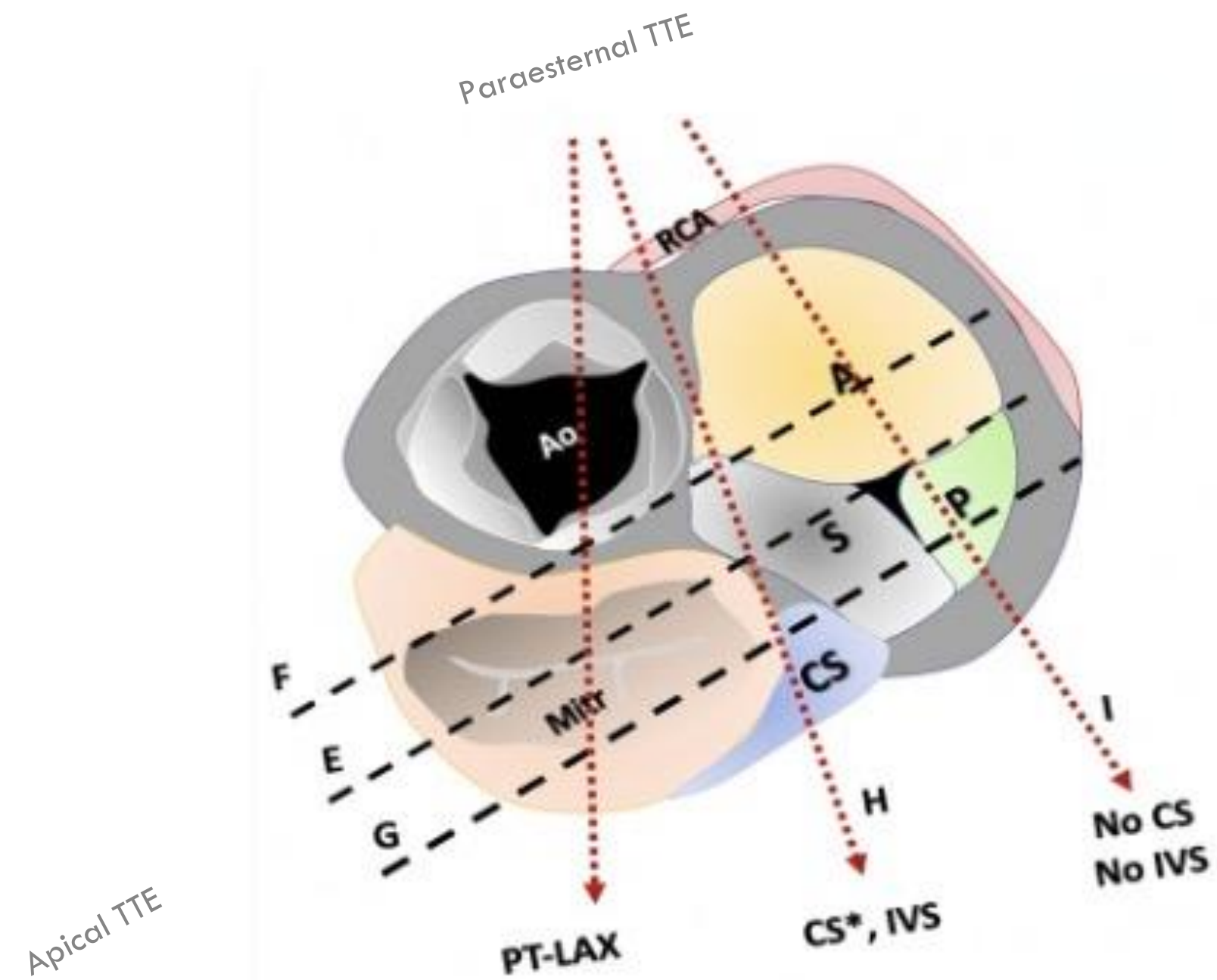


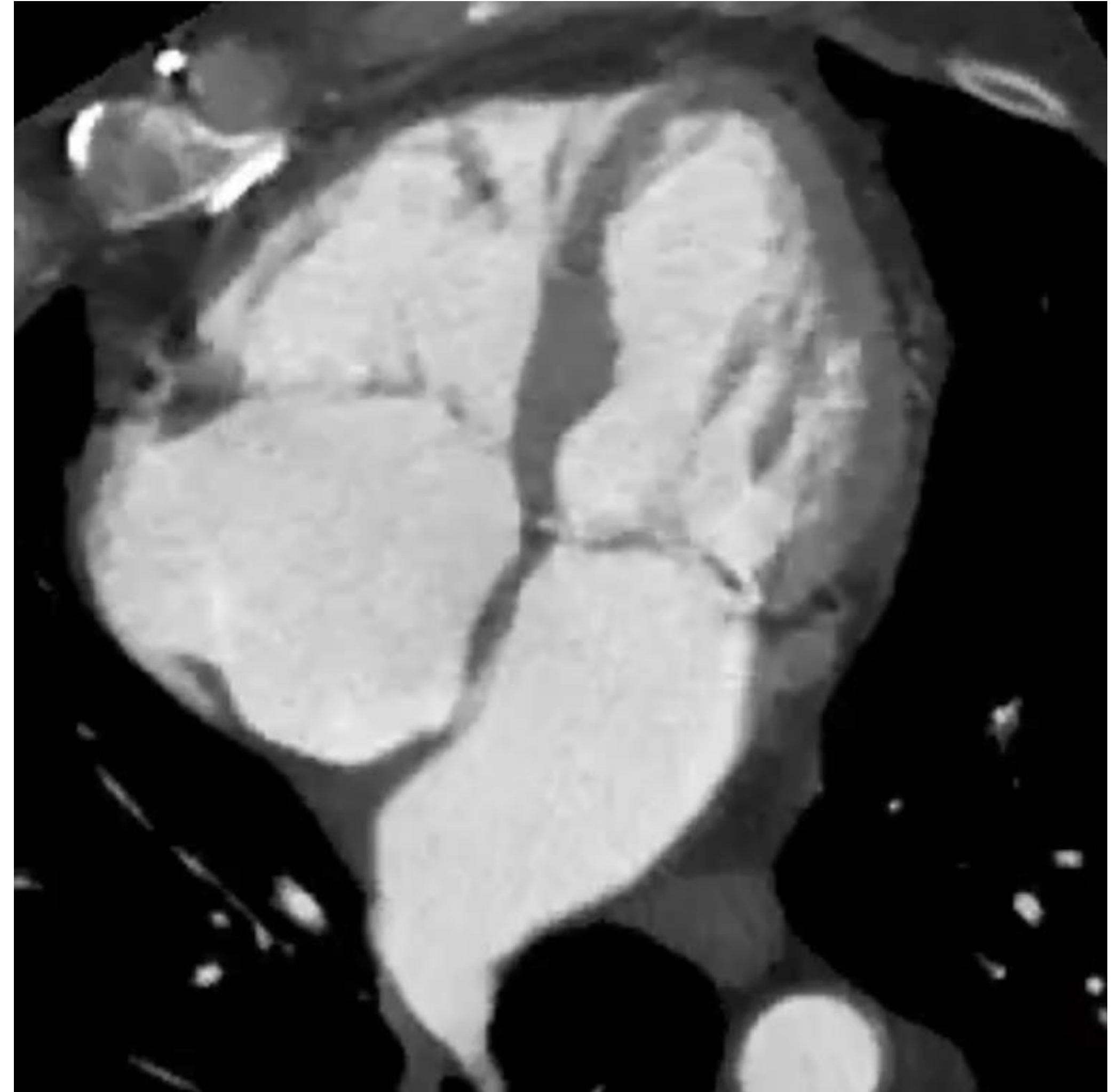
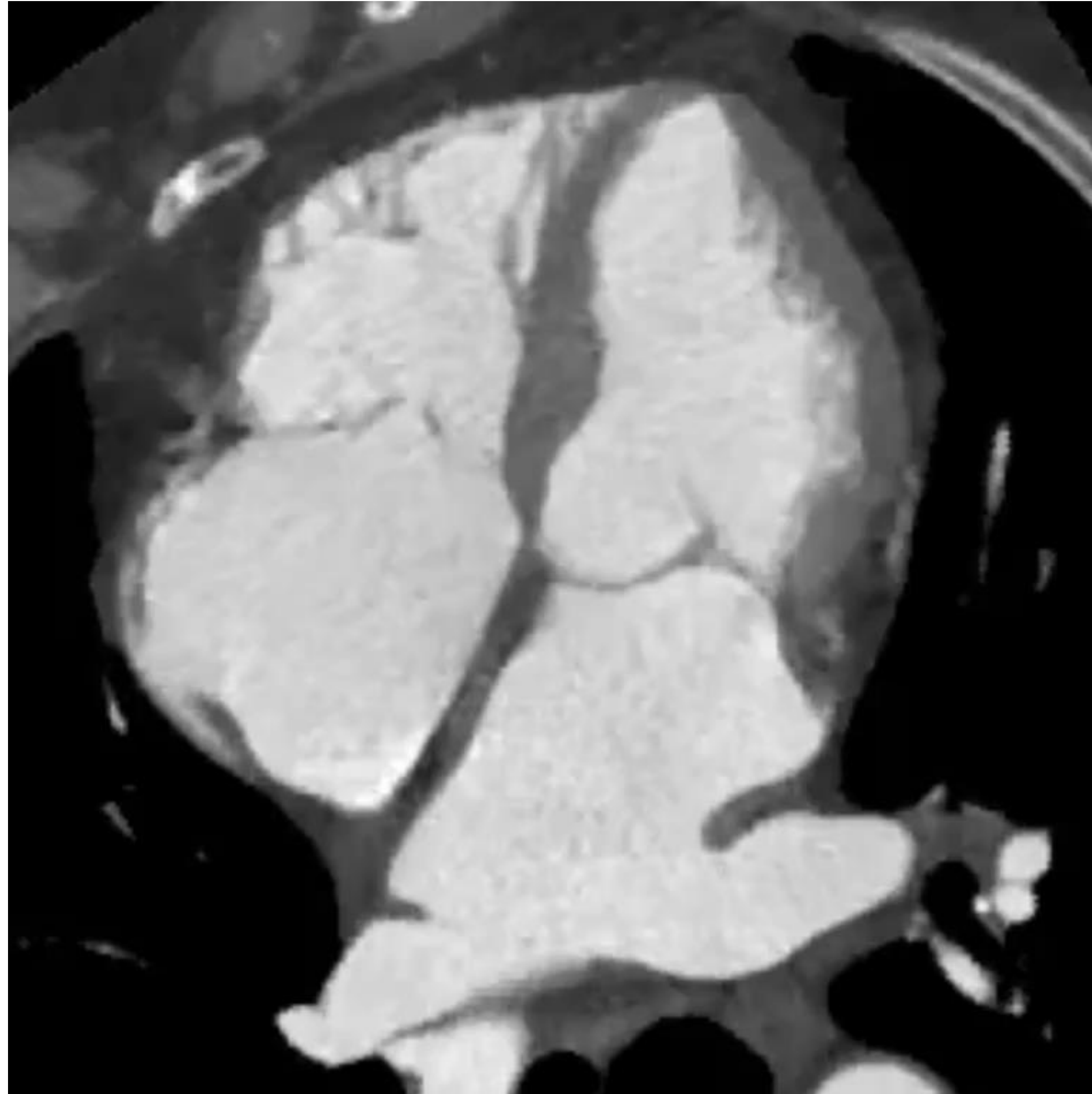
Tricuspid leaflet configuration

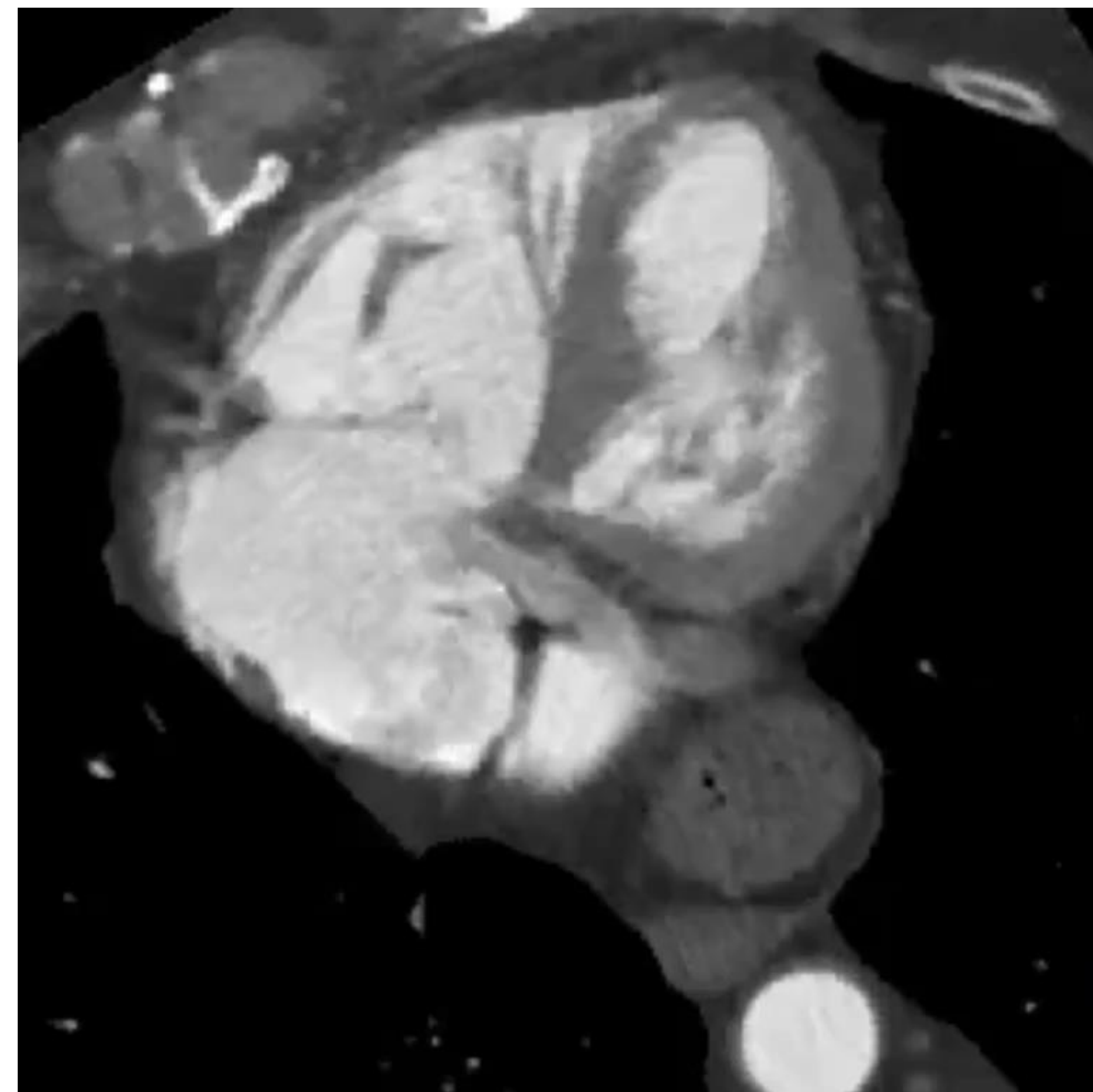
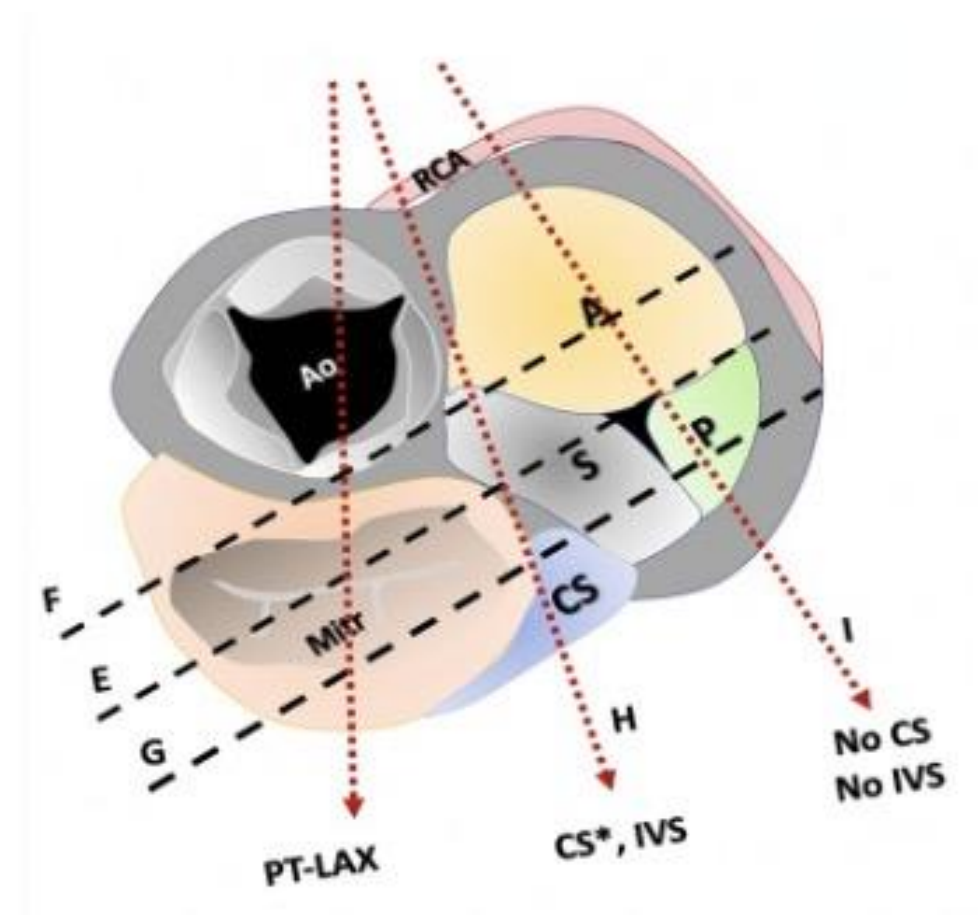
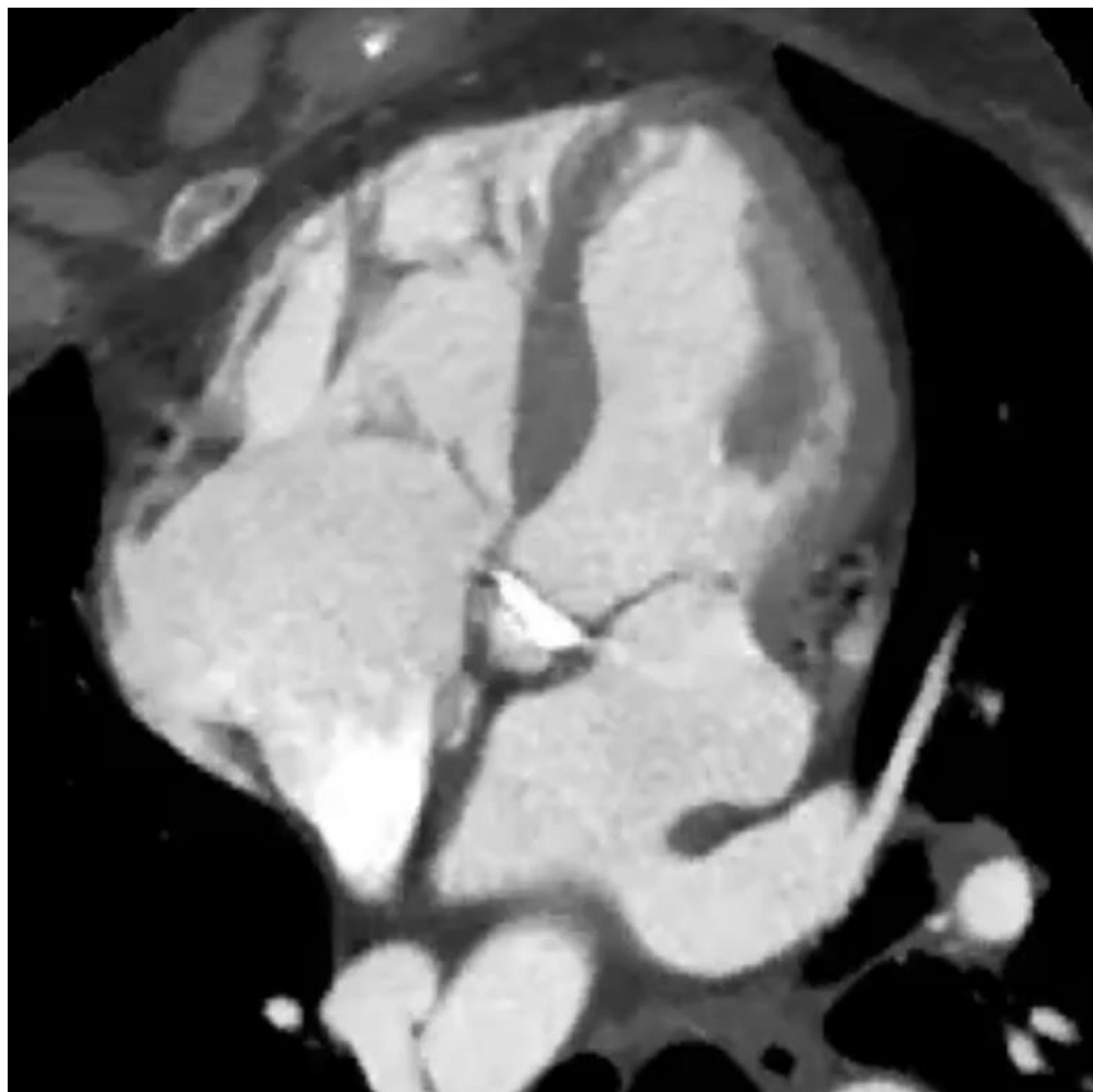


Hahn, R.T. et al. J Am Coll Cardiol Img. 2021;14(7):1299-305.

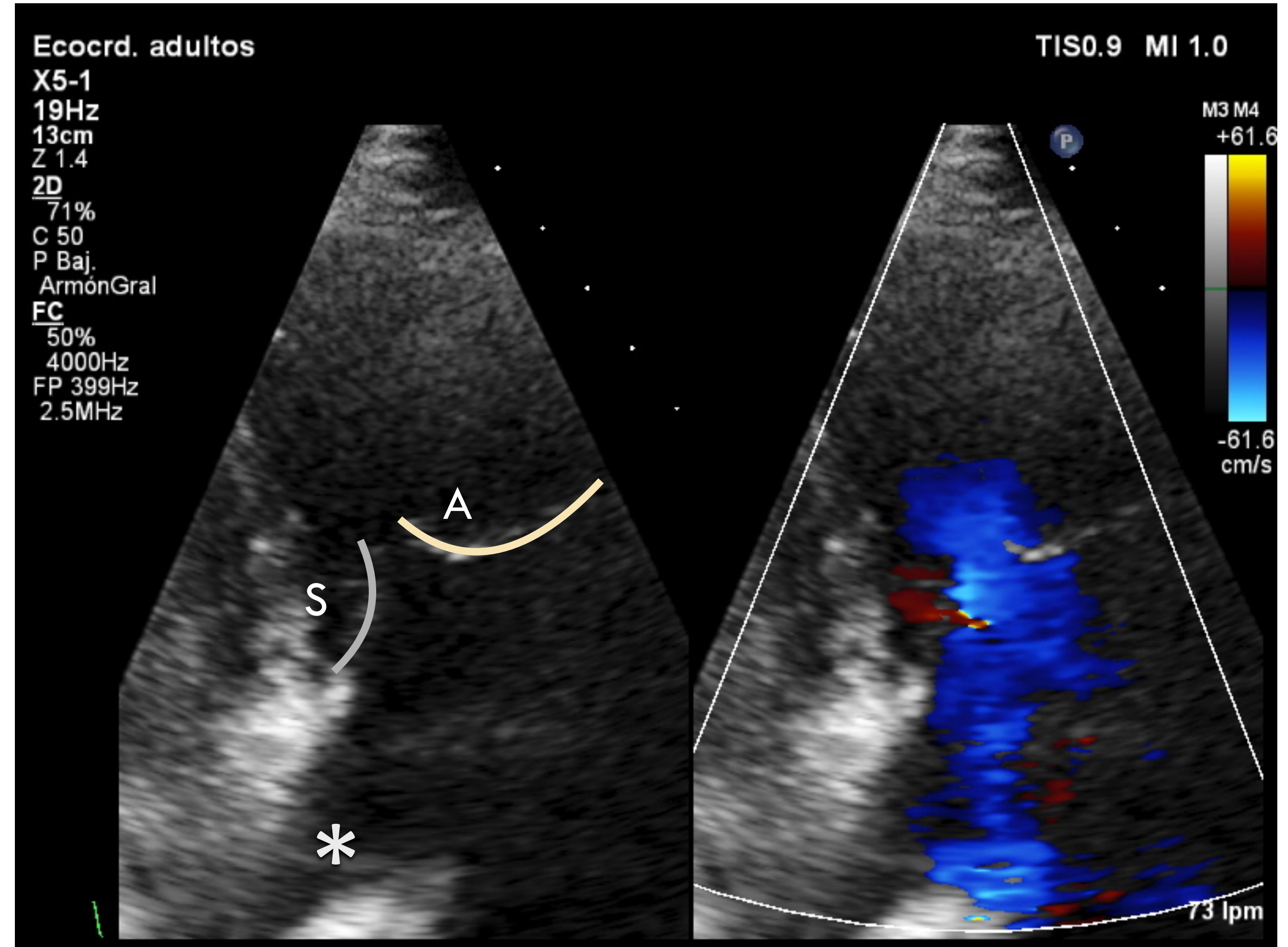
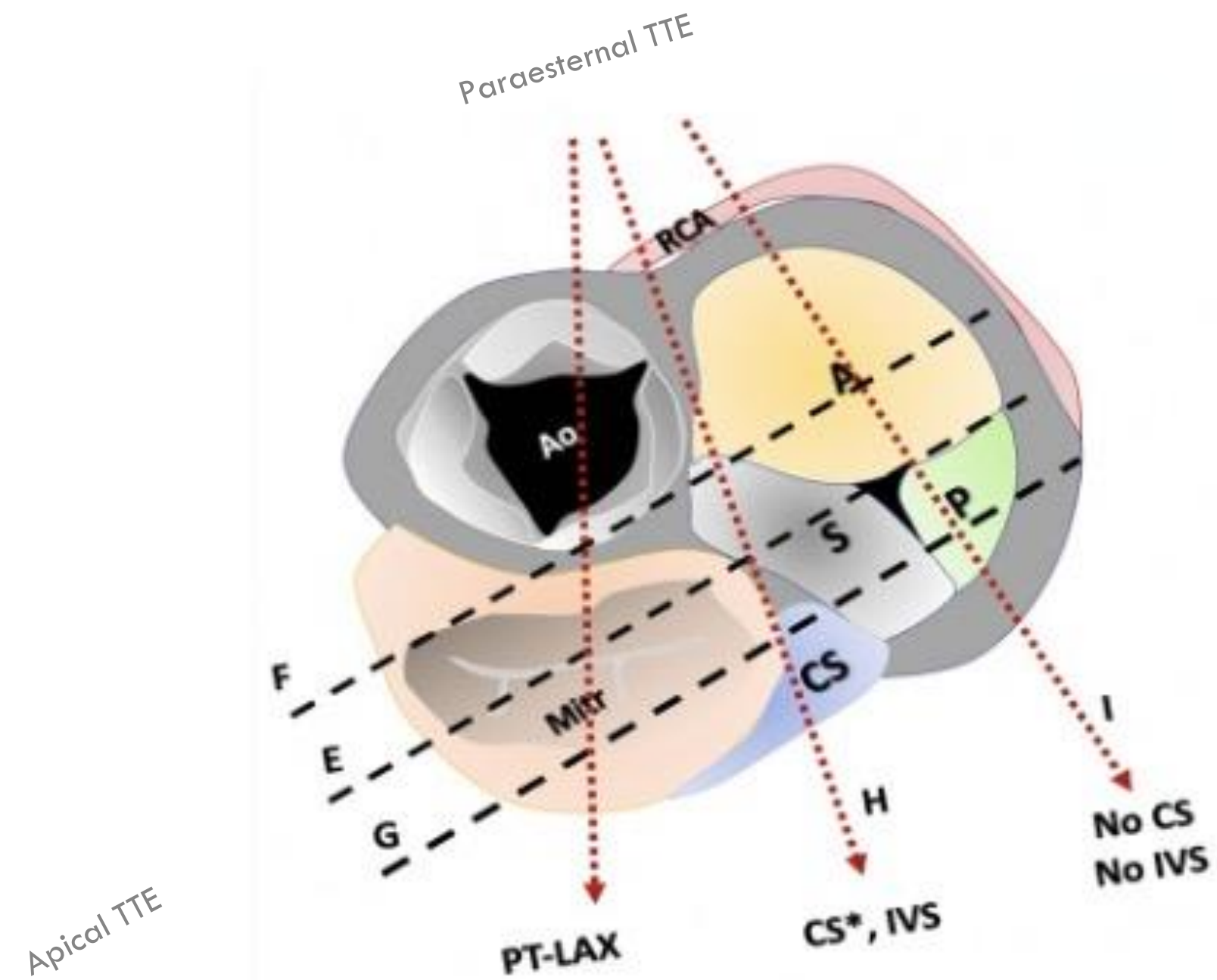
How to identify tricuspid leaflets



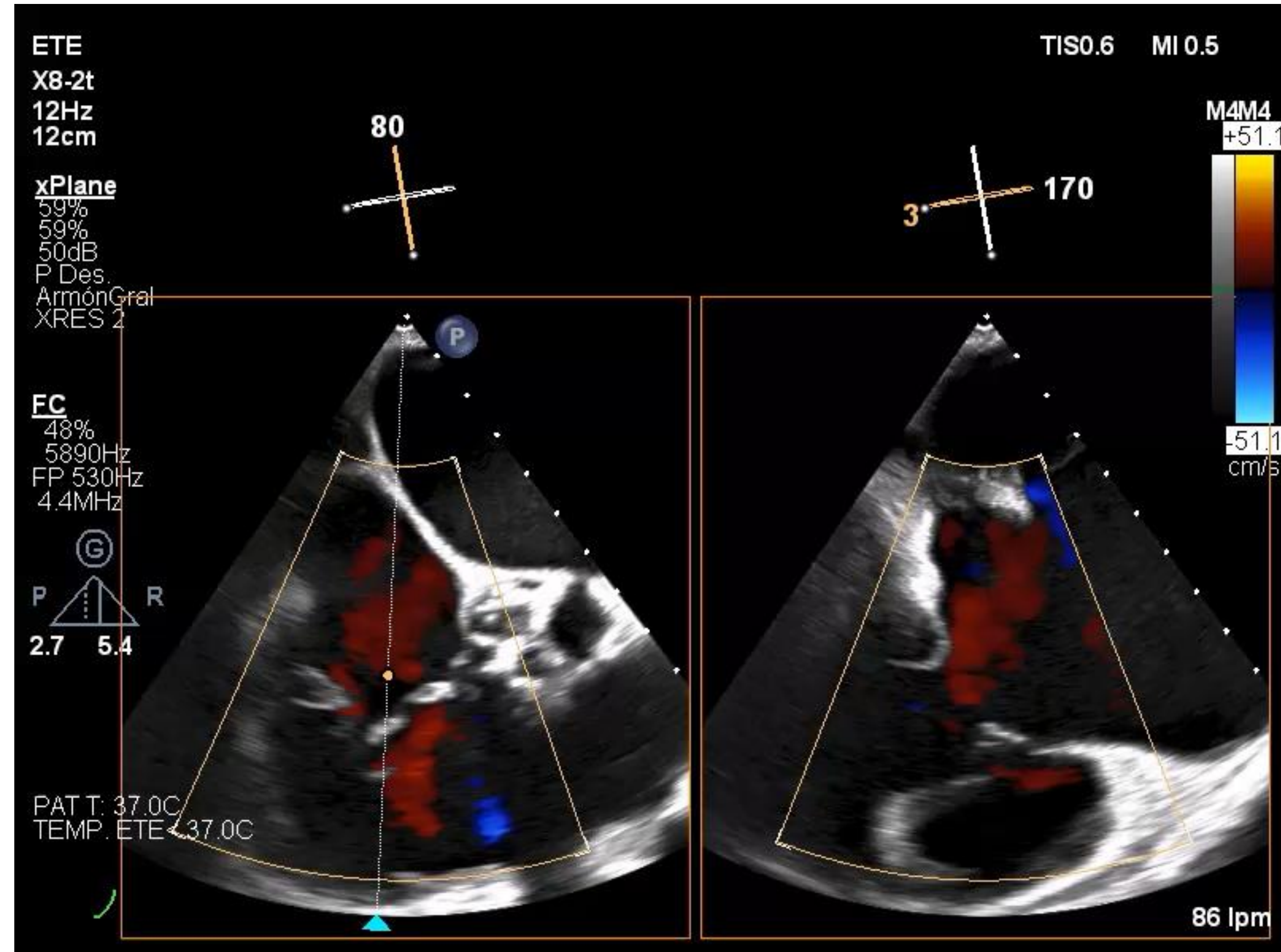




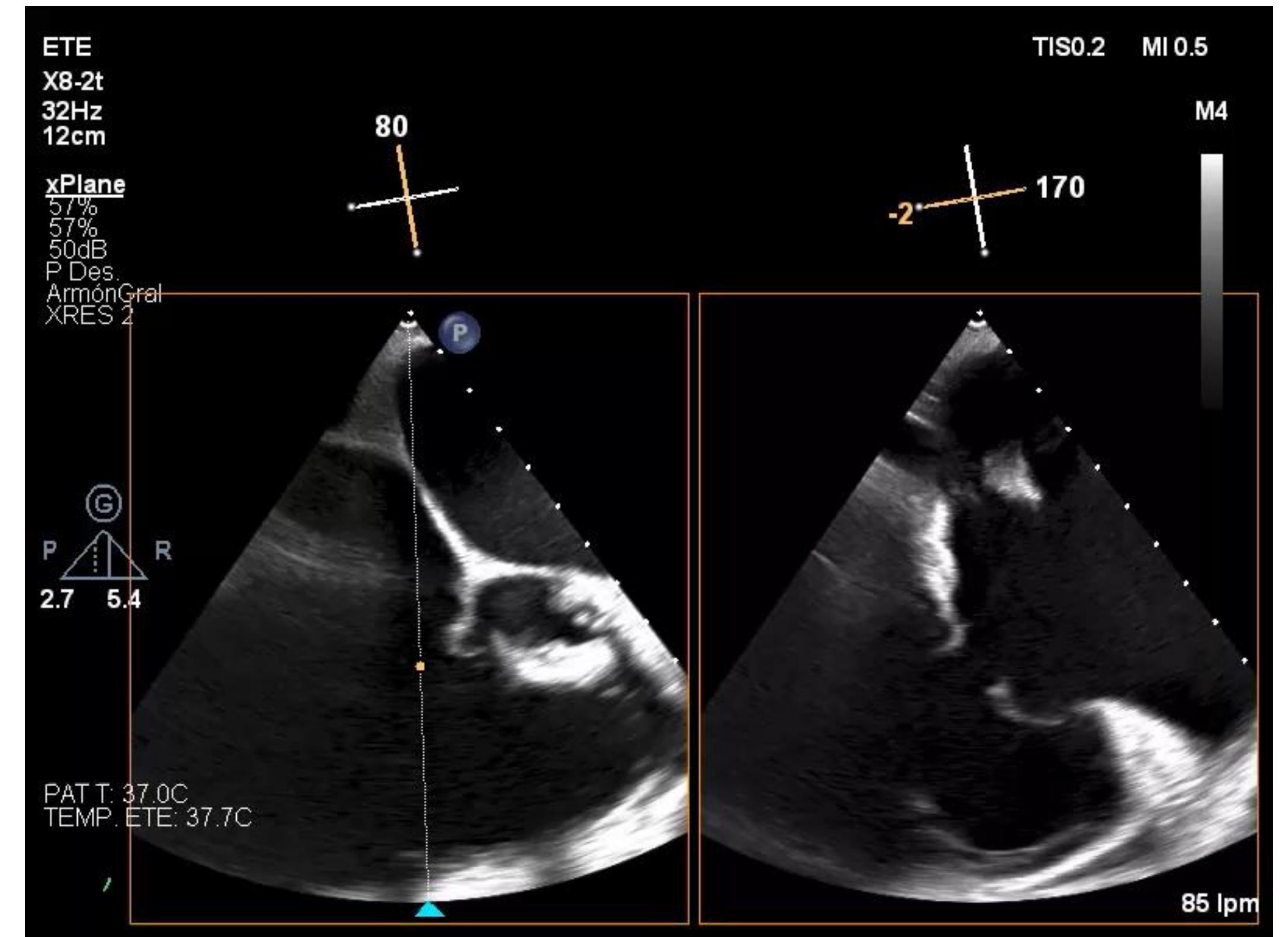
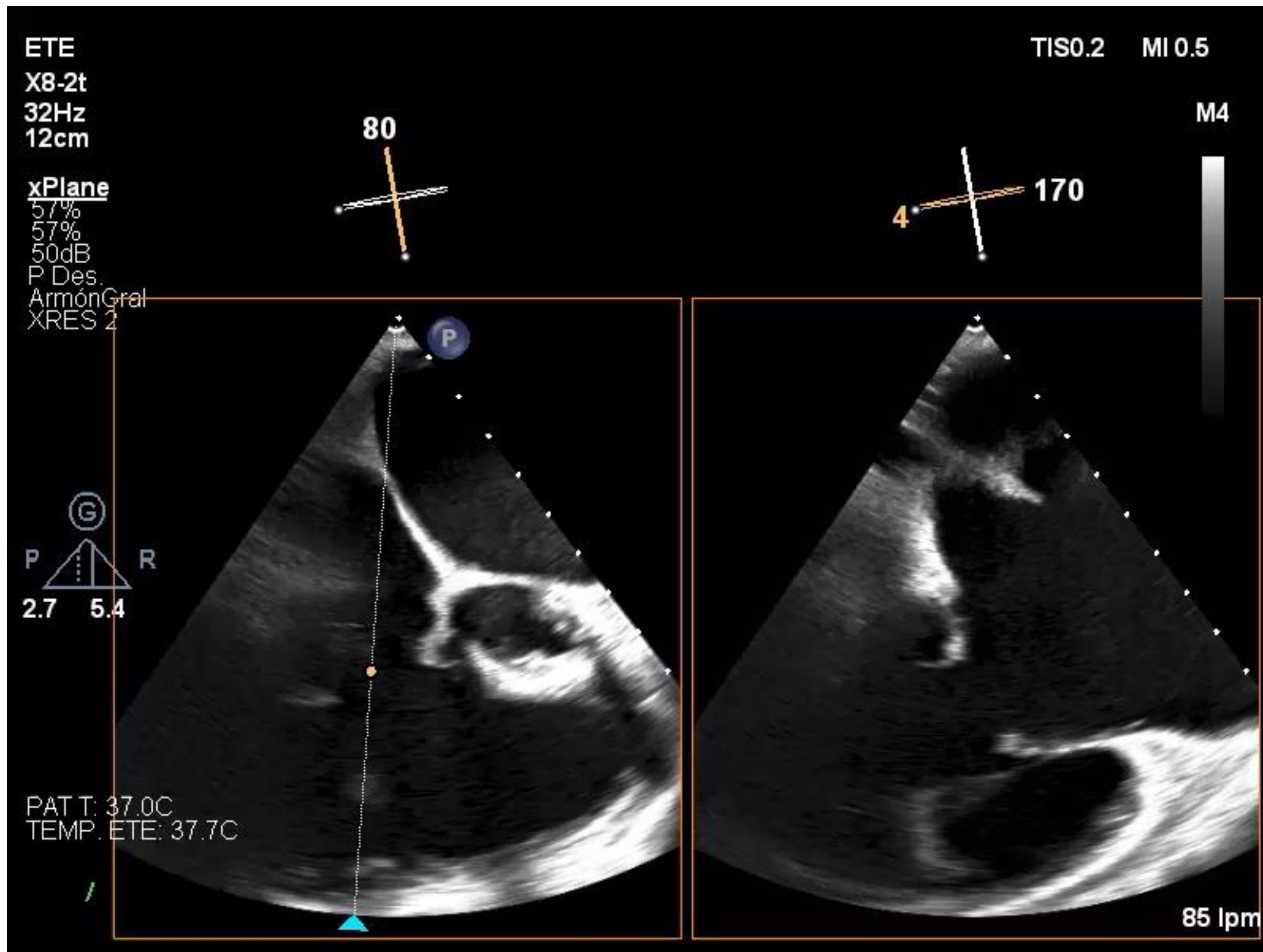
How to identify tricuspid leaflets



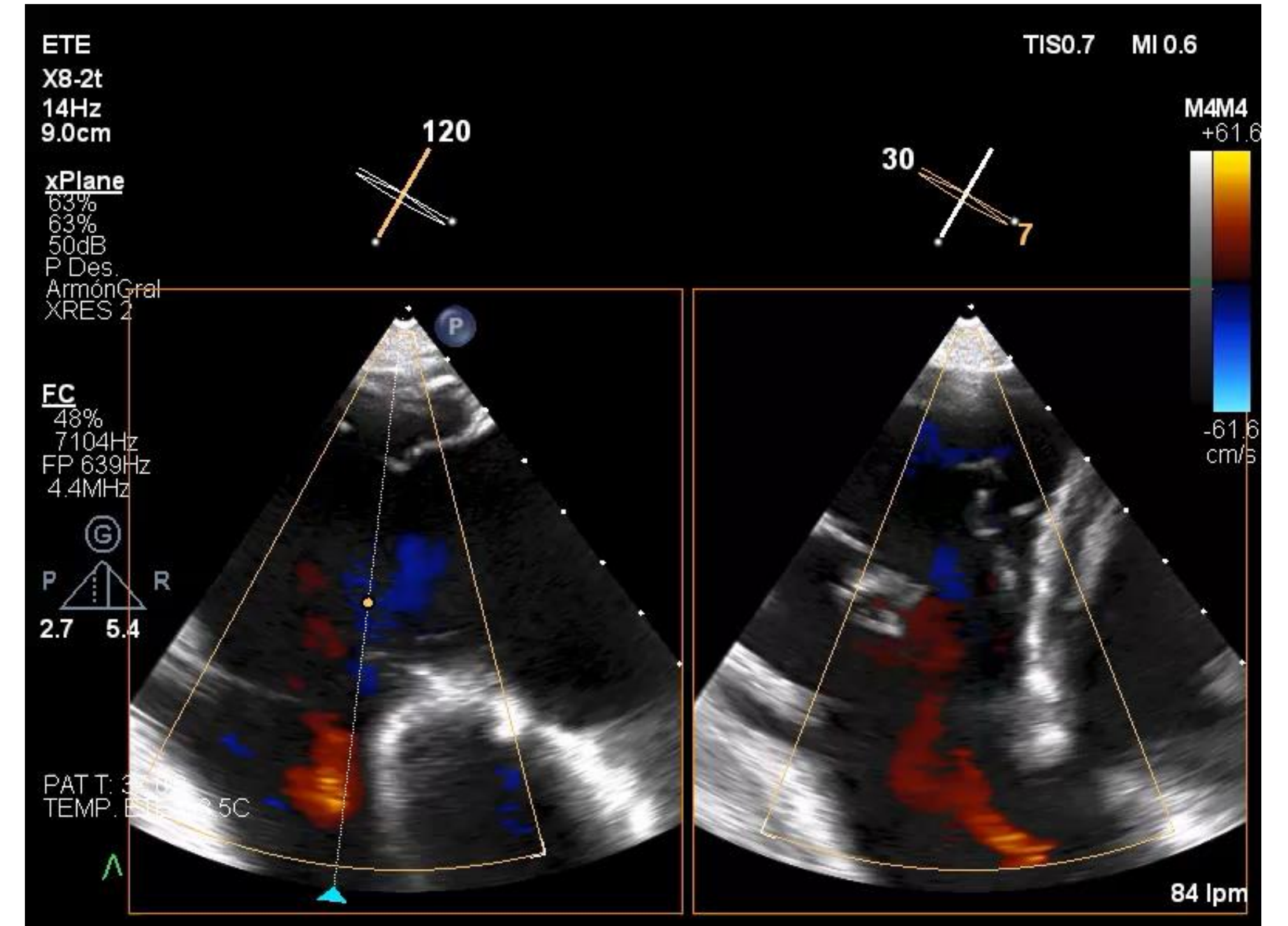
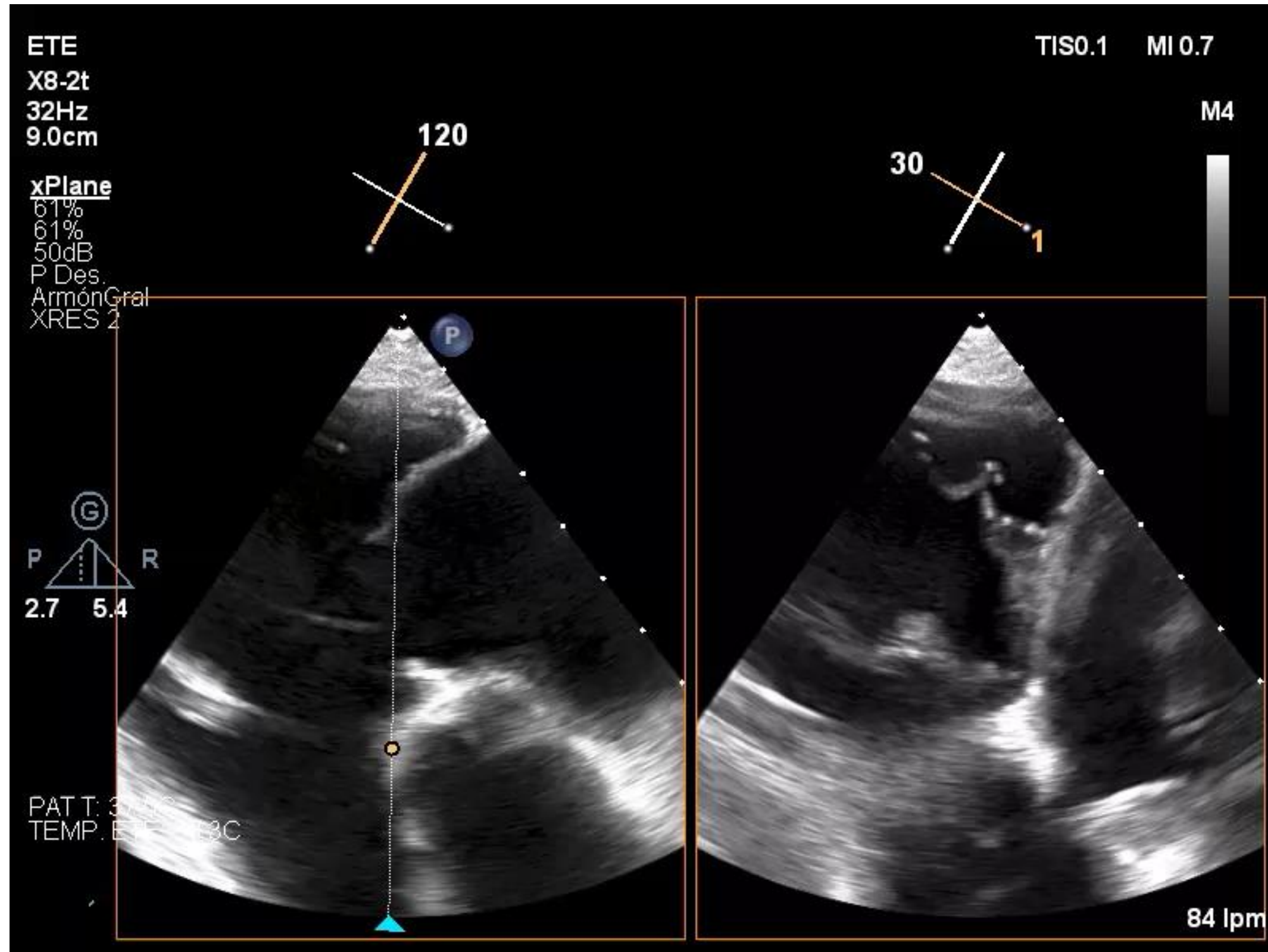
How to identify tricuspid leaflets



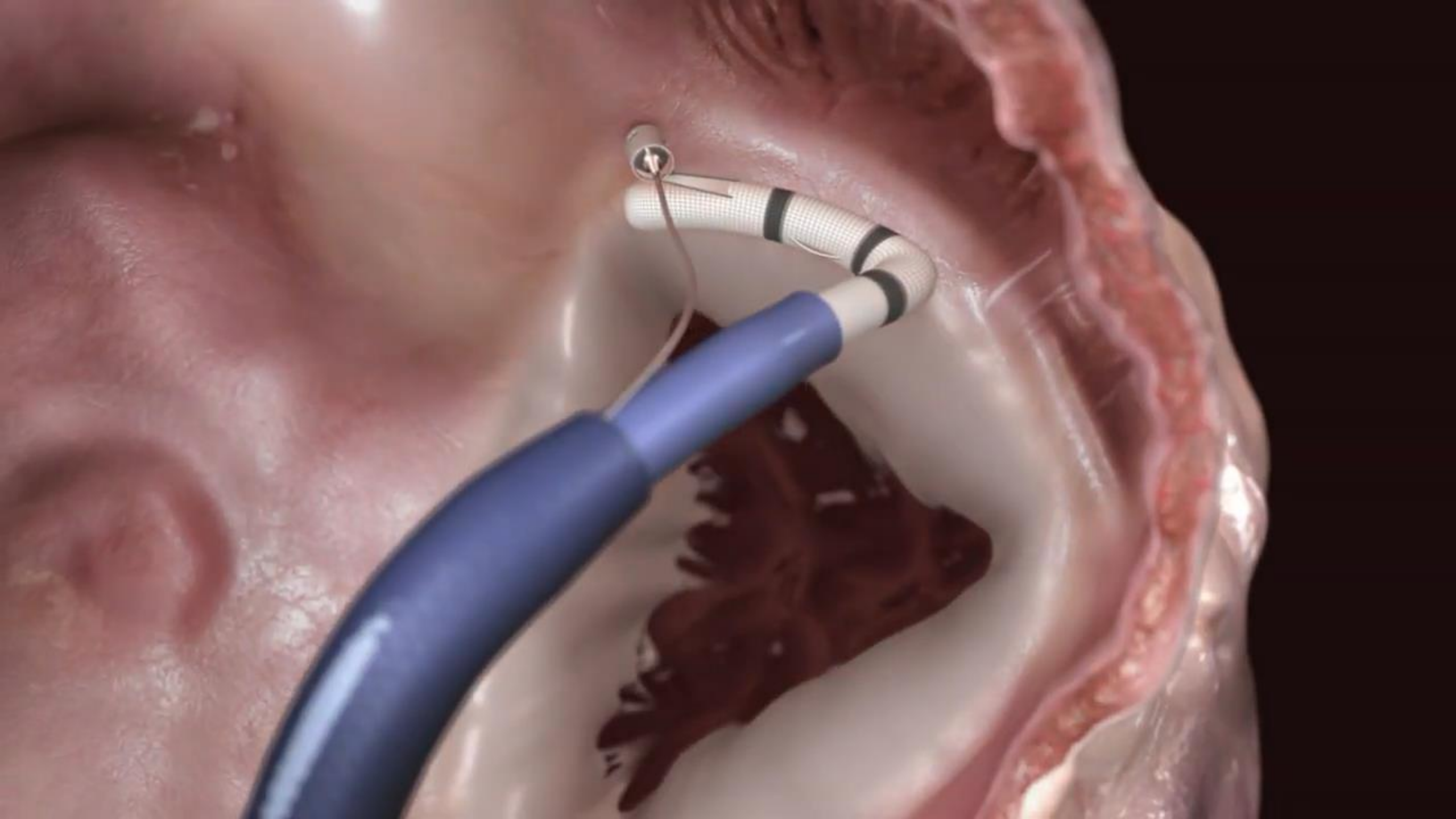
How to identify tricuspid leaflets



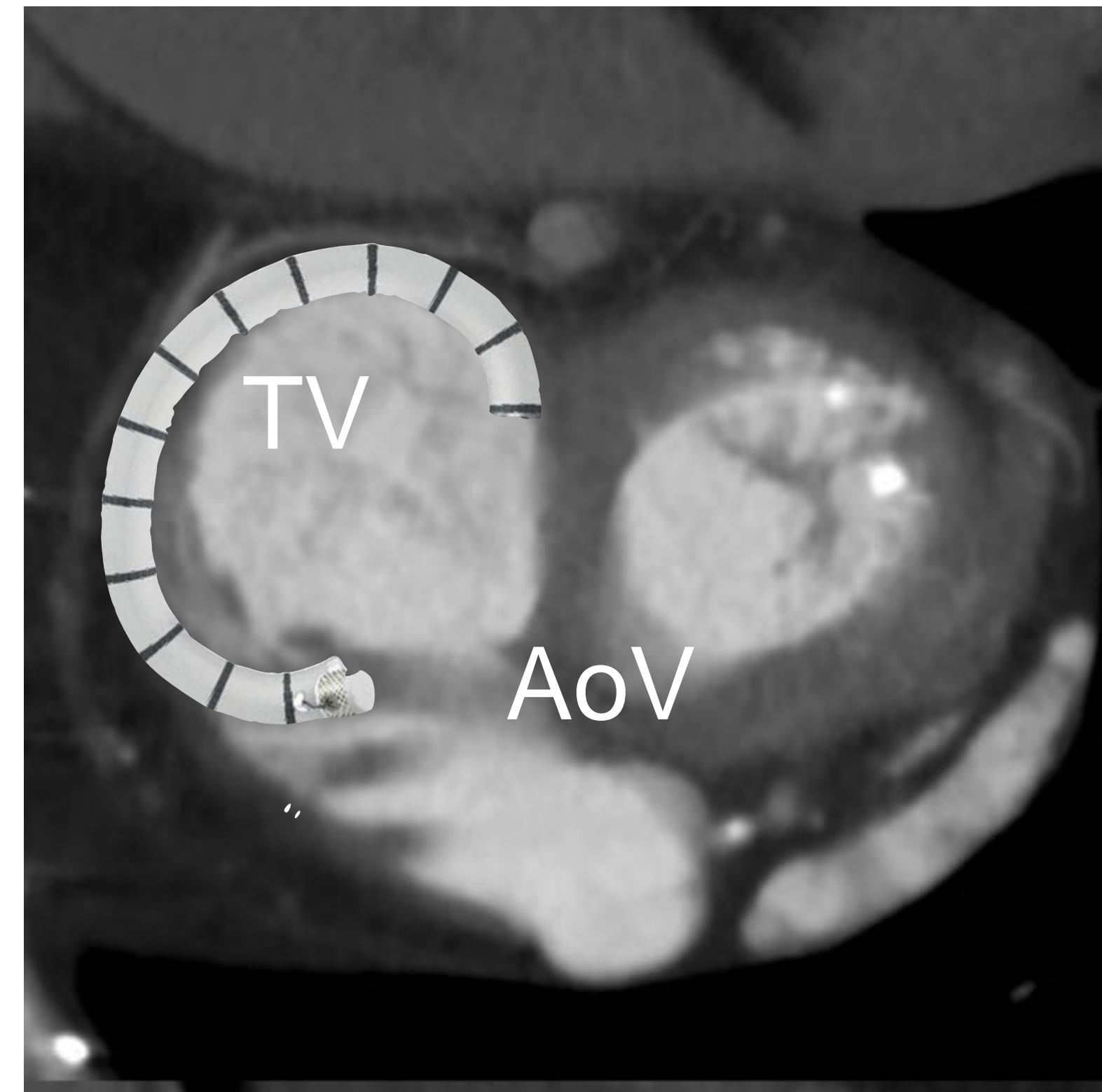
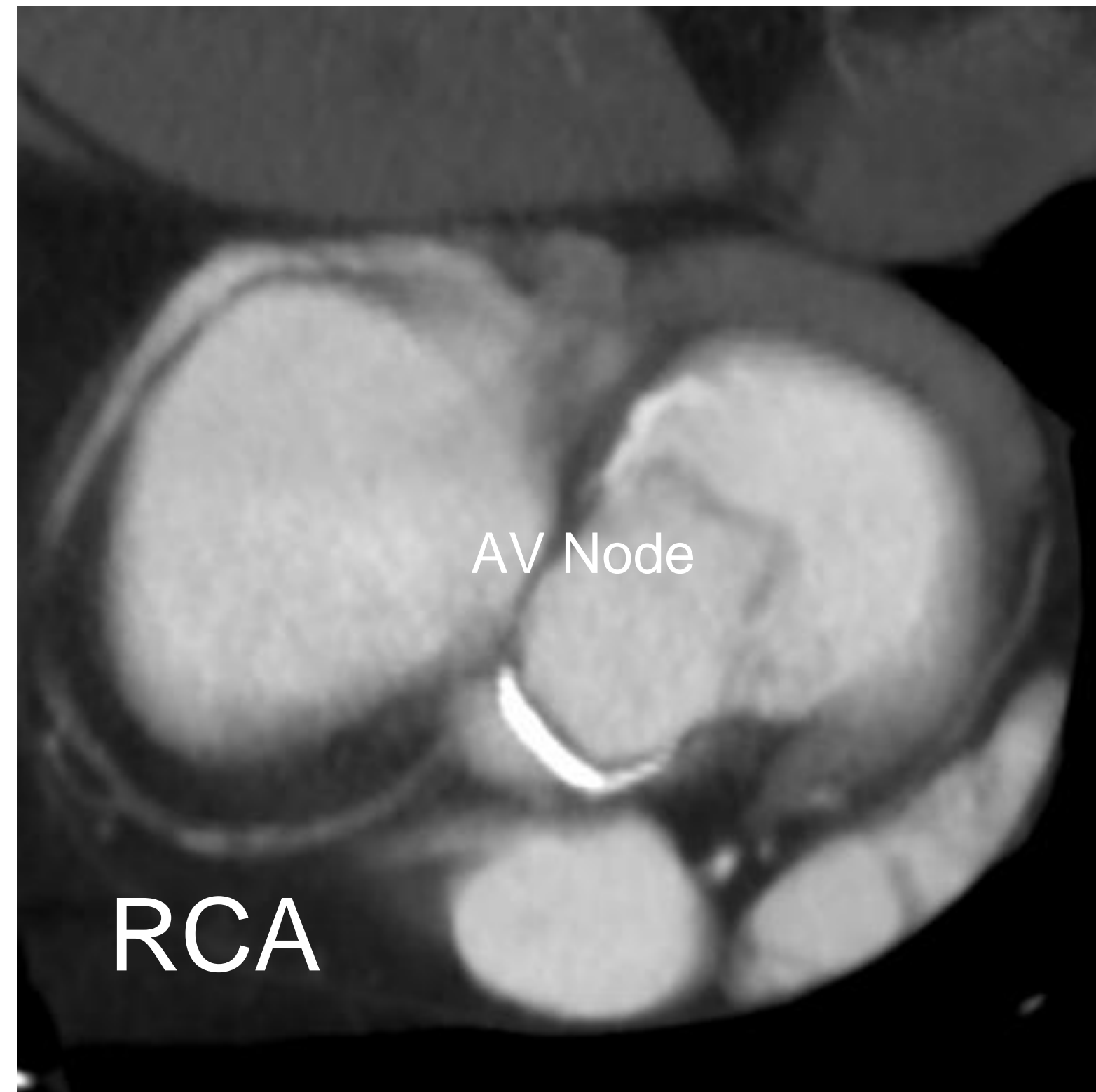
How to identify tricuspid leaflets



Anatomical considerations for tricuspid transcatheter annuloplasty

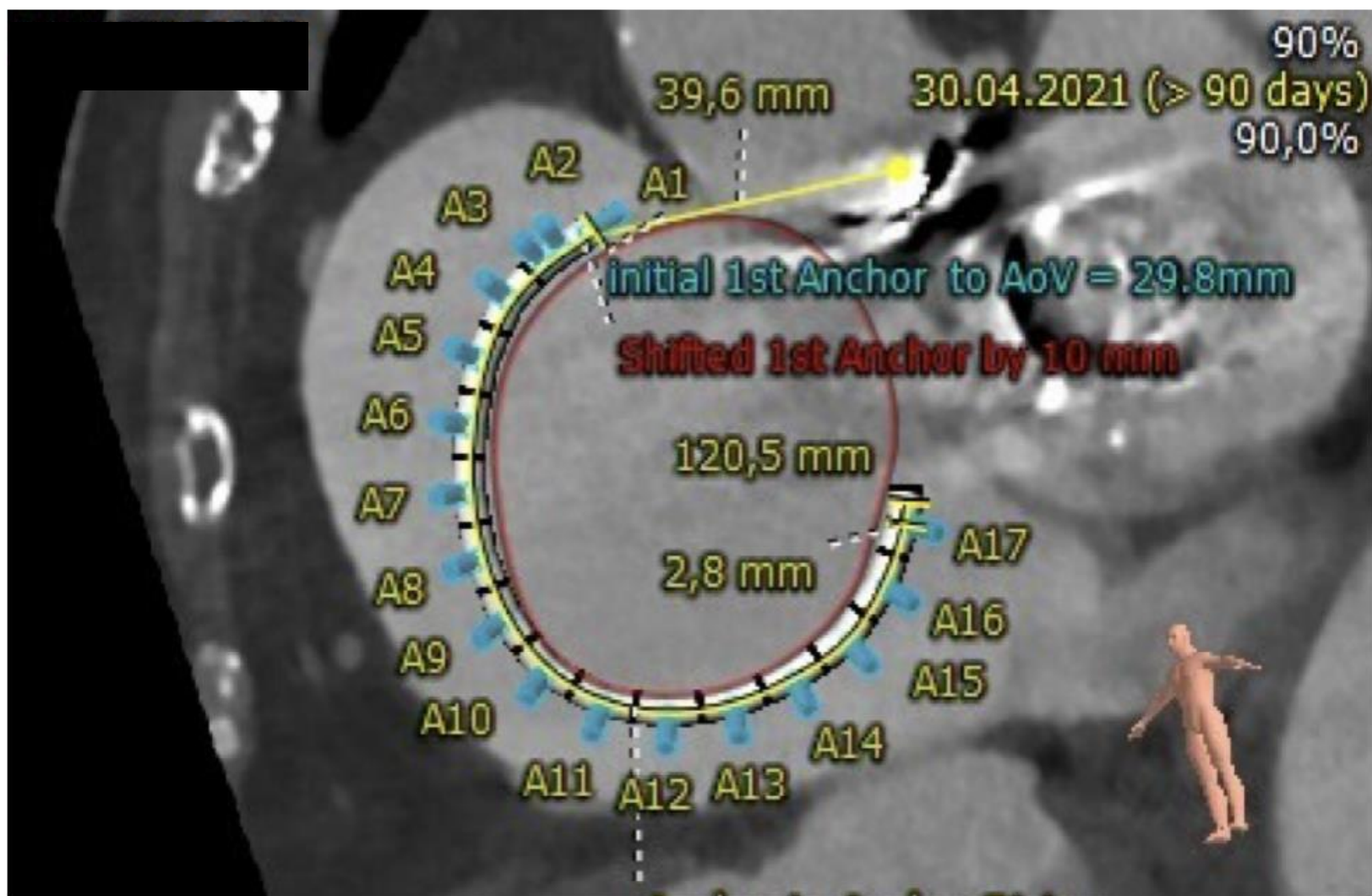


Anatomical considerations for Cardioband implant



Start at 25-30mm distance from aortic valve
End after coronary sinus

Anatomical considerations for screening



Annulus Area Diastole

22,1 cm²

1st Anchor to AoV

39,6 mm

Predicted Annular Device Coverage

67,9%

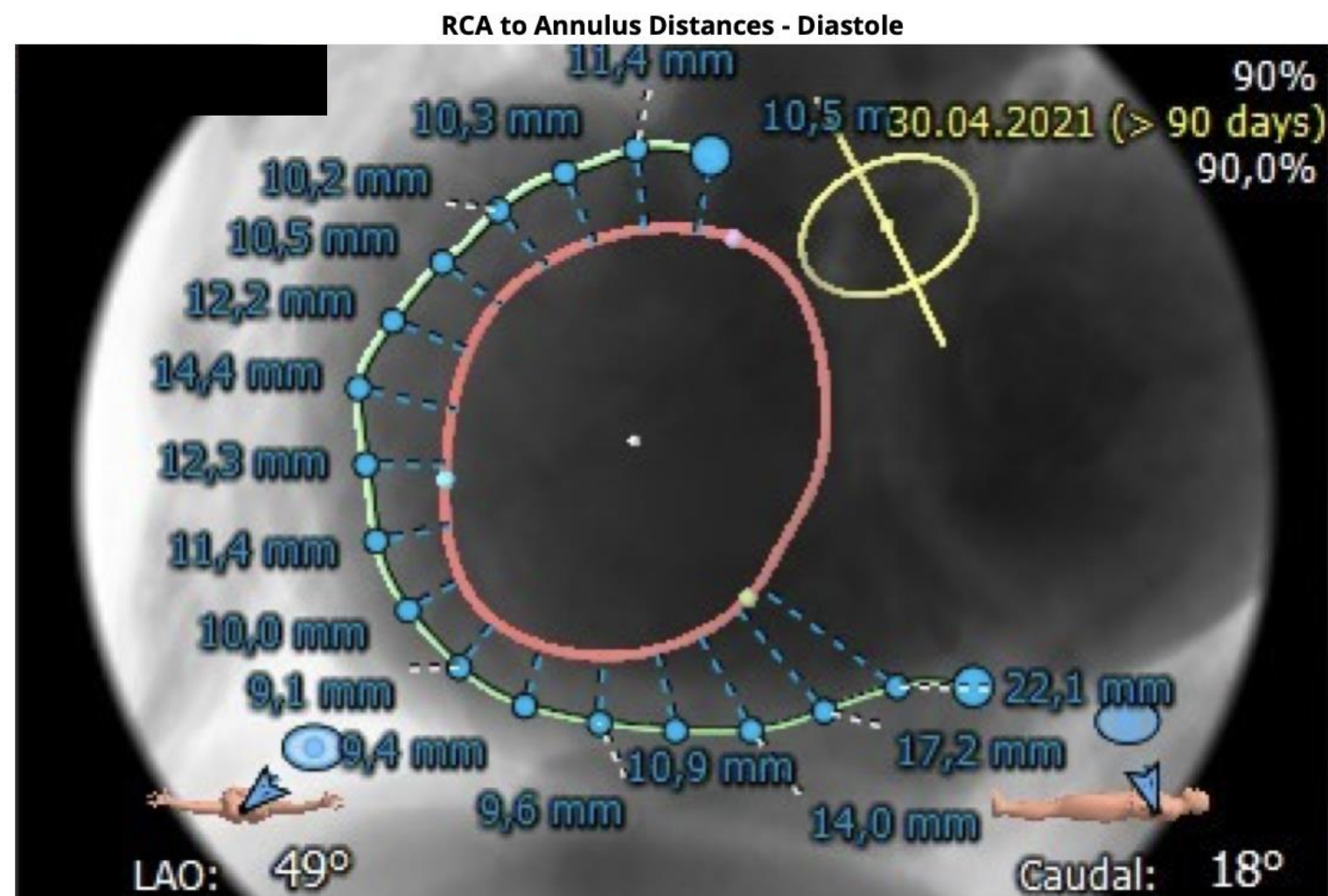
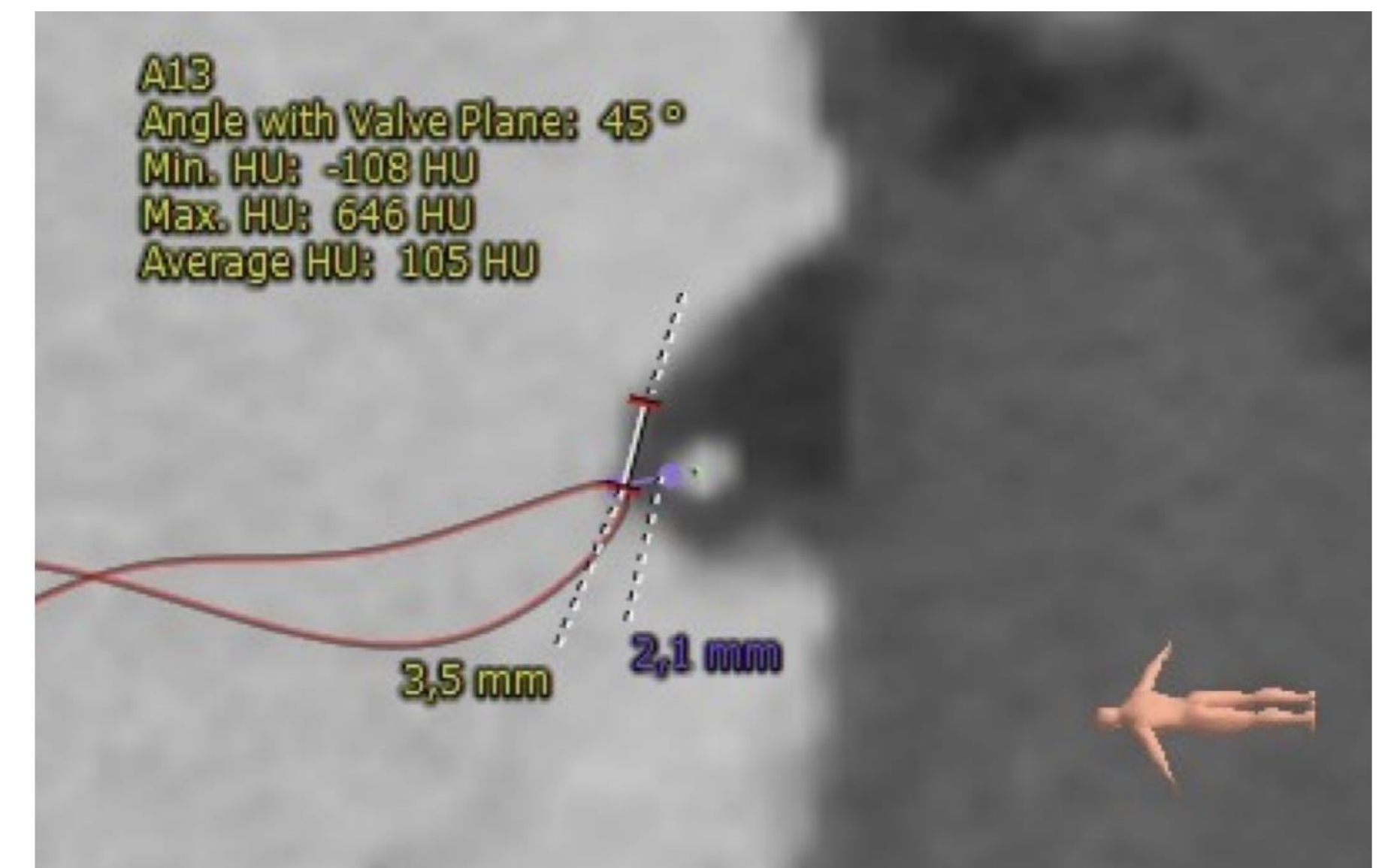
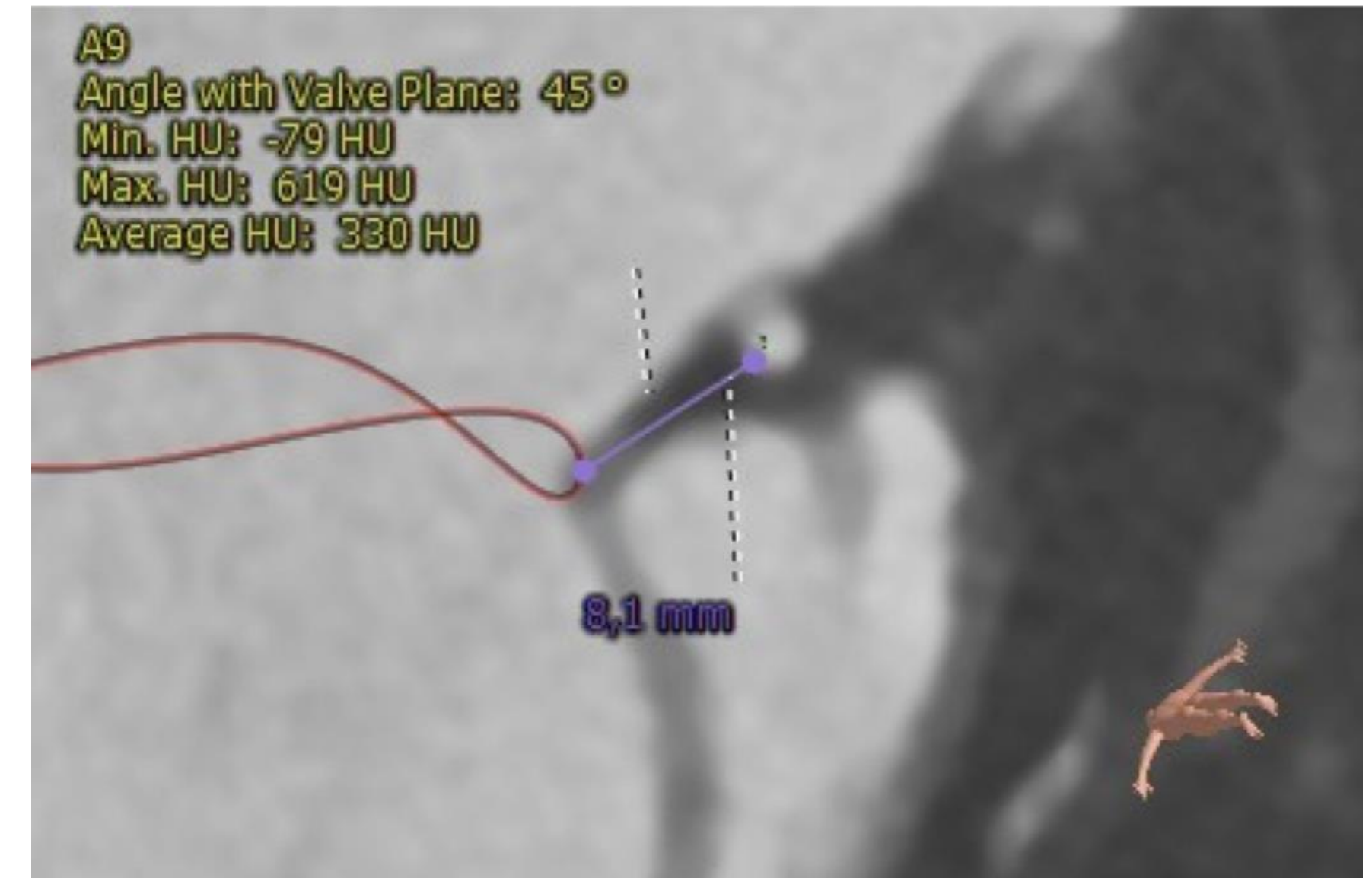
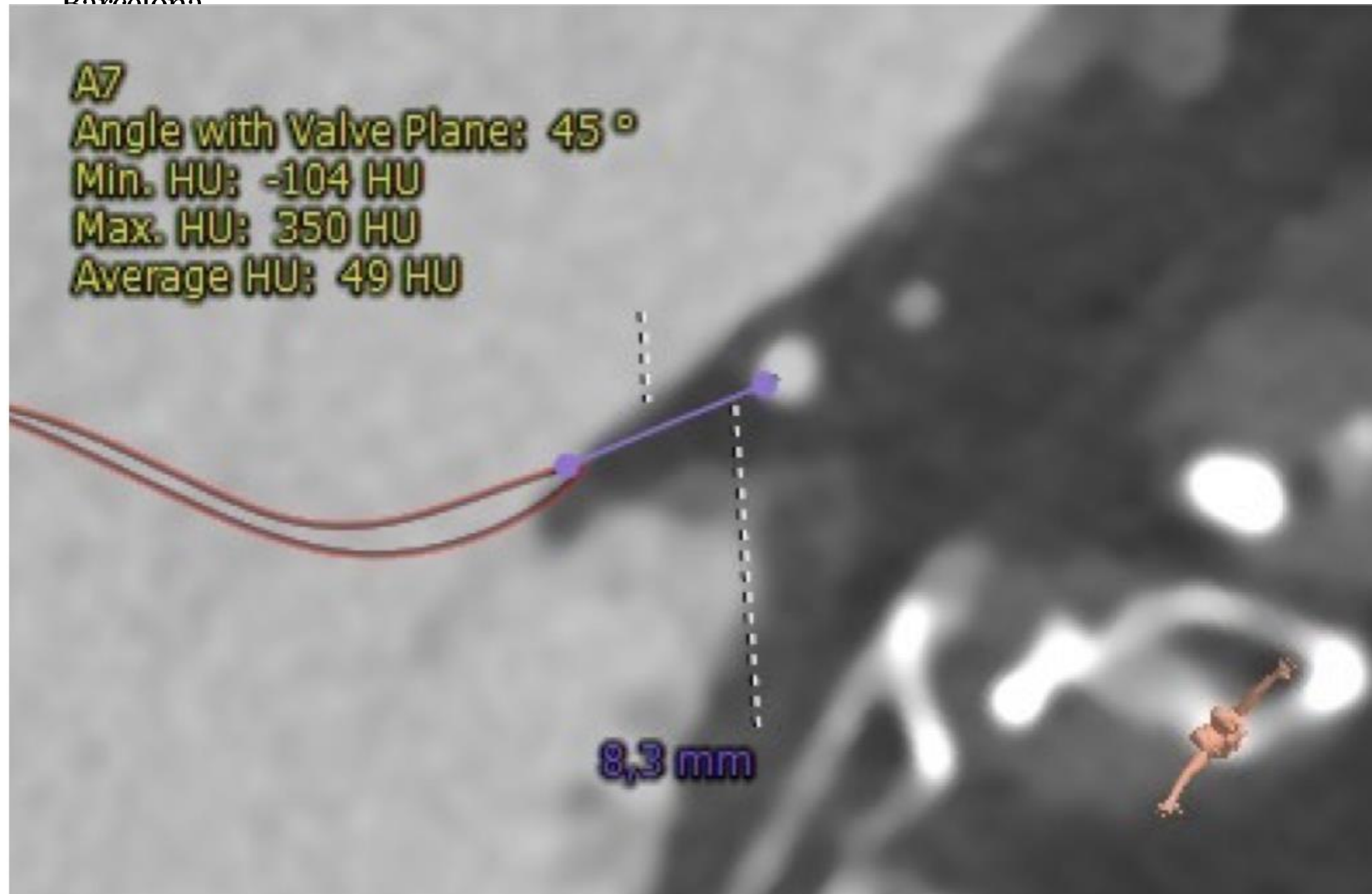


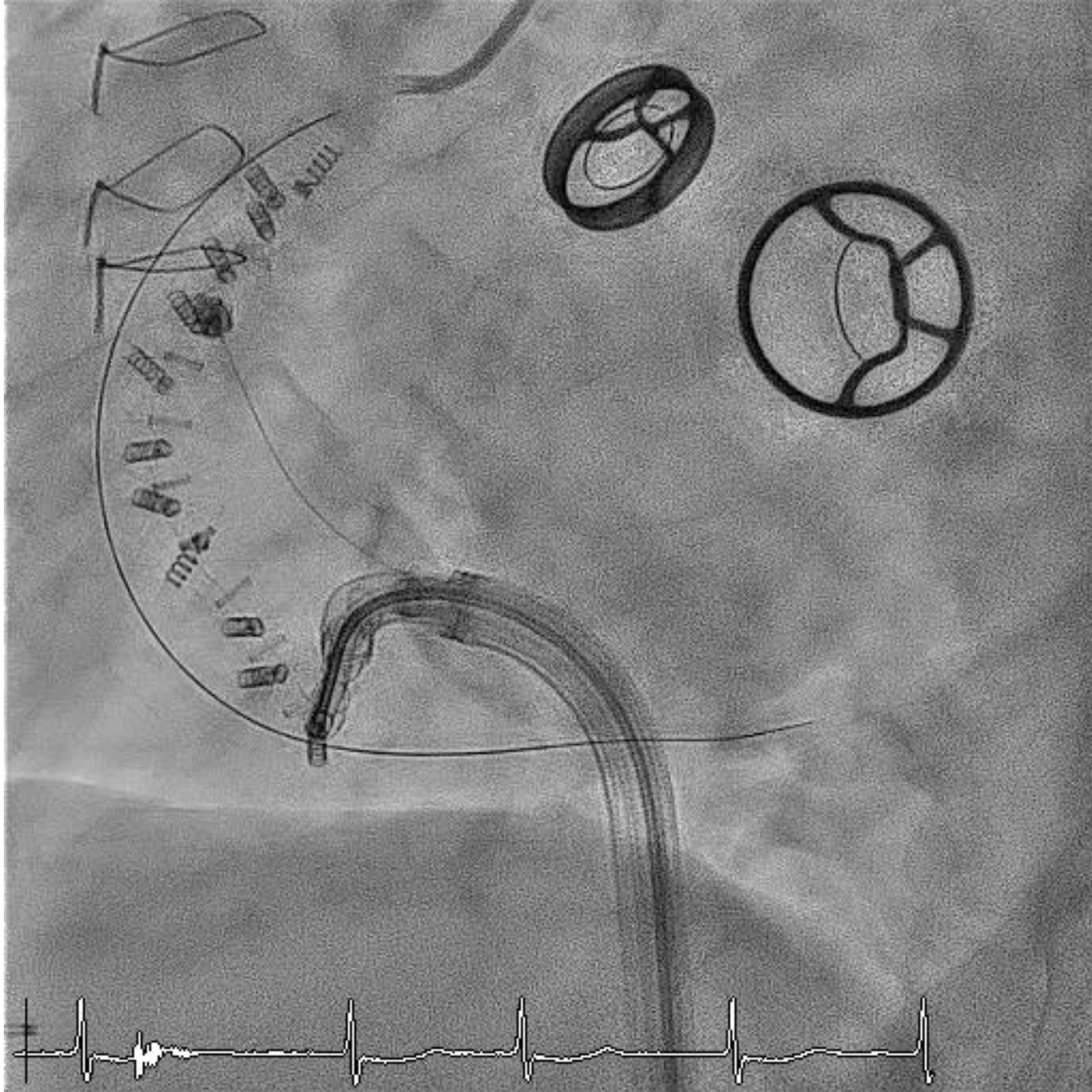
Table 1 RCA proximity thresholds

RCA Measured Distance	RCA Proximity Likelihood
>8.25mm	Unlikely Proximity
<6.9–8.25mm	Likely Proximity
≤6.90mm	Most Likely Proximity

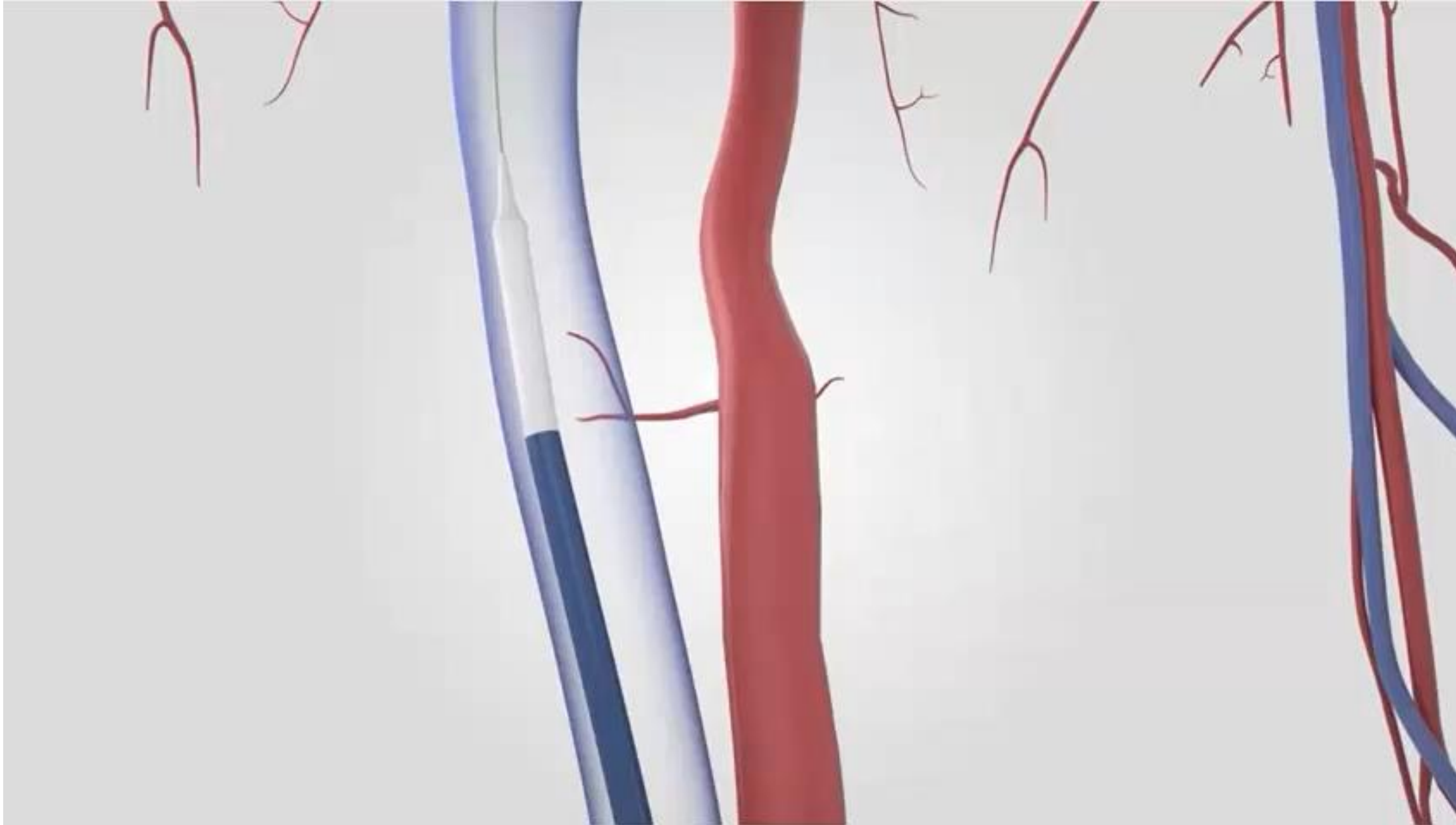
	Recommended measurement range of tricuspid valve annulus from Aorta to Coronary Sinus (mm)	Recommended Cardioband Tricuspid Implant Size	Approximate Cardioband Implant Working Length (mm)
<input type="checkbox"/>	73-80 mm	A	76
<input type="checkbox"/>	81-88 mm	B	84
<input type="checkbox"/>	89-96 mm	C	92
<input type="checkbox"/>	97-104 mm	D	100
<input type="checkbox"/>	105-112 mm	E	108
<input type="checkbox"/>	113-120 mm	F	116



- Implant anchor at 4mm of hinge point
- 6mm anchor length (at least 4mm tissue)



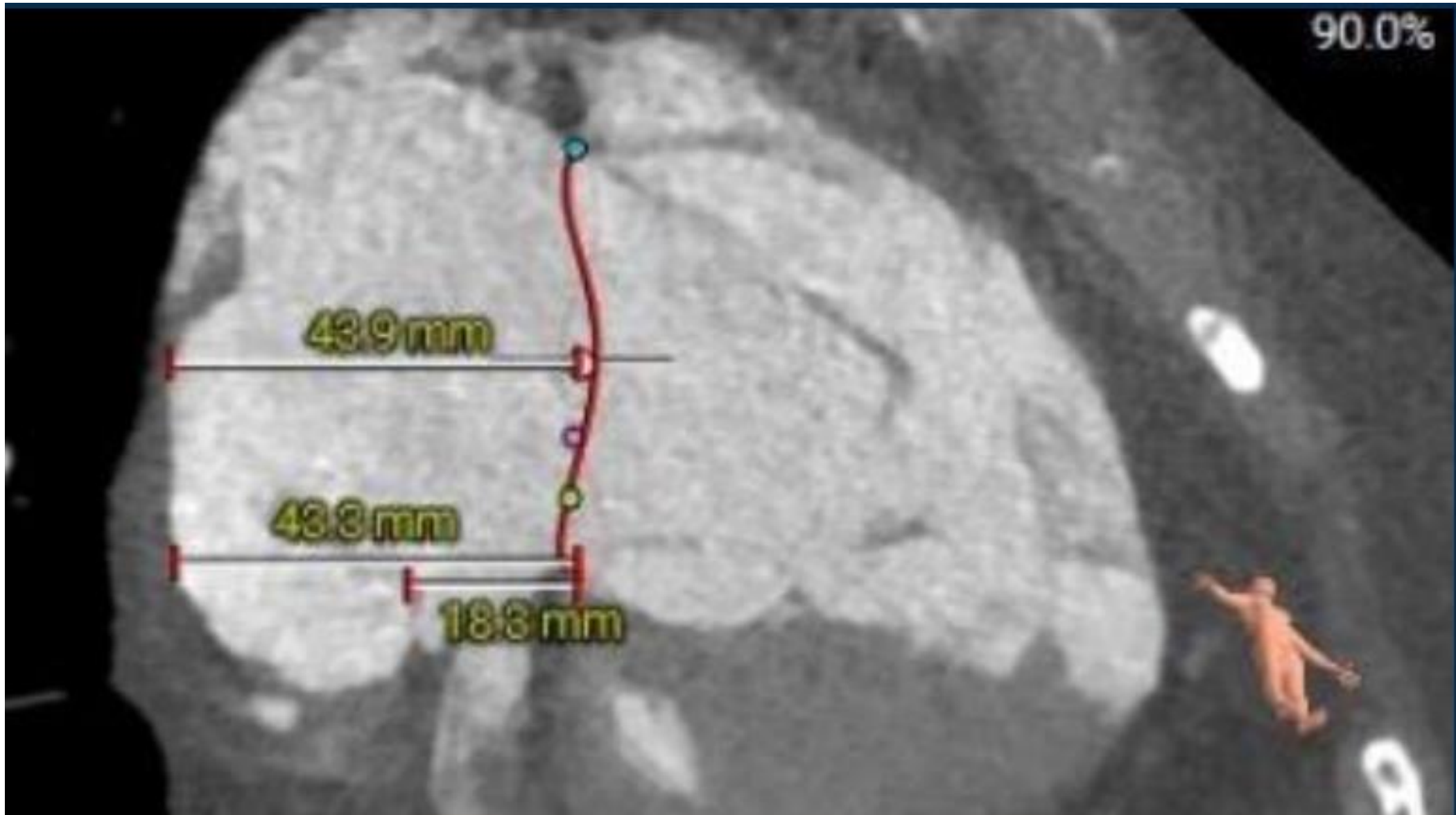
Anatomical considerations for orthotopic TTVR



Patients were considered anatomically suitable for EVOQUE TTVR if they had adequate screening transesophageal echocardiographic imaging of the tricuspid valve leaflets for procedural guidance and computed tomography– derived tricuspid valve annular dimensions compatible with 44- or 48-mm valves.

Anatomical considerations for orthotopic TTVR

	Annulus		Per. Derived	RV Length	RA height	IVC Offset
	Max	Min				
Systole				>65mm	>60mm	<20º
Diastole					>60mm	<20º



Take home messages

1.- Screening for TV intervention needs understand:

- TR Mechanism and Severity
- TR Location
- Specific anatomical consideration depending on the planned procedure

Take home messages

2.- Remember specific anatomical landmarks in TV:

- Aortic valve
- Coronary sinus
- AV node
- Right coronary artery
- Anterior papillary muscle (RV)

Take home messages

3.- Understand specific echocardiographic views for tricuspid interventions:

- **Transgastric!!**
- Inflow-outflow
- 3D with MPR
- TT: Apical 5Ch, 4Ch with coronary sinus, RV long axis in paraesternal view

Thanks!

