

Which Imaging technique before TAVI ?



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- 
- Patients selection for TAVI

Indications

Severe Aortic Stenosis	Ao Valve area $< 1\text{cm}^2$ or $0,6\text{ cm}^2/\text{m}^2$ (Edwards Inc. \rightarrow AVA $< 0,8\text{ cm}^2$) Max. Velocity $> 4\text{ m/s}$ Mean LV/Ao gradient $> 40\text{ mmHg}$
Symptoms	III-IV NYHA
High risk	Logistic EuroScore $> 20\%$ or STS score $> 10\%$
Contraindication to surgery	
Other possible indications:	degenerative bioprosthesis

At this stage, TAVI is not recommended for patients who simply refuse surgery on the basis of personal preference.

- Patients selection for TAVI

Contra - Indications

Systemic

Heart

Aorta

- Patients selection for TAVI

Contra - Indications

Aorta

Aortic valve	Bicuspid
	Severe and asymmetric calcification
Aortic Annulus	<18mm or >25mm Edwards-Sapien <20mm or >27mm CoreValve
Sinotubular Junction	>45mm (CoreValve)
Aorta (percutaneous assess)	Severe angulation Severe aortic arch atheroma Coarctation Abdominal Ao aneurysm with thrombus

Zamorano JL, et al EAE/ASE recommendations for the use of echocardiography in new transcatheter interventions for valvular heart disease. Eur Heart J. 2011

- Patients selection for TAVI

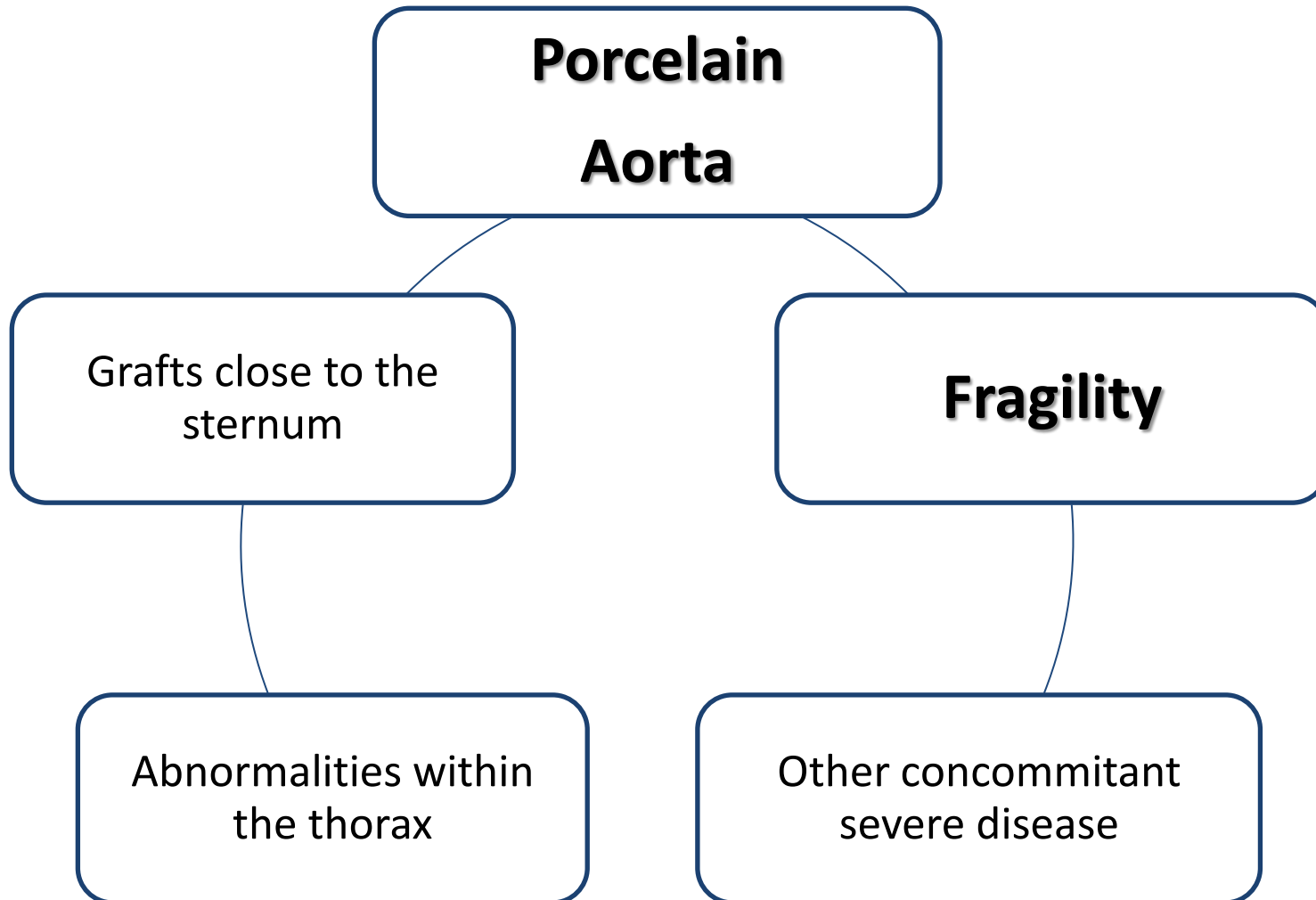
Contra - Indications

Heart

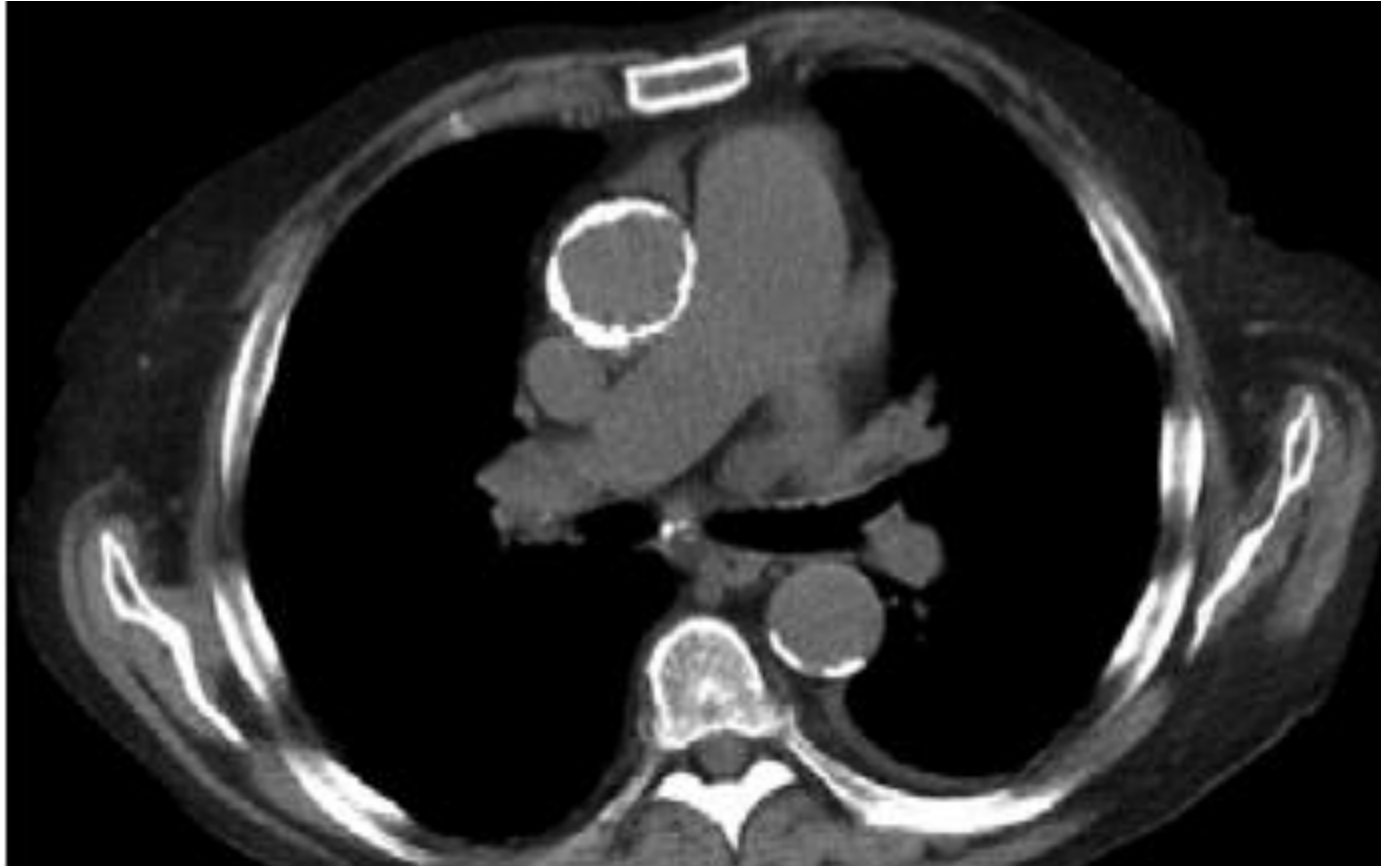
- LV thrombus
- Severe LV dysfunction with contractile reserve < 20%.
- Subaortic disease causing severe stenosis: CoreValve if septum > de 17mm. Both if HOCM.
- Mitral regurgitation > II/IV (CoreValve)
- Coronary arteries: Proximal severe stenosis non suitable for PTCA. Lower implantation.
- Recent AMI.

European Heart Journal (2012) 33, 2451–2496

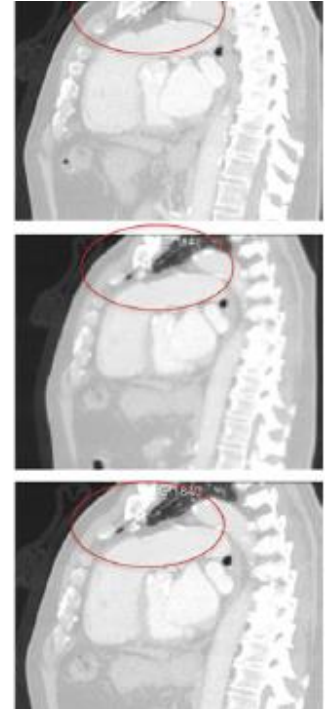
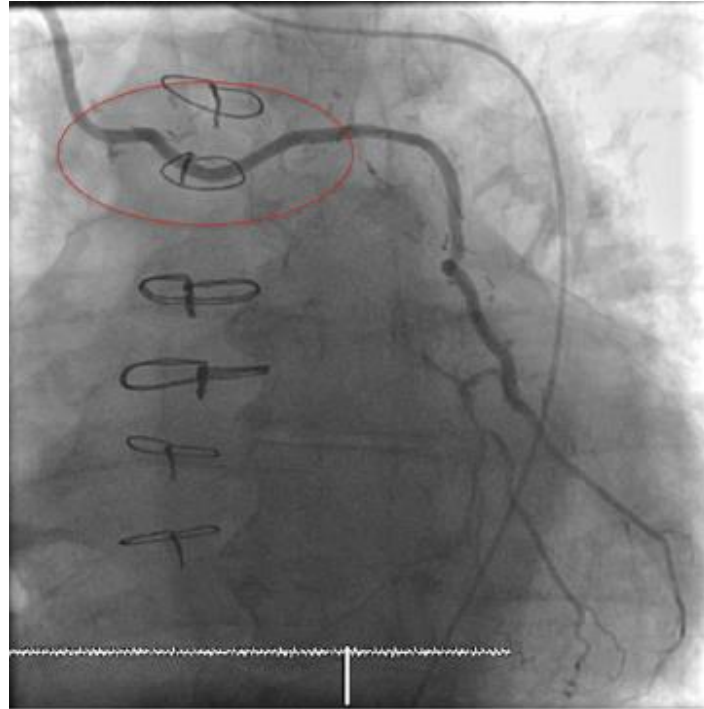
Surgical Risk



CT Scan. Needed ?



CT scan Needed. Post OP patients



Cardiac Anatomy

Ao VAlve



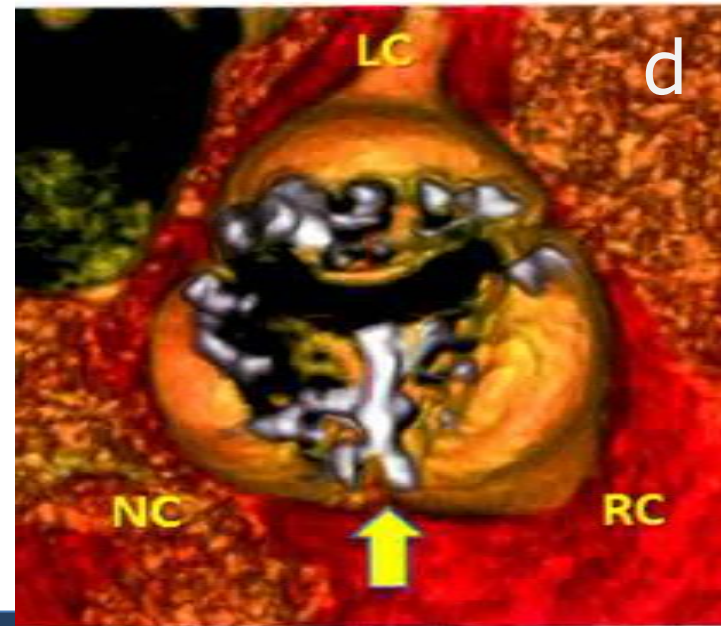
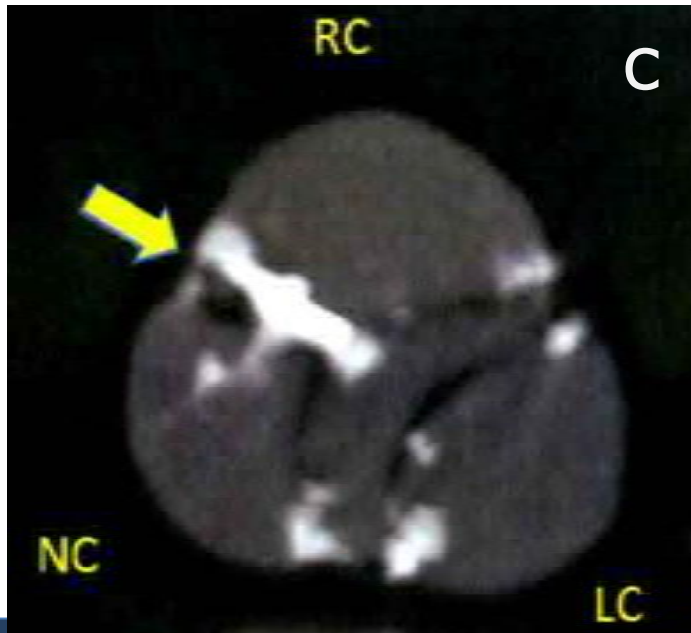
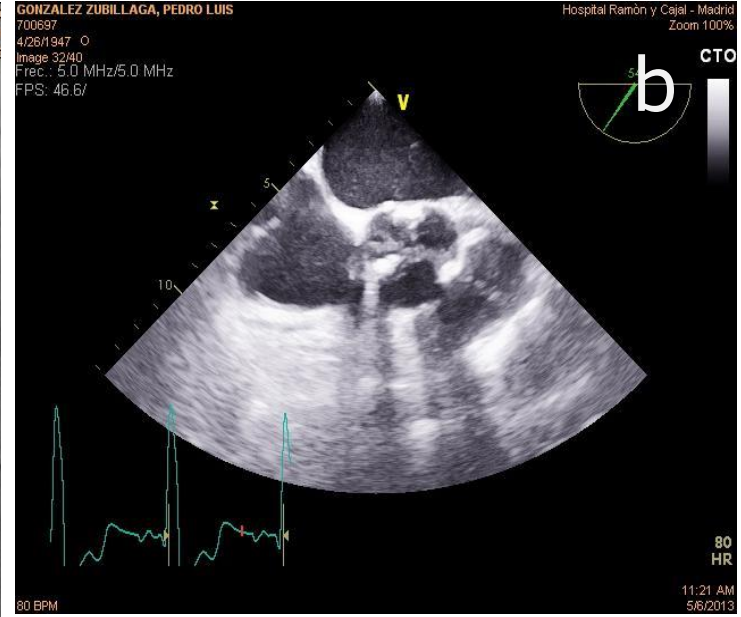
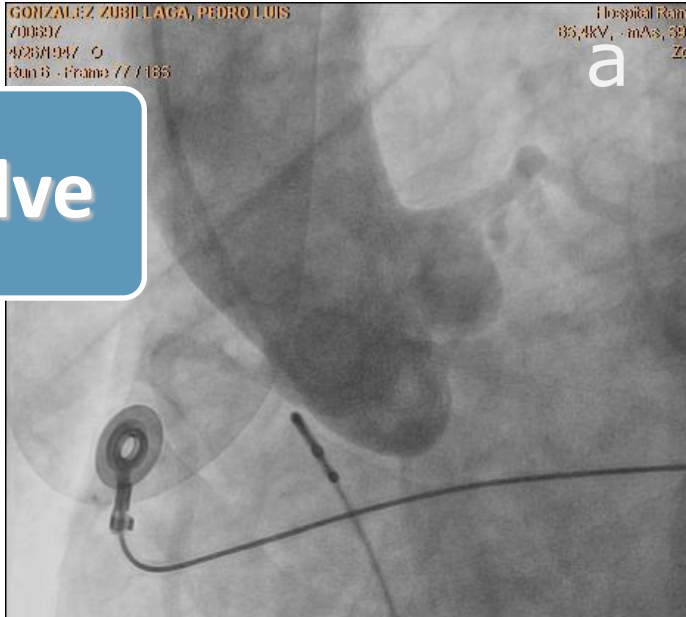
Aorta

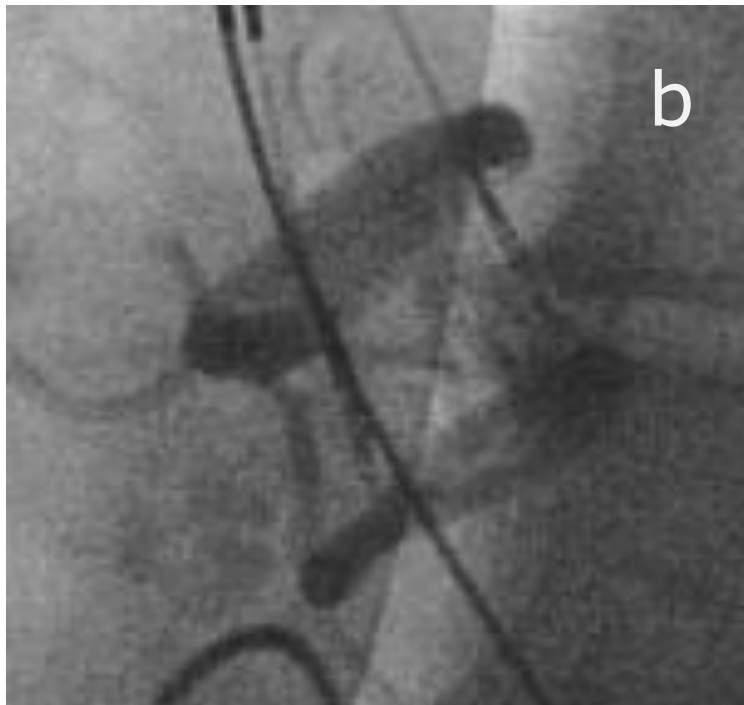
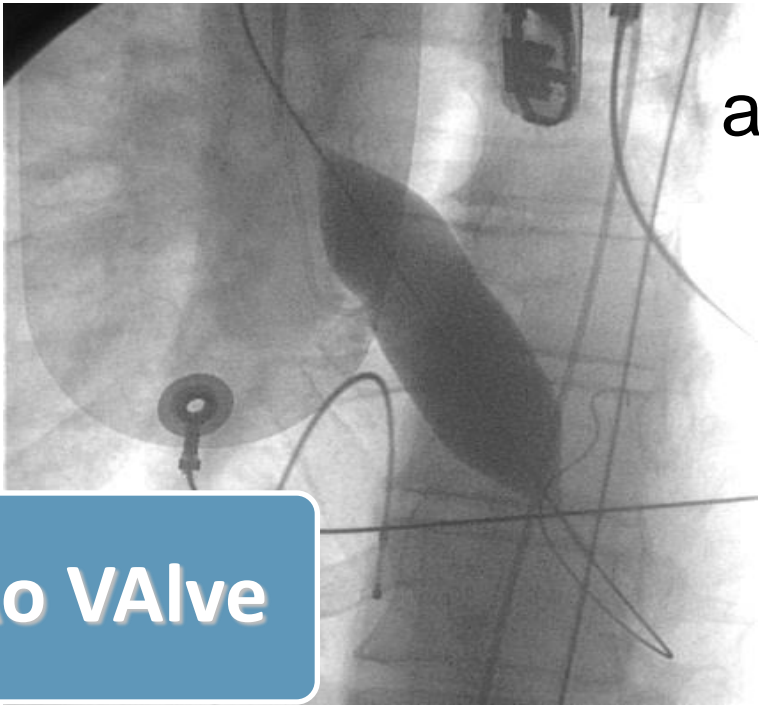


LV

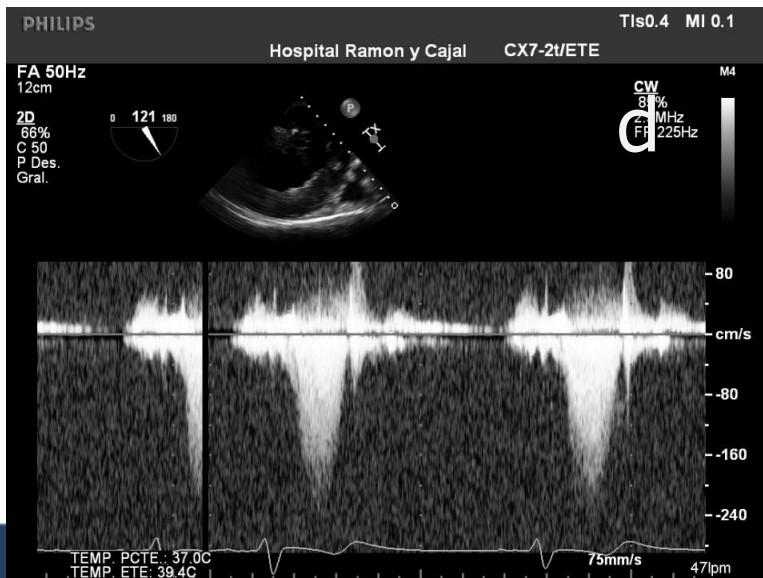
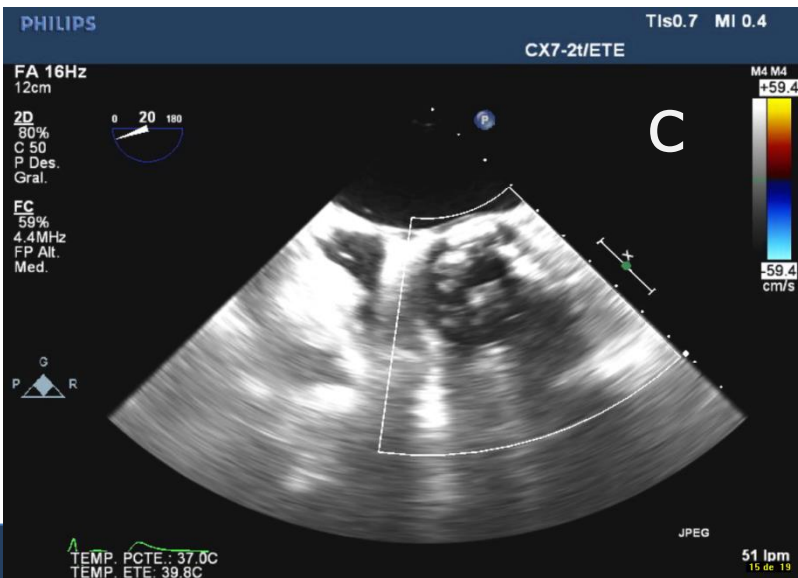
ECHOCARDIOGRAM

Ao Valve



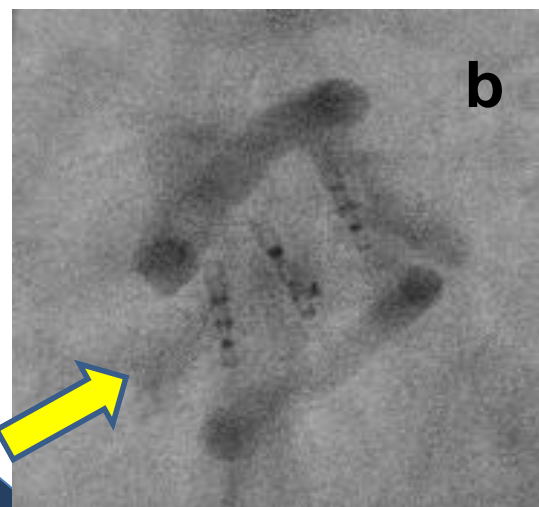
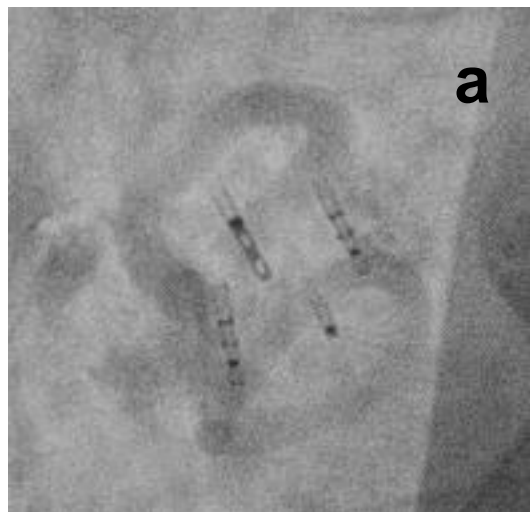


Ao Valve

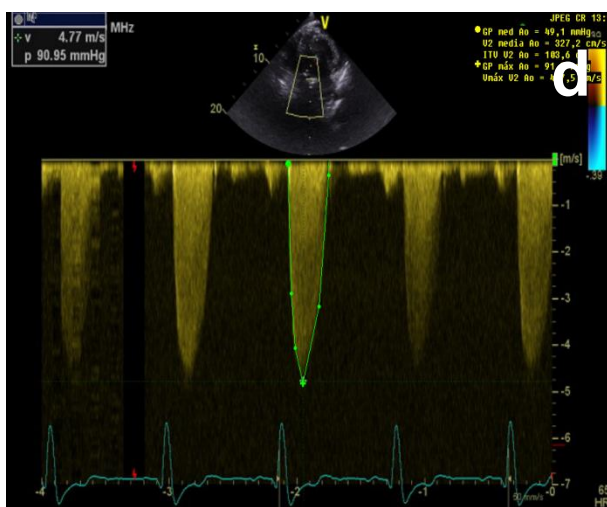
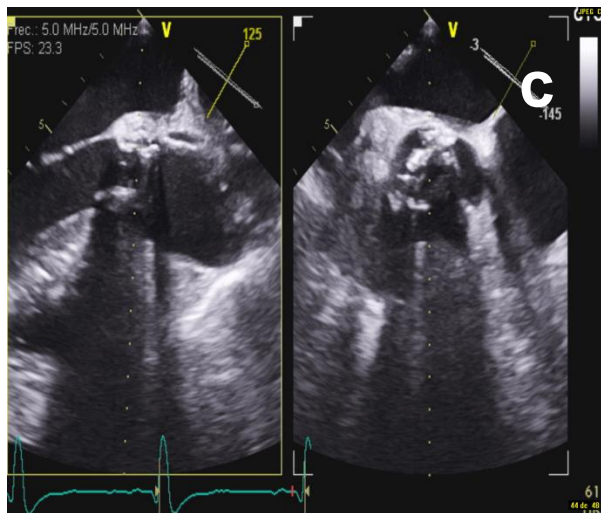


Ao Valve

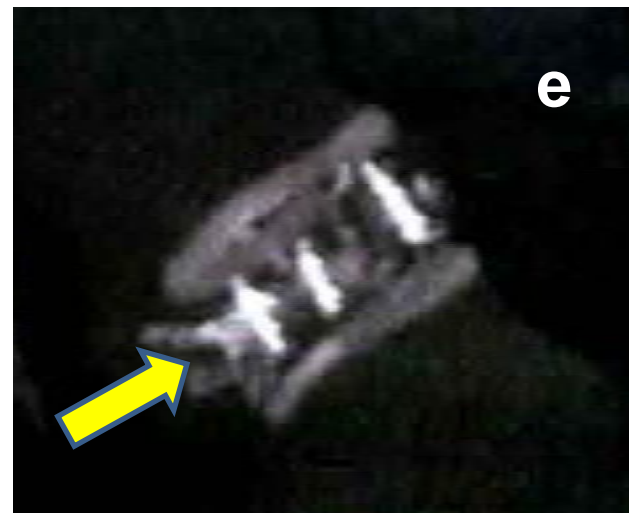
Fluoroscopy



TTE



CT



Cardiac Anatomy

Ao Valve



Aorta



LV

CT

Calcification

Dimension

Aneurysm

Tortuosity

Atherosclerosis

Distance to Coronaries

Cardiac Anatomy

Ao Valve

LVH and type

LVEF

Dimensions

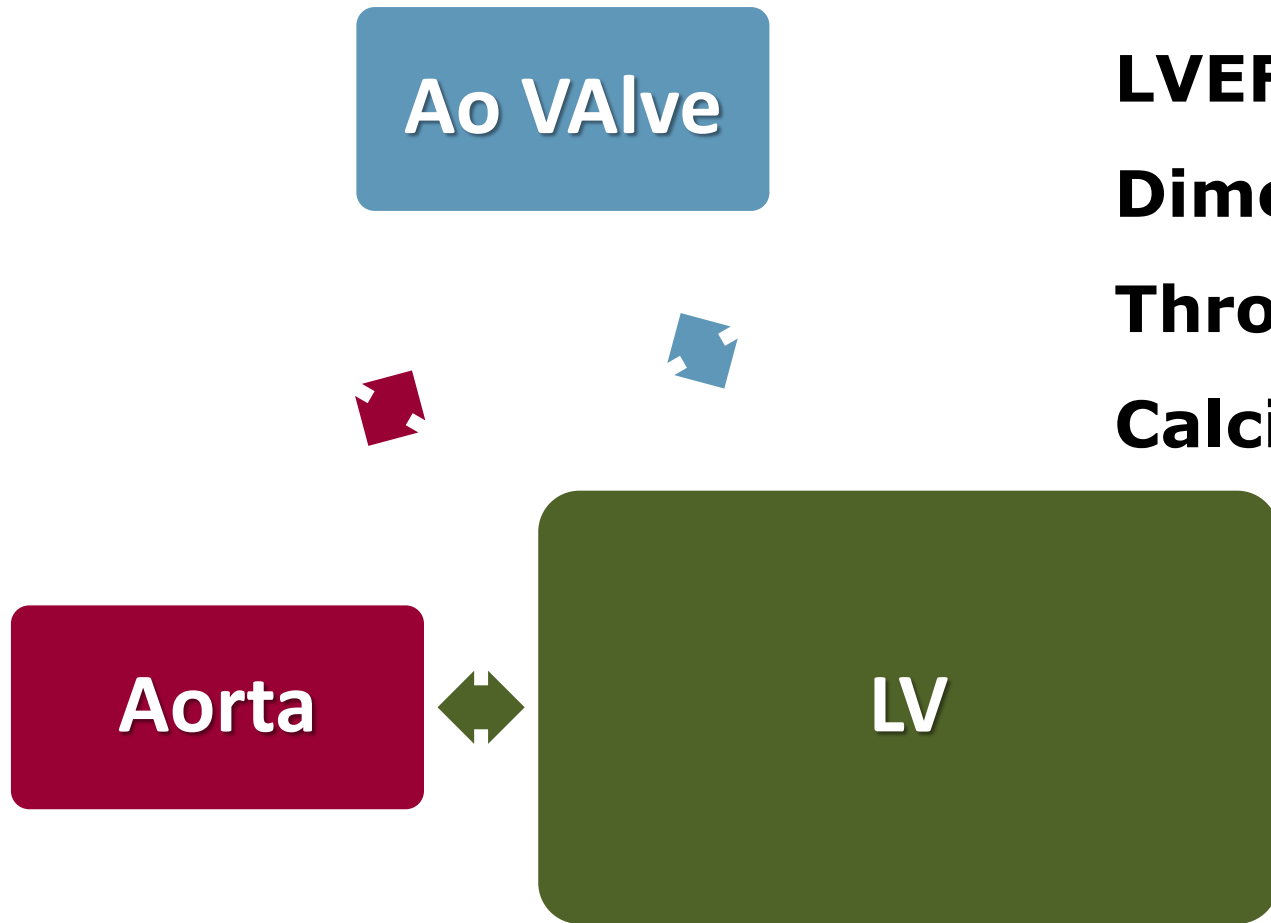
Thrombi

Calcification

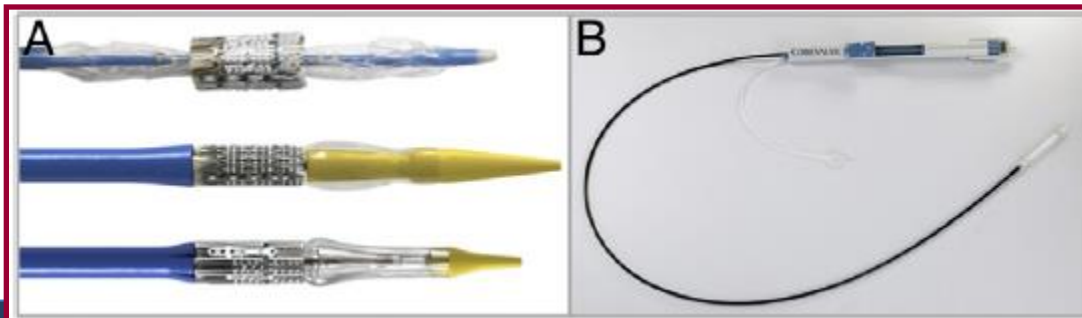
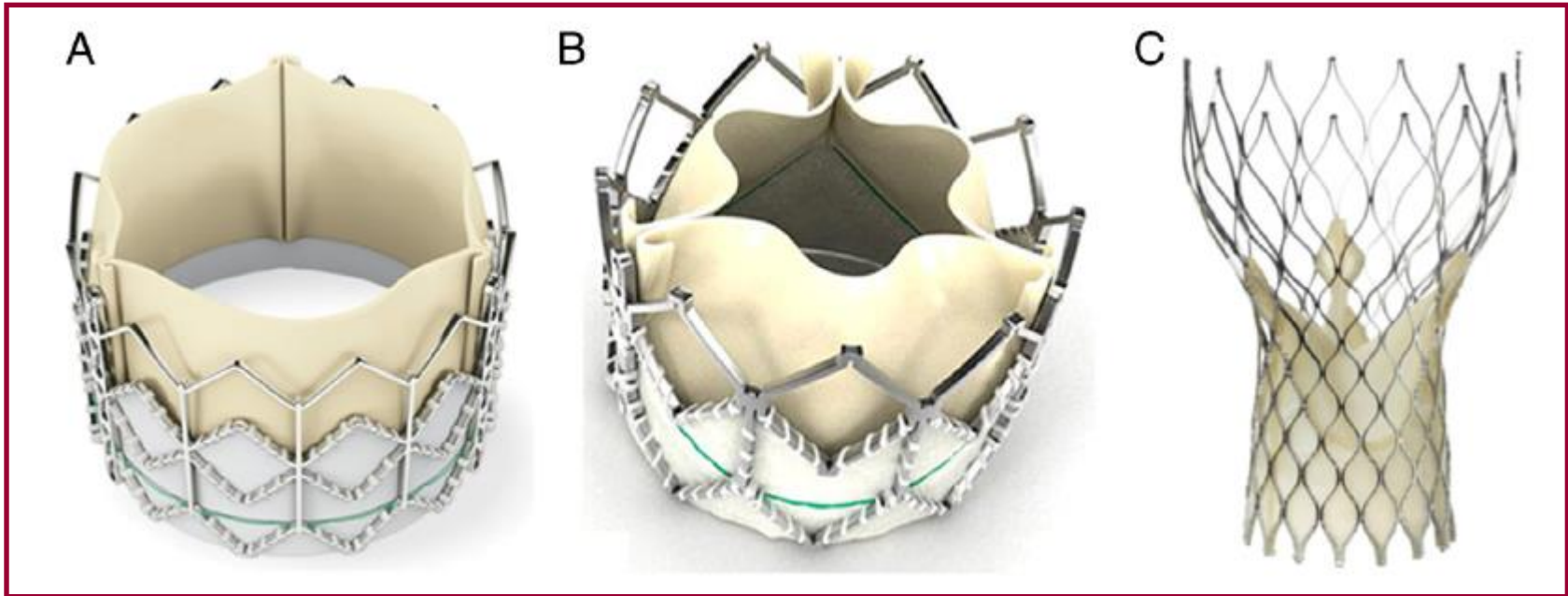
Aorta

LV

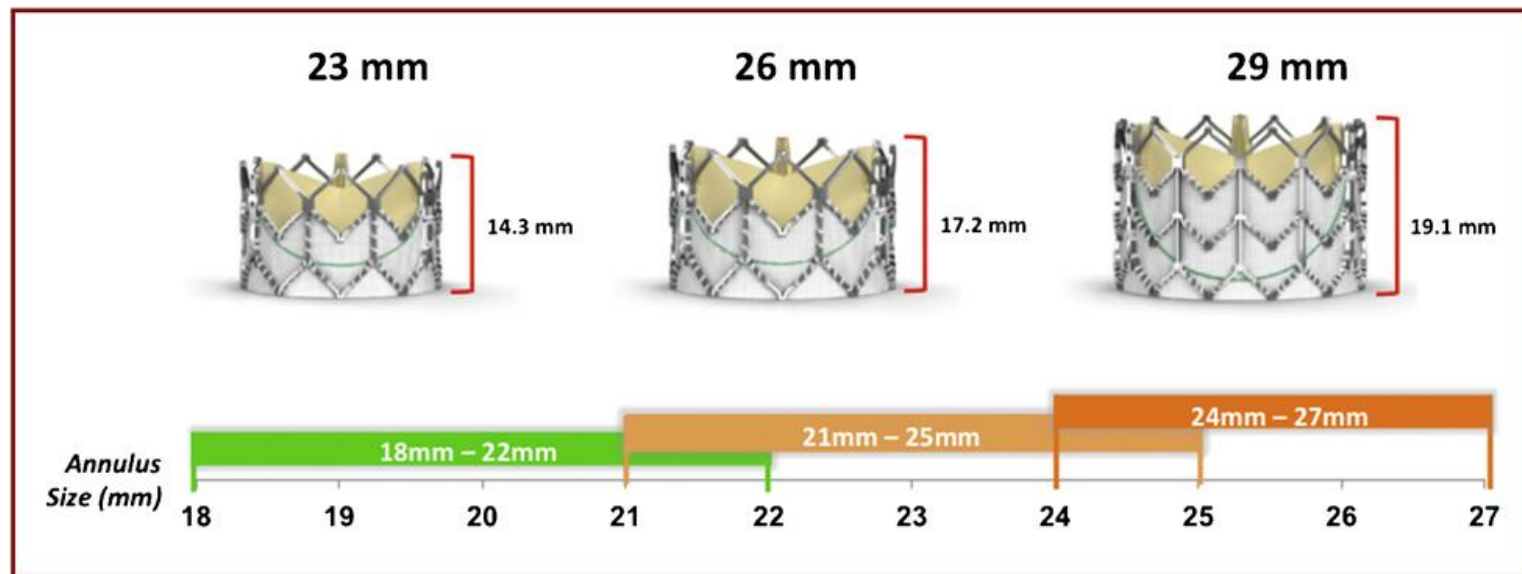
ECHOCARDIOGRAM



Then....decide



Then....decide



Then....decide

Indications for 26 mm CoreValve

Annulus diameter	20–23 mm
Ascending aorta	≤ 40 mm
Sinus of Valsalva width	≥ 27 mm
Sinus of Valsalva height	≥ 15 mm

Indications for 29 mm CoreValve

Annulus diameter	23–27 mm
Ascending aorta	≤ 43 mm
Sinus of Valsalva width	≥ 29 mm
Sinus of Valsalva height	≥ 15 mm

Indications for 31 mm CoreValve

Annulus diameter	26–29 mm
Ascending aorta	≤ 43 mm
Sinus of Valsalva width	≥ 29 mm
Sinus of Valsalva height	≥ 15 mm



26 mm
CoreValve

For 20-23 mm
annulus diameters



29 mm
CoreValve

For 23-26 mm
annulus diameters

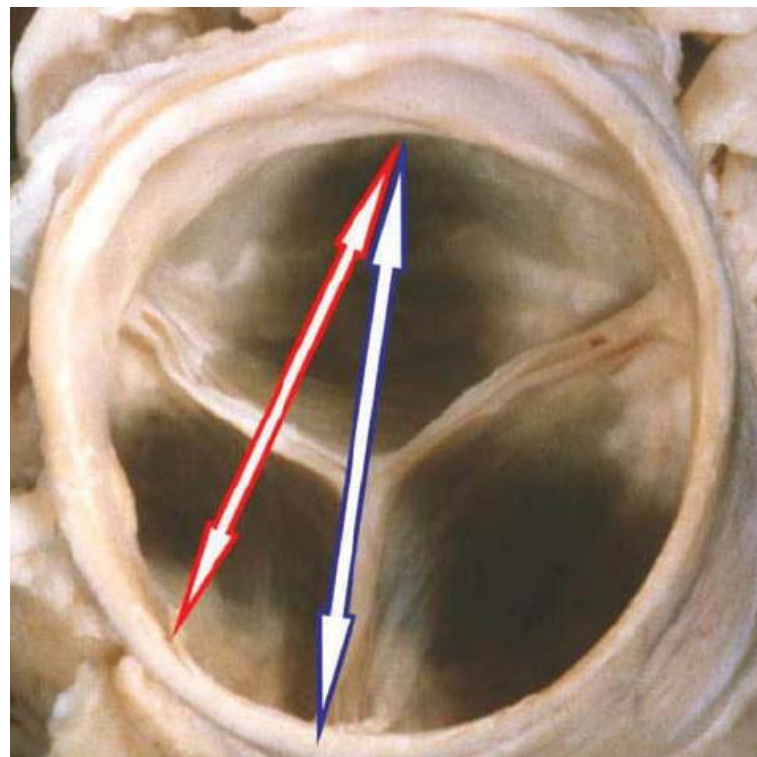
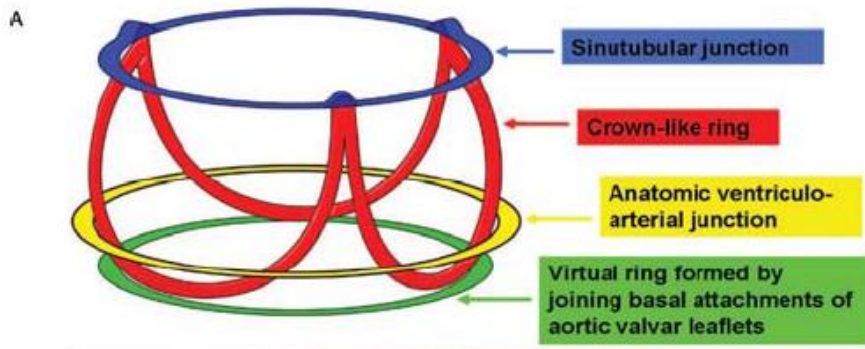


31 mm
CoreValve

For 26-29 mm
annulus diameters

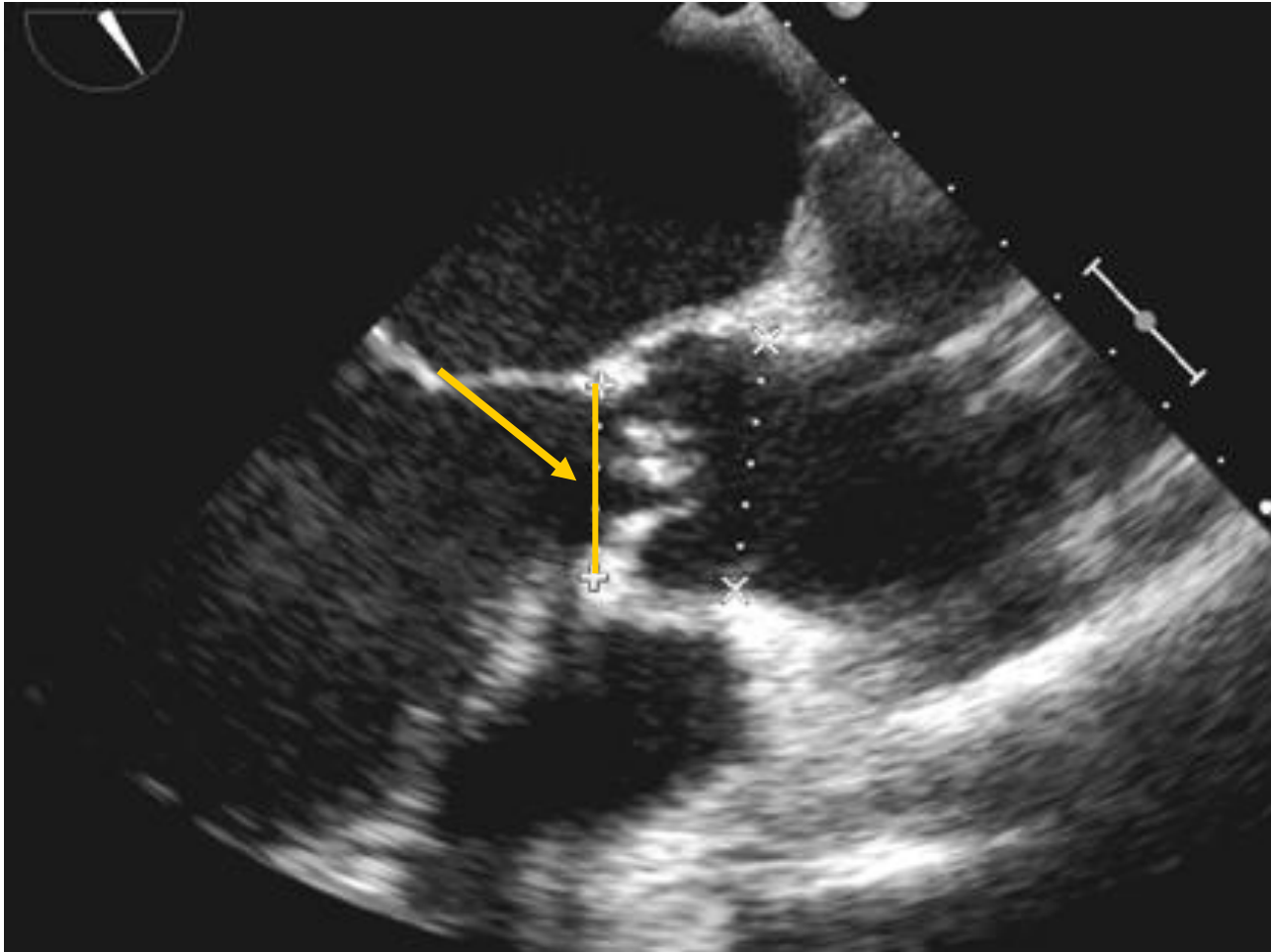
Then...CT or Echo ?

Circulation
Cardiovascular Interventions
JOURNAL OF THE AMERICAN HEART ASSOCIATION

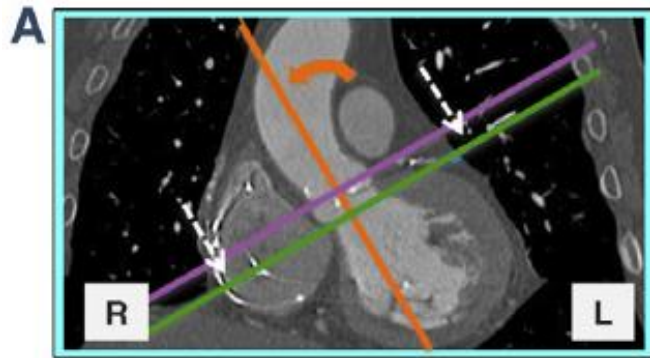


Piazza N et al. *Circ Cardiovasc Interv* 2008

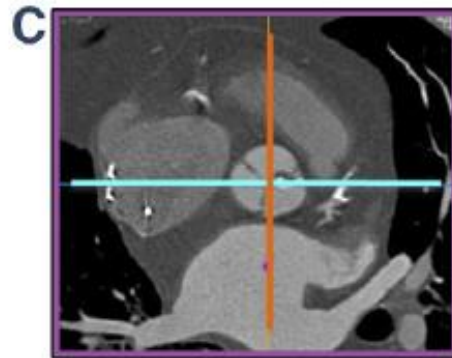
Echo measurements ?



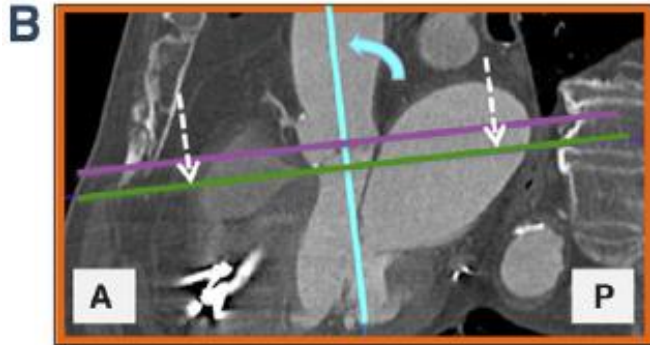
CT measurements ?



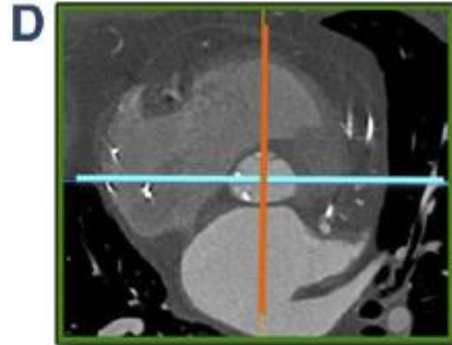
Coronal Oblique Plane



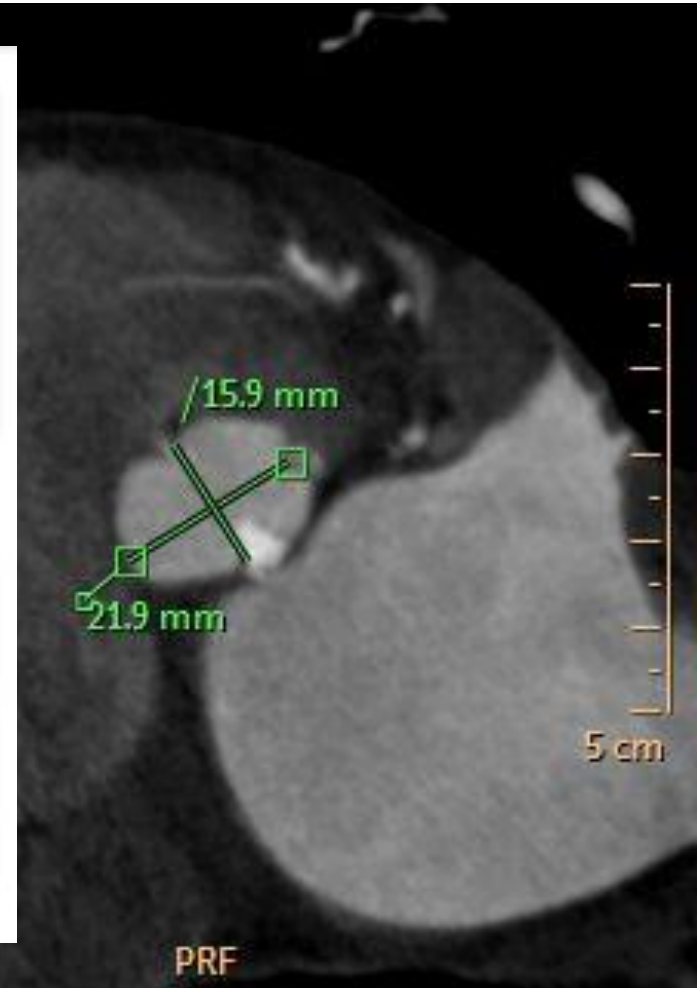
Valve Plane



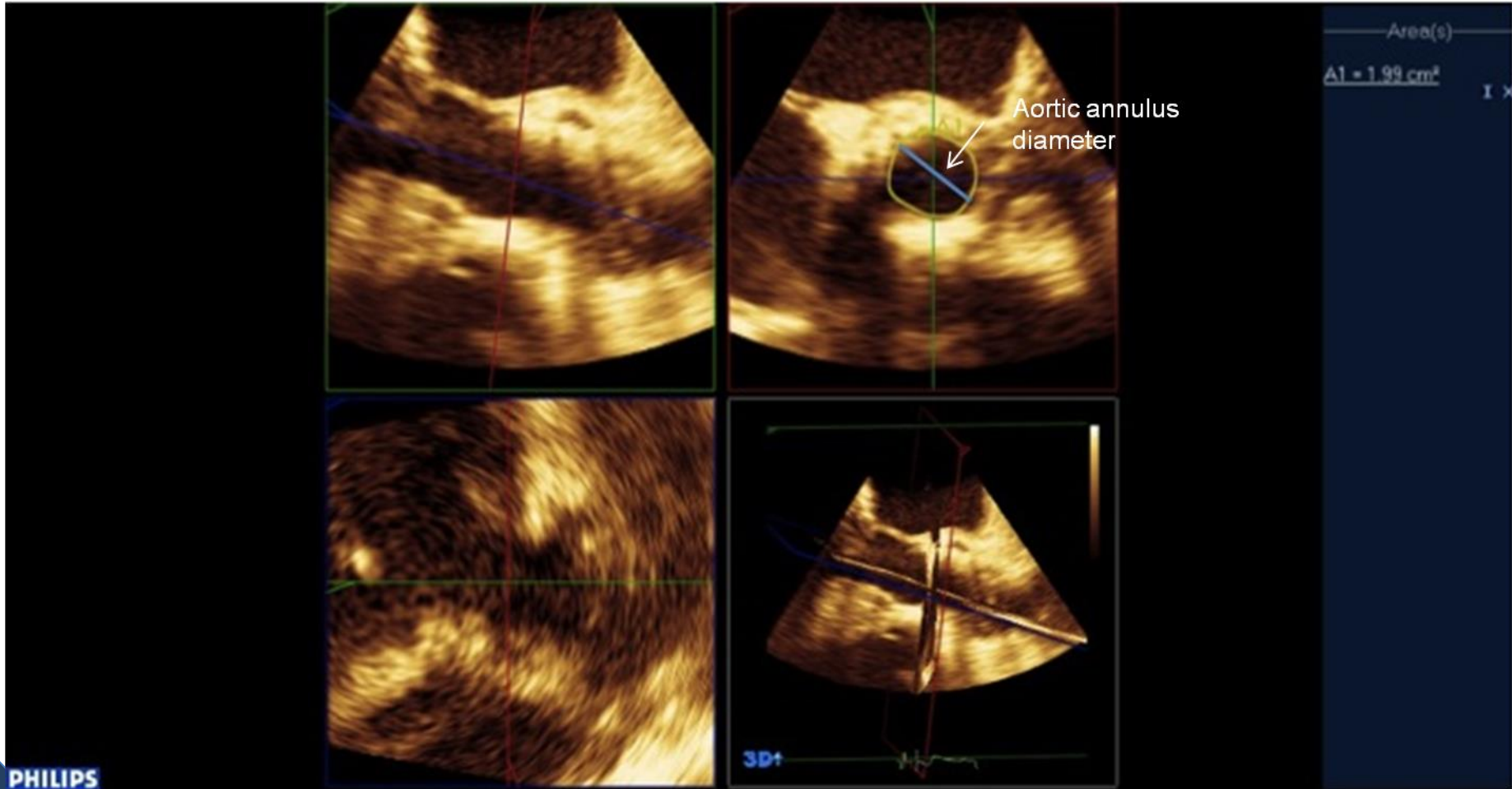
Sagittal Oblique Plane



Transverse Plane

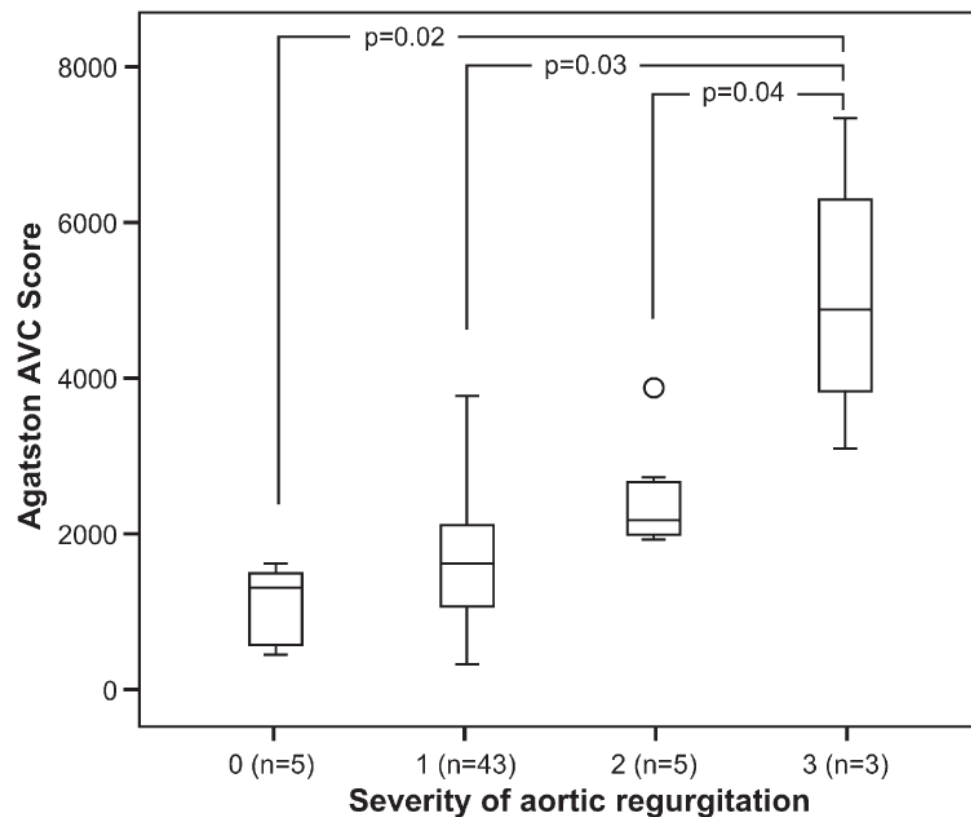
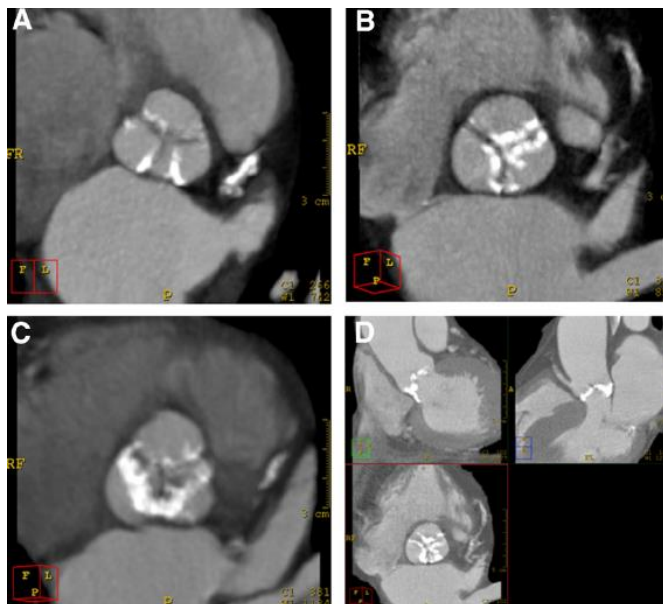


3D echo ?

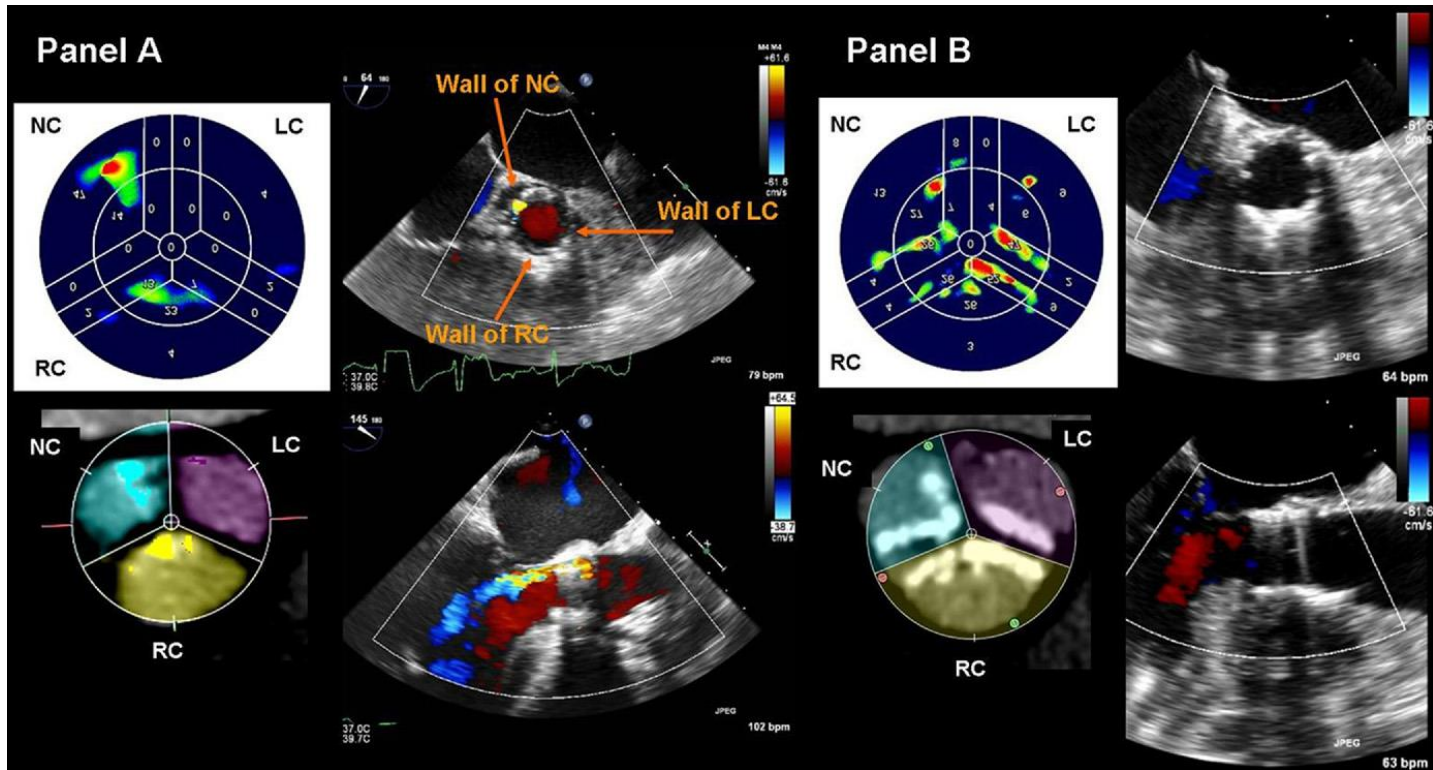


Calcification. A main issue

Patients with severe AVC have an increased risk for a relevant AR after TAVI as well as a trend for increased need for additional procedures.



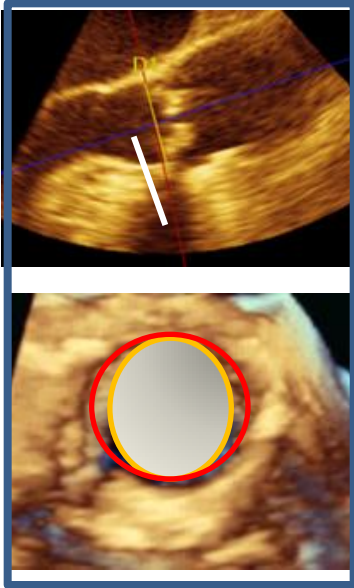
Calcification.



Calcium at the valvular commissure was better than calcium at the valvular edge in predicting paravavular AR originating from the corresponding commissure.

Ewe SH et al. Am J Cardiol 2011;108:1470-1477

3D echo



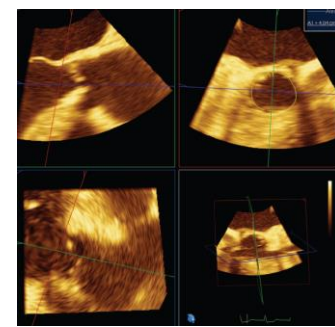
	No AR N=26	Parav AR N=27	P Value
Aortic annulus diameter (mm)	20.5 ± 2.0	21.8 ± 2.3	0,046
Non-coaptation index	0.18 ± 0.22	0.36 ± 0.2	0,011

Non-coaptation index ≥ 0.3 – increased risk of AR [7.1 IC95% (1.8-28.9)].

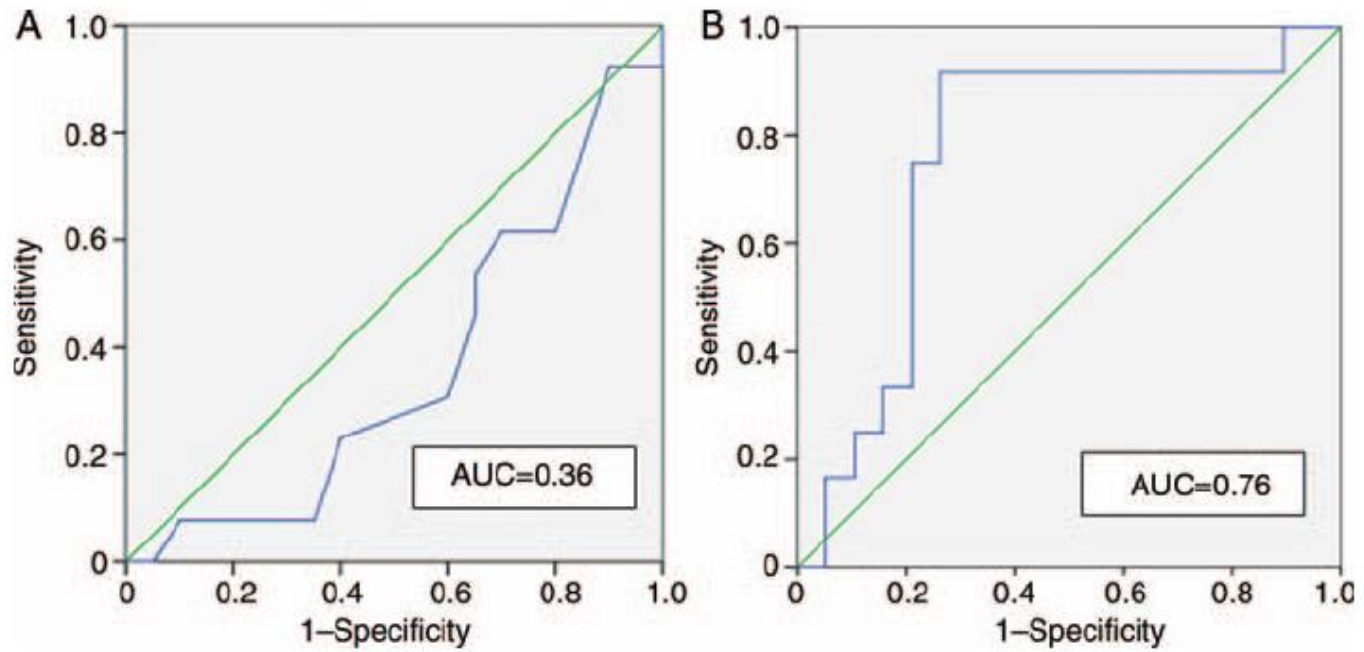
Non-coaptation index

aortic annulus area - aortic prosthesis area / aortic annulus area

Prosthesis/annulus discongruence assessed by three-dimensional transoesophageal echocardiography: A predictor of significant paravalvular aortic regurgitation after transcatheter aortic valve implantation



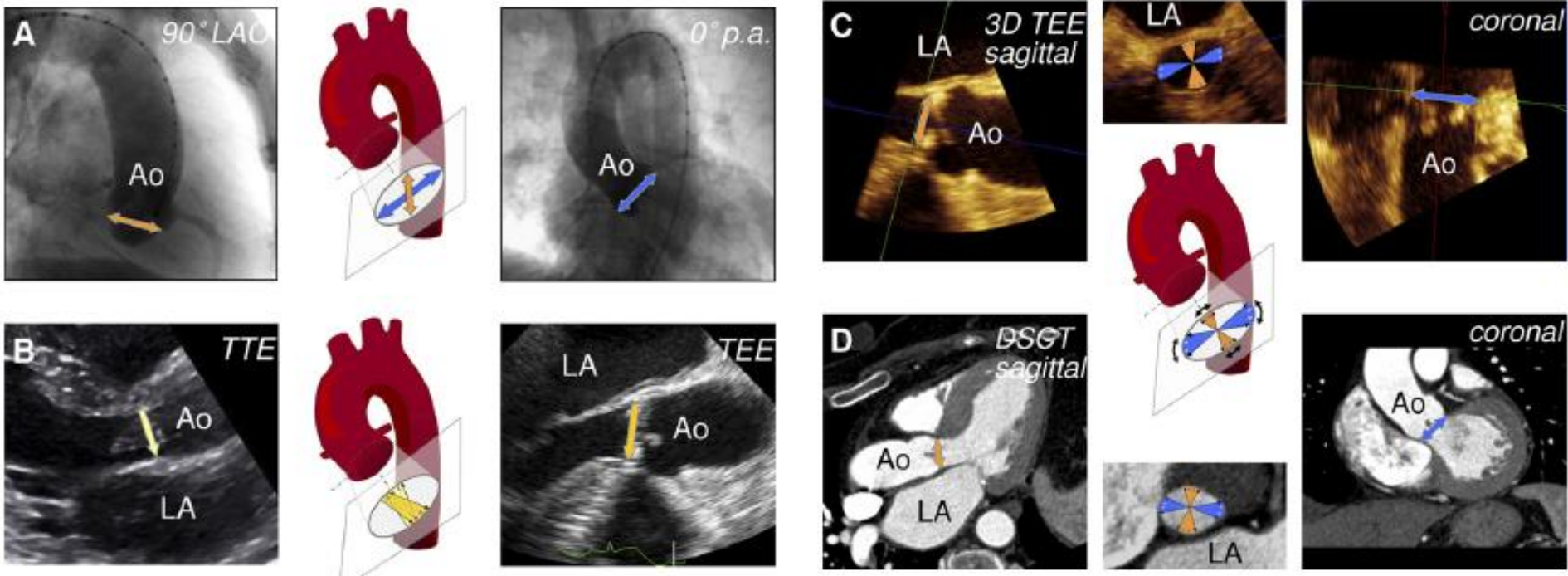
Mismatch index for 2D circular area	-1.02 ± 0.42	-0.96 ± 0.46	-1.13 ± 0.32	0.2
Mismatch index for 3D planimetered area	0.19 ± 0.89	-0.06 ± 0.88	0.65 ± 0.75	0.03



ROC curves for post-IAVI significant AR prediction obtained by 'mismatch index' derived from

2D circular area (A) and 3D planimetered area (B).

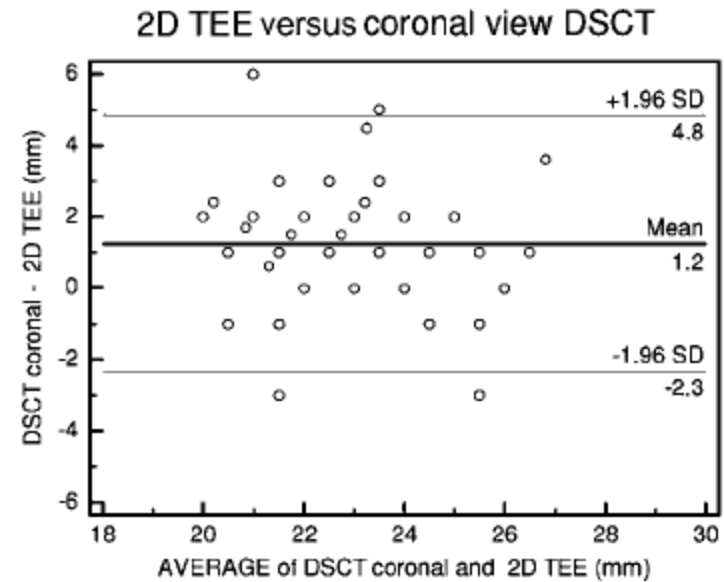
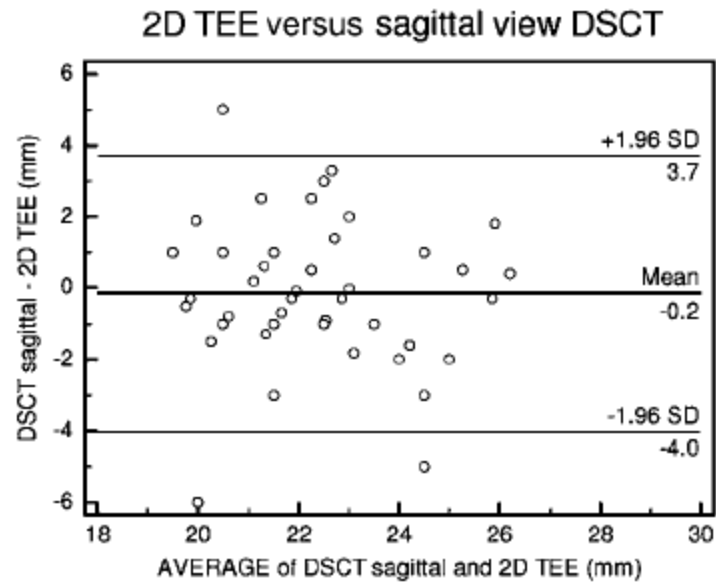
What we know



3D imaging techniques should be used to evaluate aortic annulus diameters
2D imaging techniques, providing only a sagittal view, underestimate them.
3D TEE provides measurements of aortic annulus diameters similar to those
obtained by DSCT.

CT vs 2D

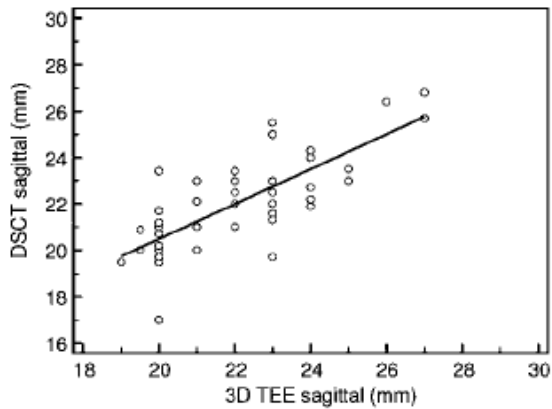
Annulus



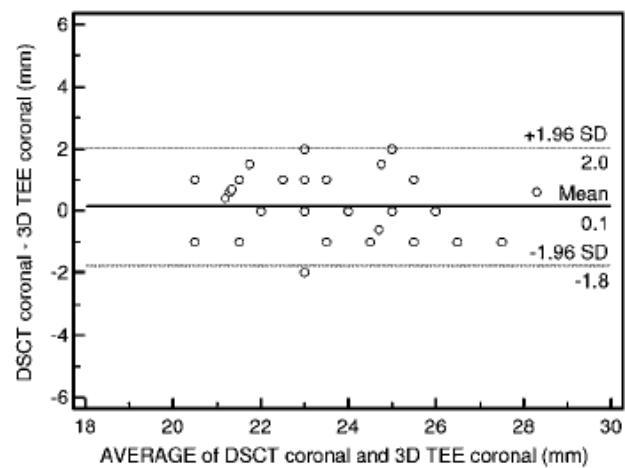
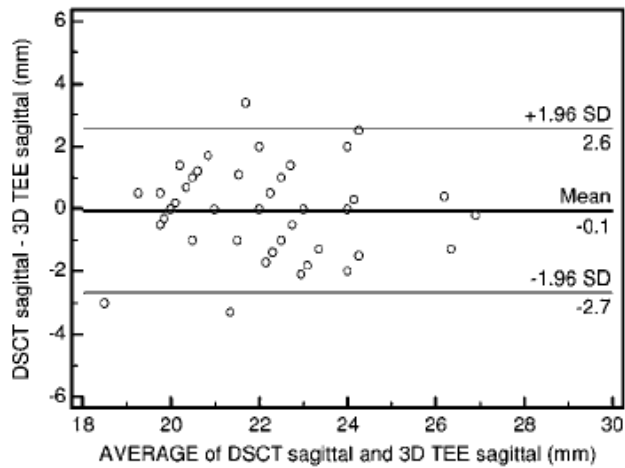
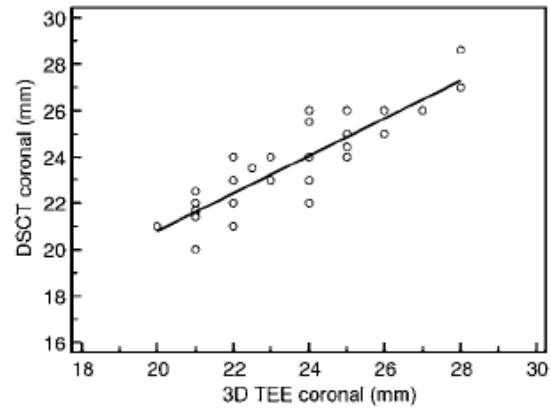
CT vs 3D

Annulus

DSCT versus 3D TEE – sagittal view diameters



DSCT versus 3D TEE – coronal view diameters



Paravalvular regurgitation: an integrated approach

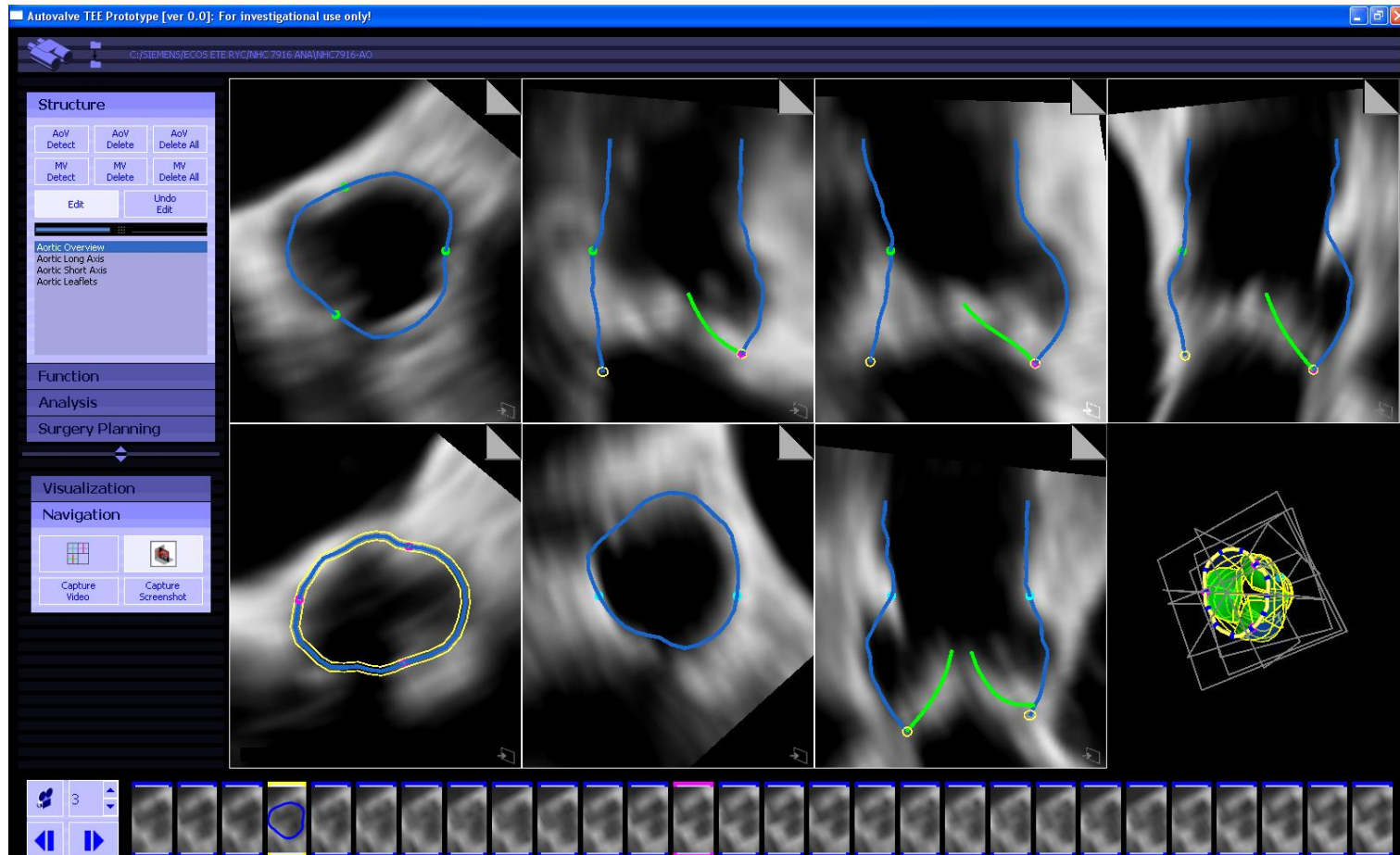
Mechanisms of AR after TAVI

- Aortic valve calcification
- Asymmetry of the aortic valve calcification
- Device landing zone calcification
- Larger annulus or oval shaped annulus
- Cover/ Eccentricity/ Non-coaptation/ Mismatch
Indexes

Where are we going ?

Automatisation

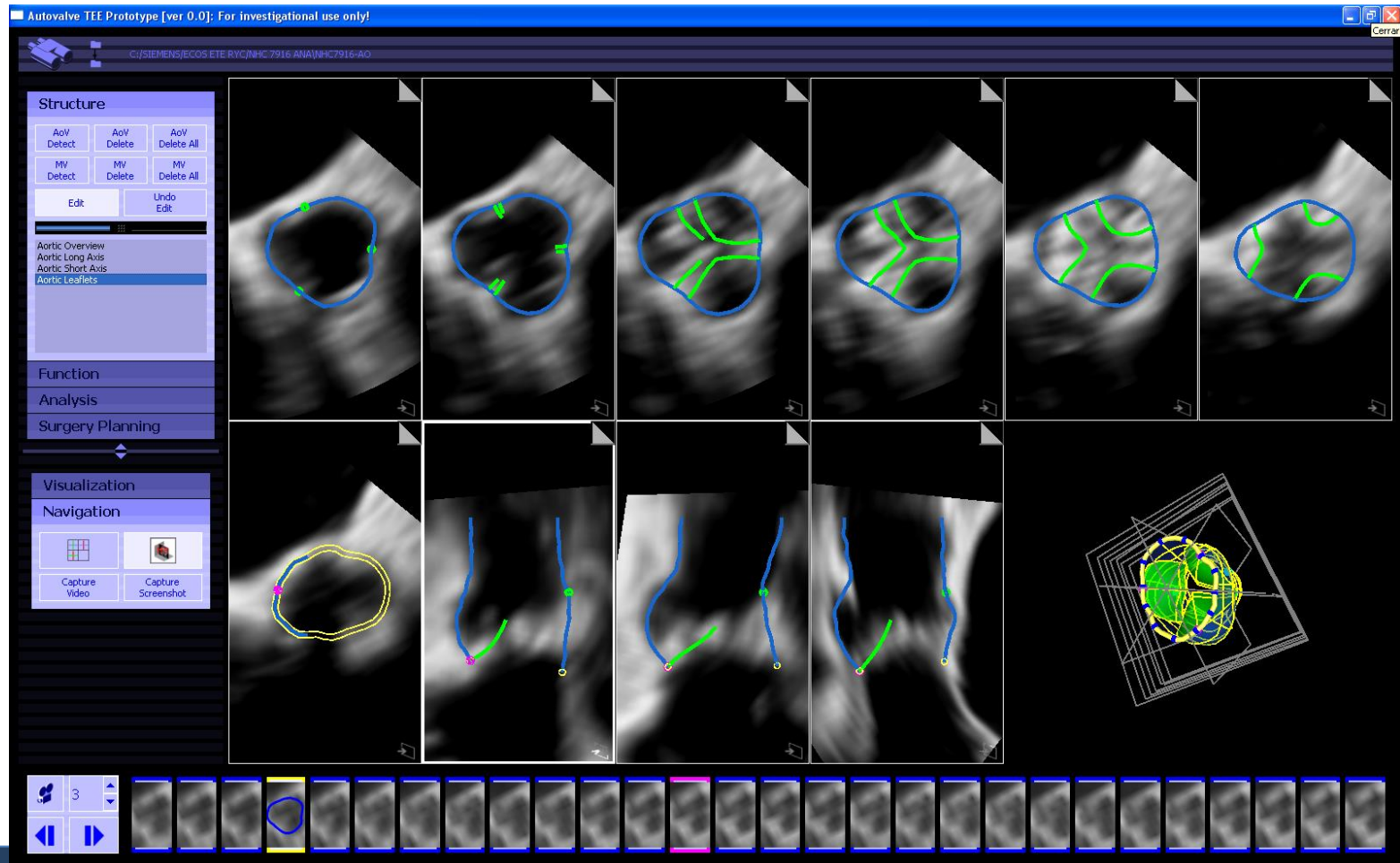
New Technologies



Where are we going ?

Automatisation

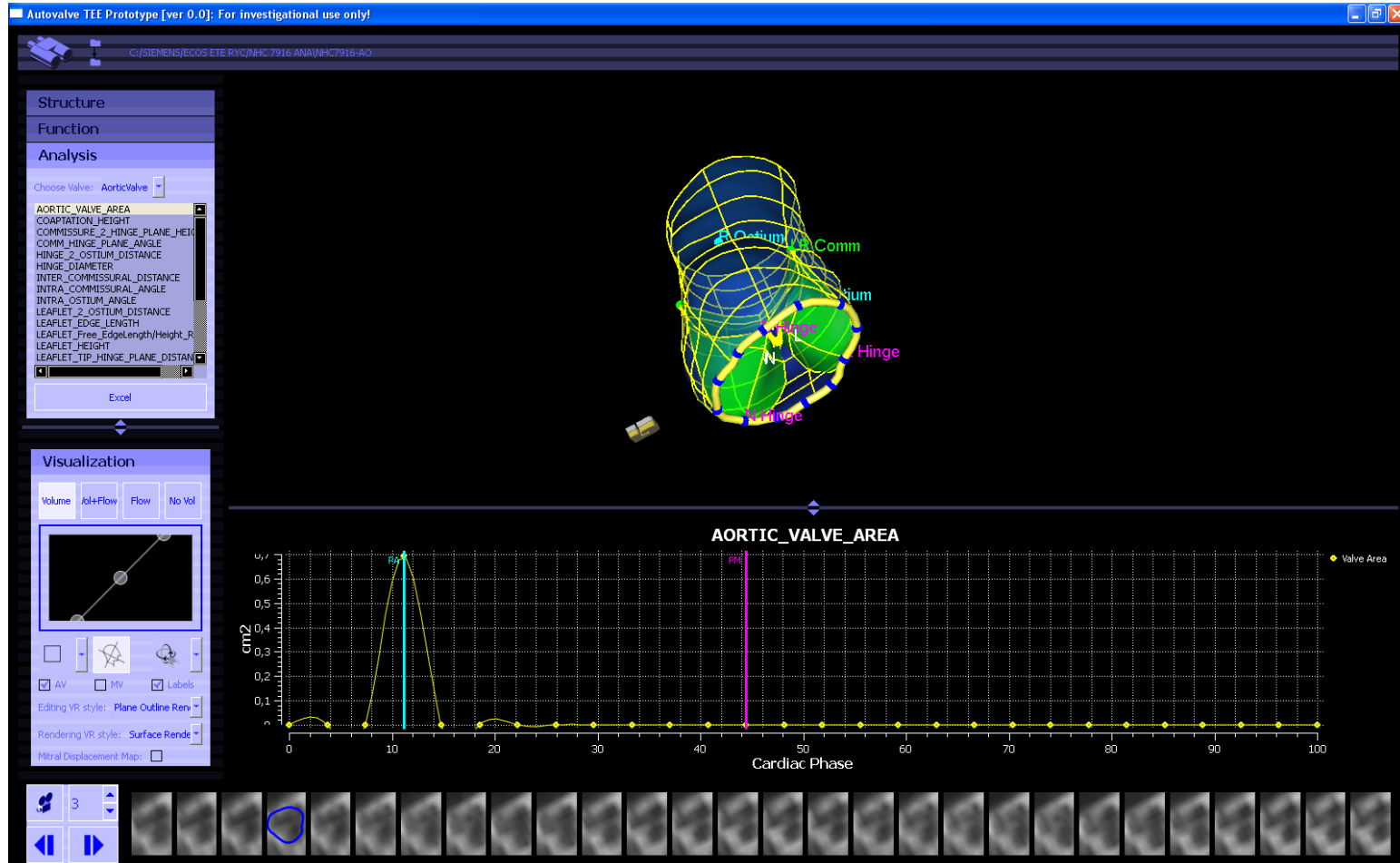
New Technologies



Where are we going ?

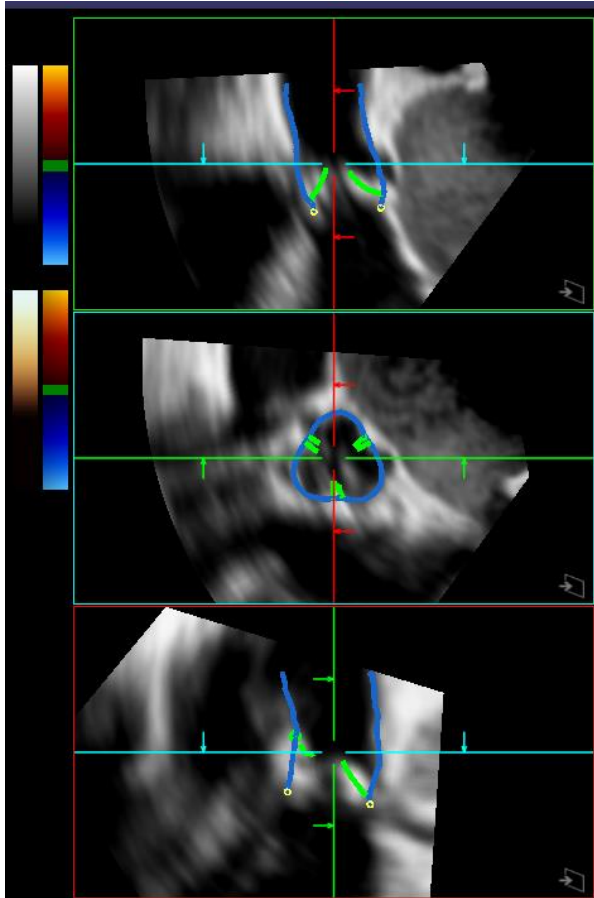
Automatisation

New Technologies

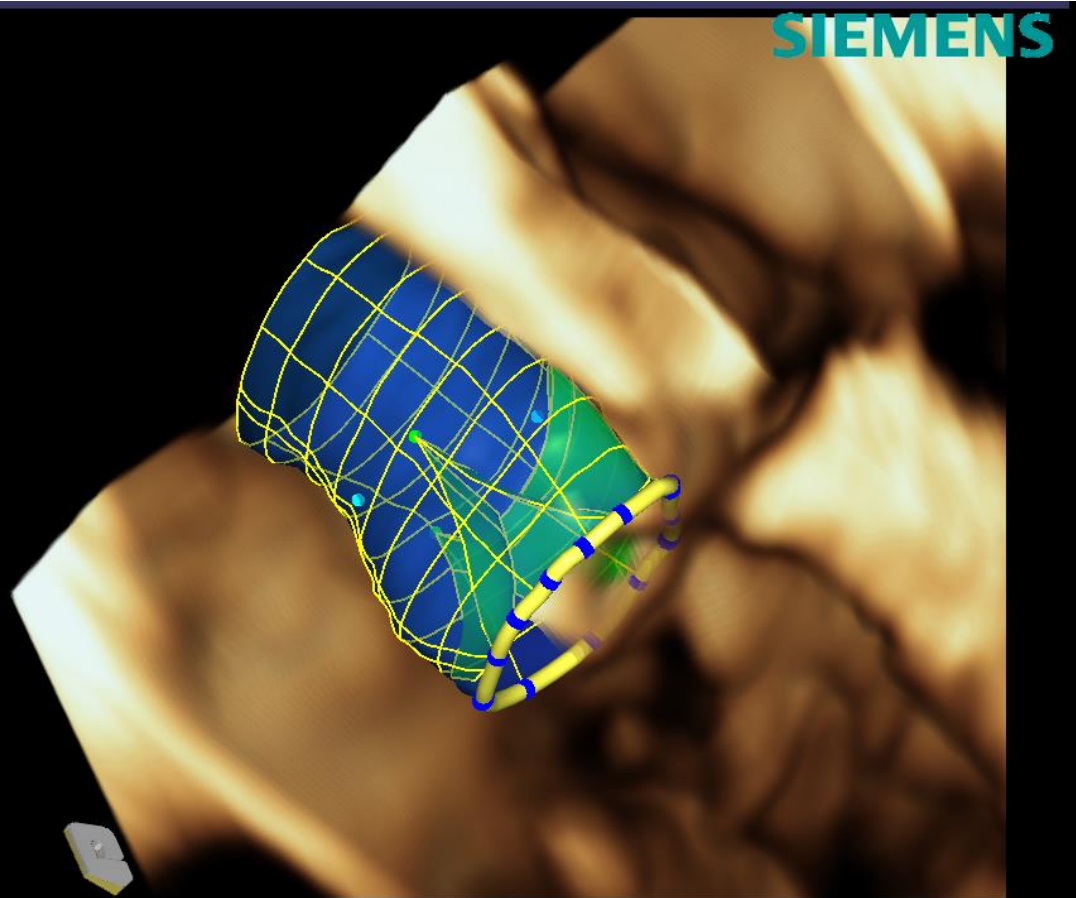


Where are we going ?

Automatisation



New Technologies



So then.....

ECHO TTE

	ETE 2D	ETE 3D	TC
Annulus	+	++	++
Calcification	+	++	++
Aorta	+	+	++
Distance RCA	+	++	+++
Distance LCA		++	+++
Ao Leaflets	+	+	

Cardiac Anatomy

Ao VAlve



Aorta



LV

Move to.....

CONCLUSION

Always TTE & TEE

2D & 3D. All info

**3D needed:
annulus,
Distance CA**

3D ECHO

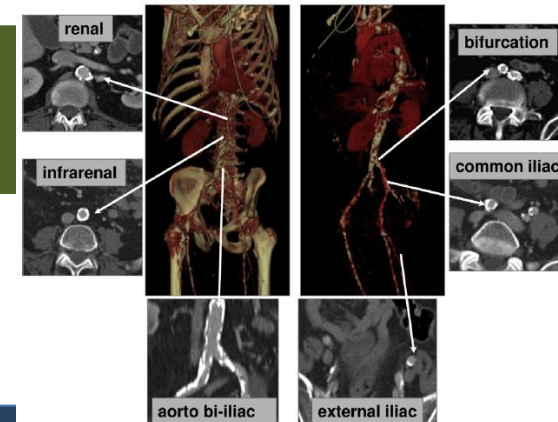
2D ECHO

CT



CT

**3D not available
Bad quality
Doubts
Aorta**



Somehow a conclusion

“Rearranging the desk chairs on the Titanic” has been a favorite parlor game of TAVR discussions for the last 8 years.





Thanks !