Exact Annular Sizing
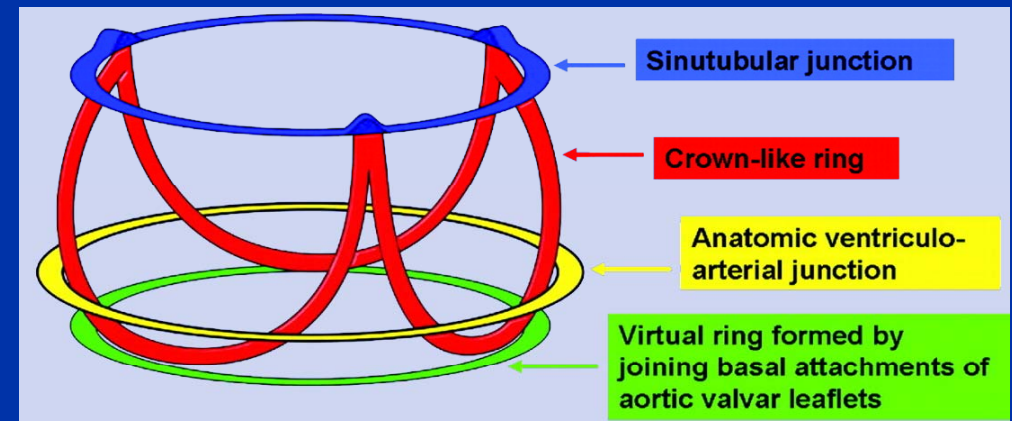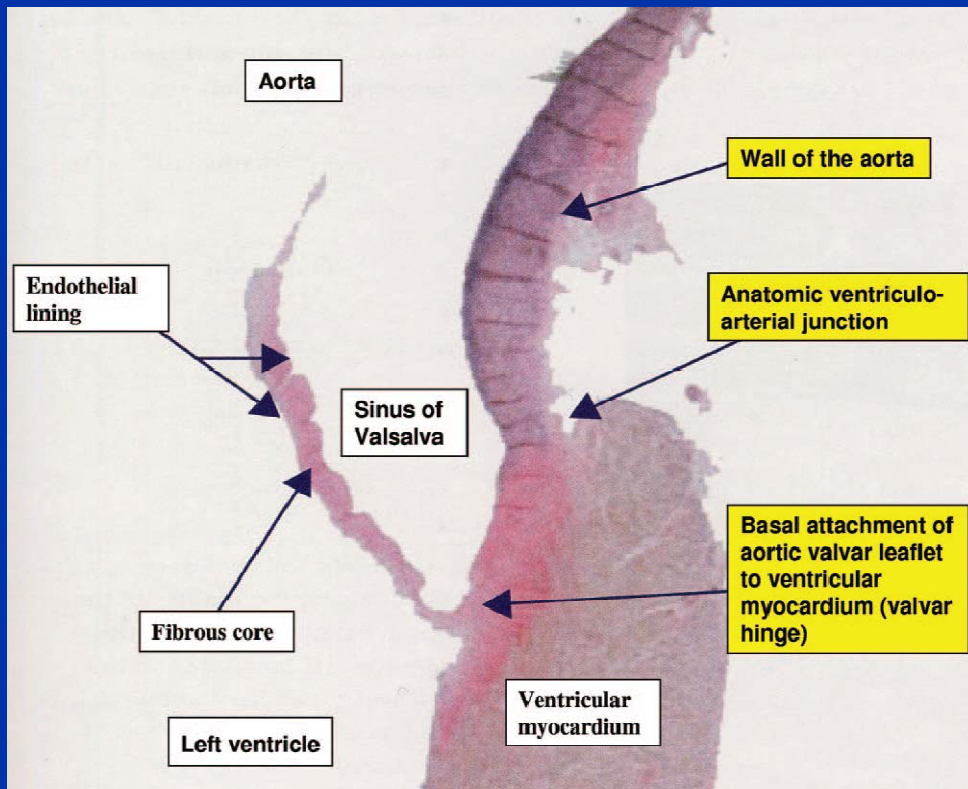# TTE, TEE and CT

Samir Kapadia, MD

Professor of Medicine

Director, Cardiac Catheterization Laboratories

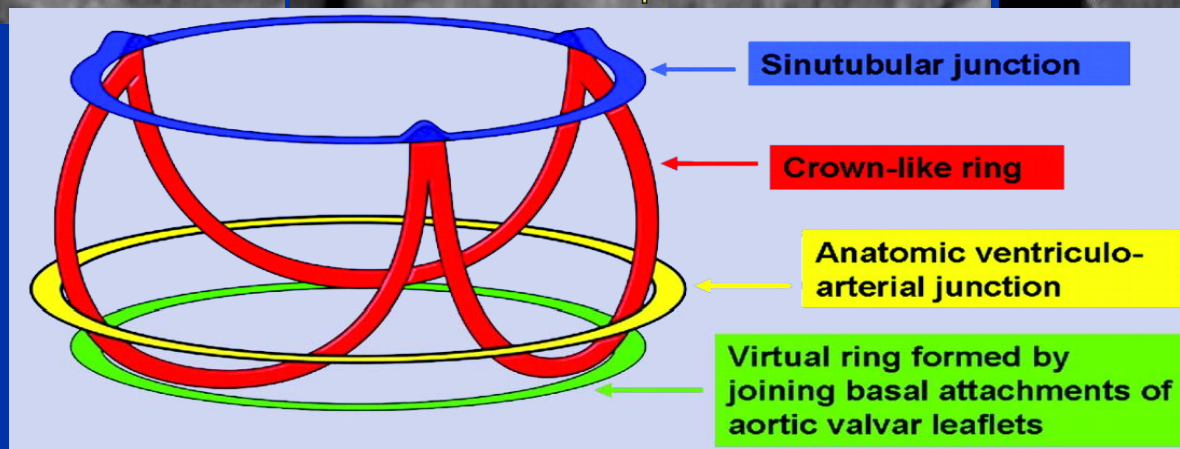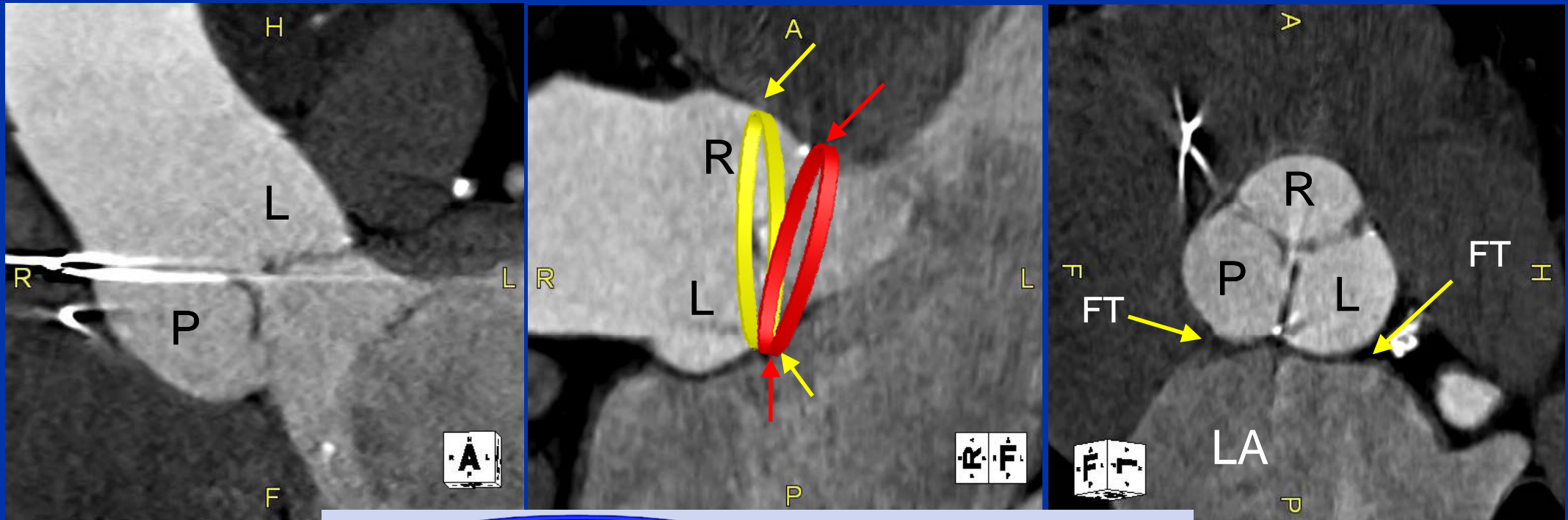Cleveland Clinic

Aortic Root and Annulus

"Anulus" and V-A Junction

Piazza, N. et al. Circ Cardiovasc Intervent 2008;1:74-81
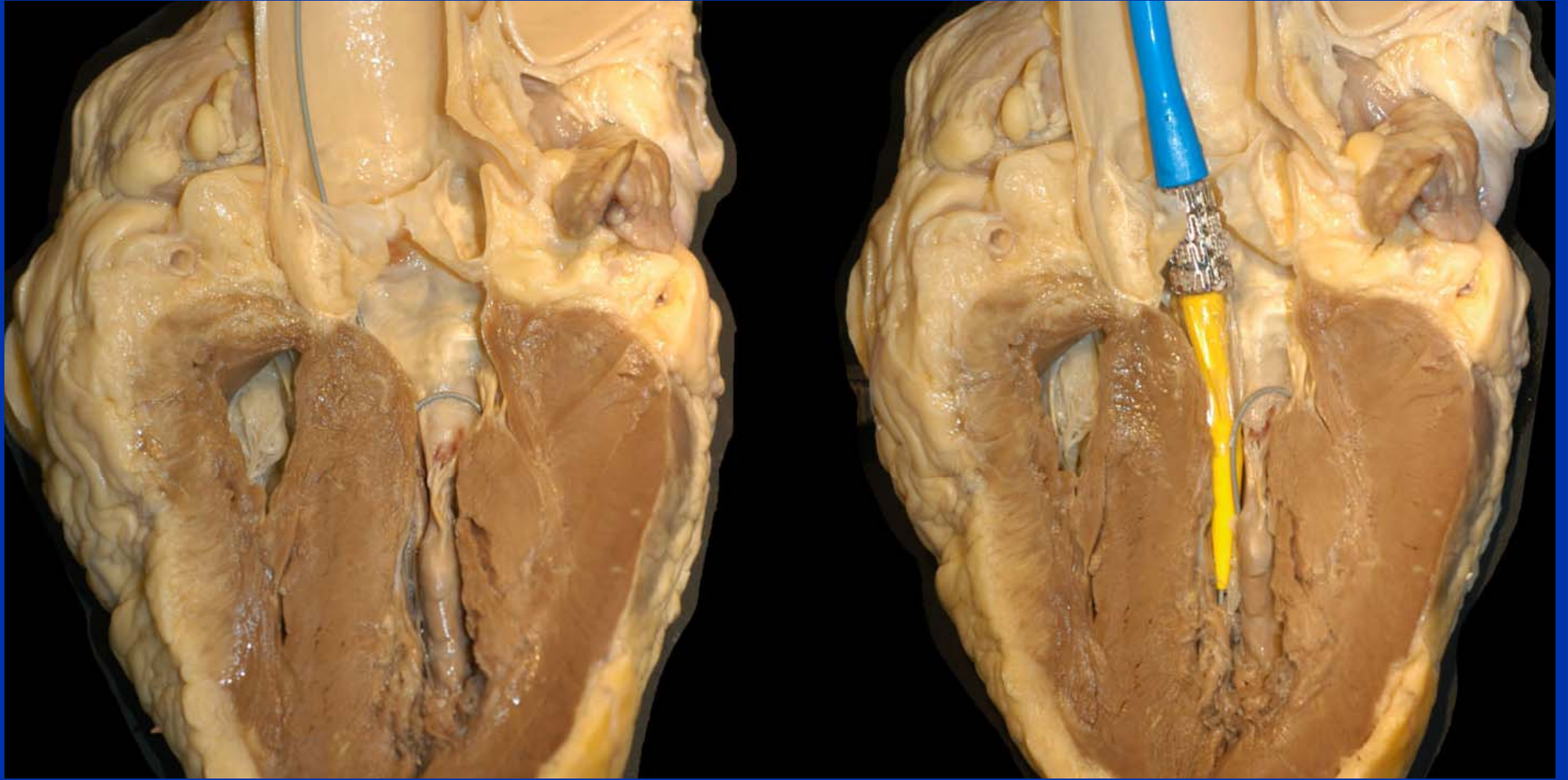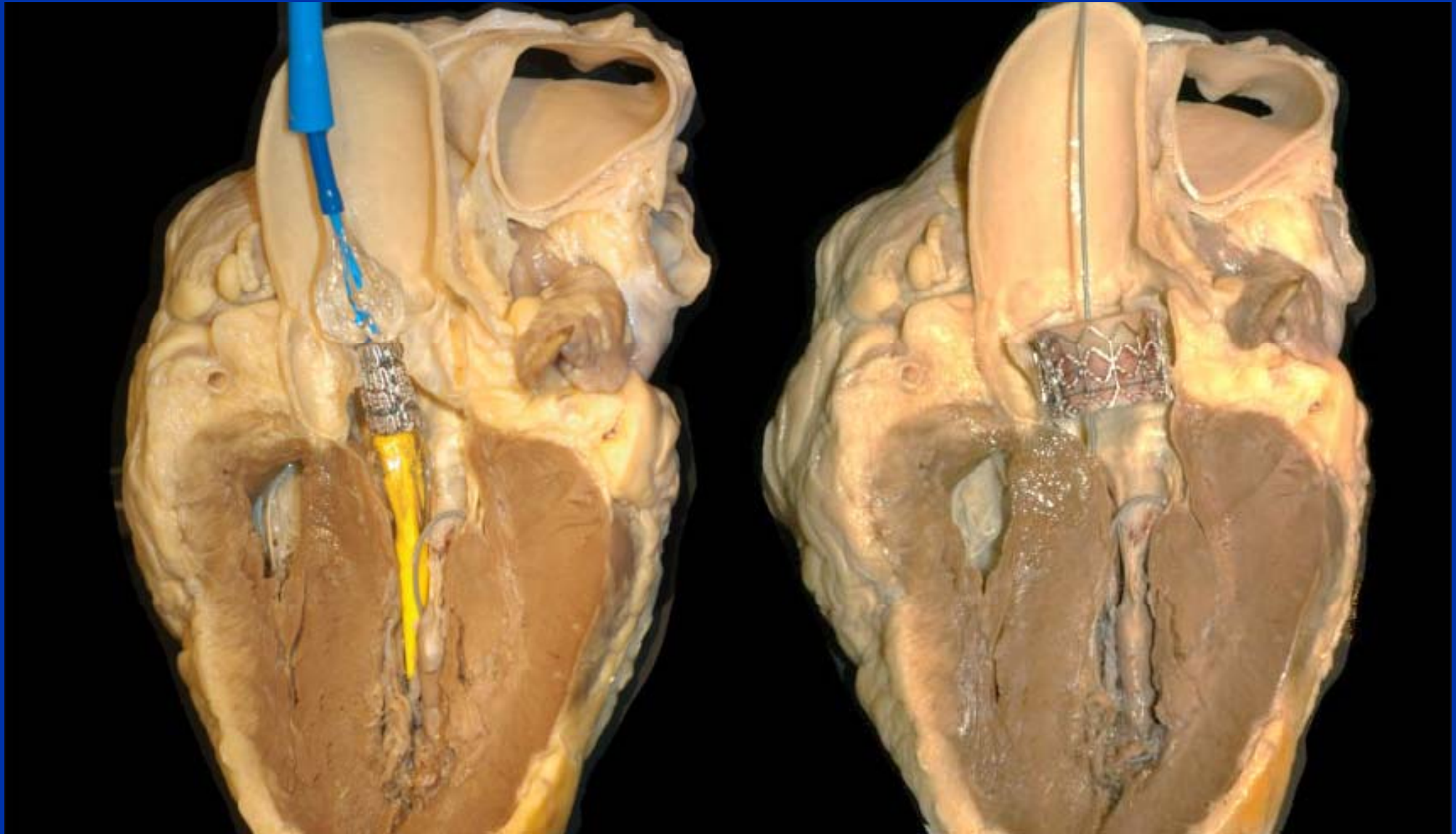
Anatomy of the Aortic Valve

Relation of the Aortic Valve
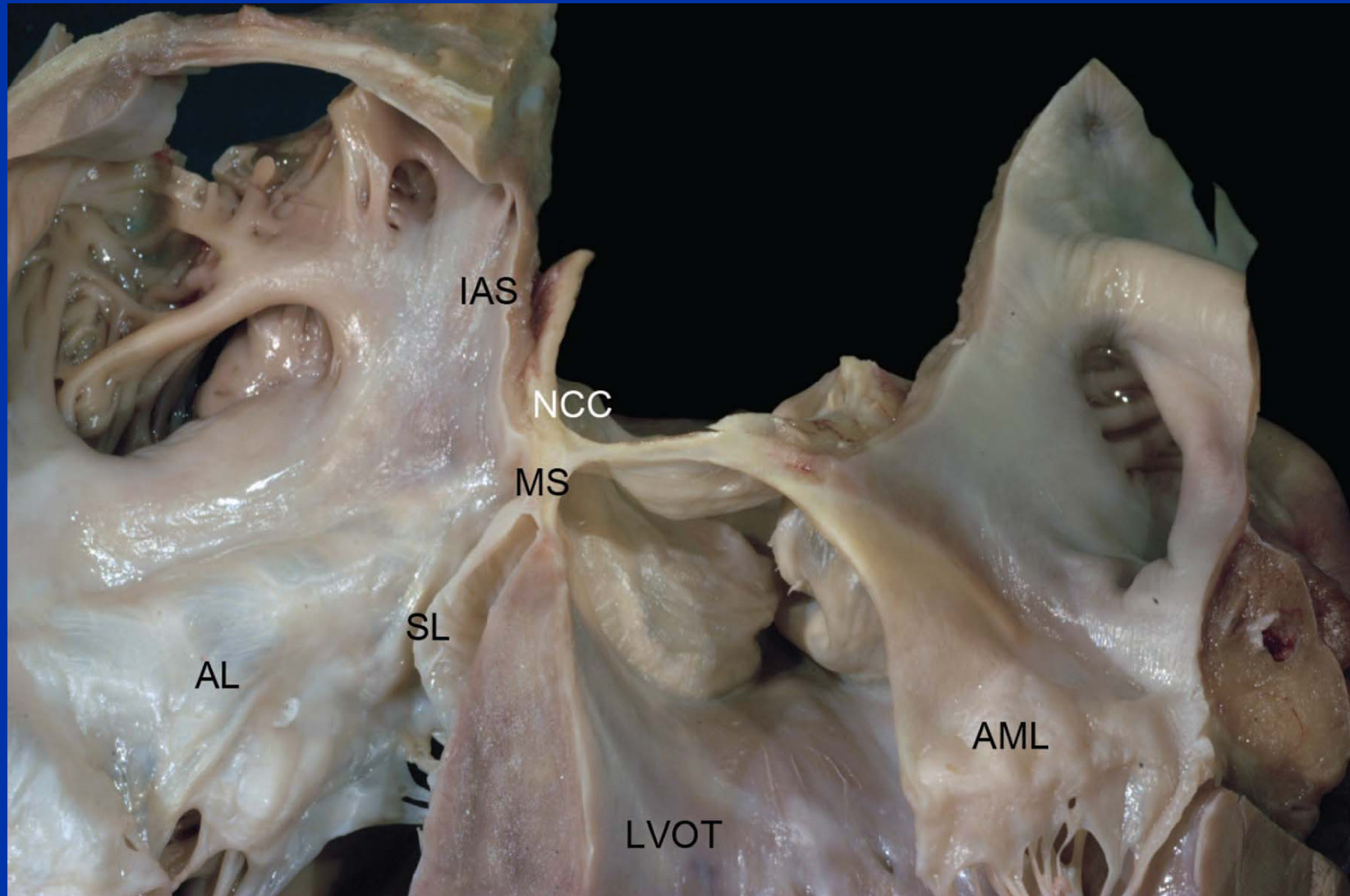
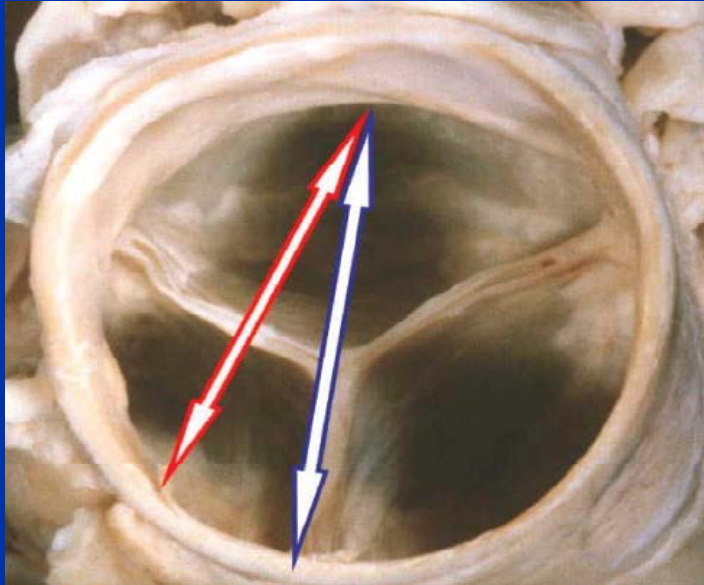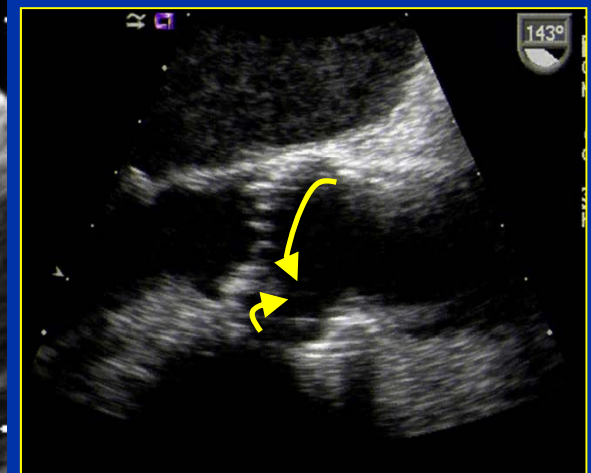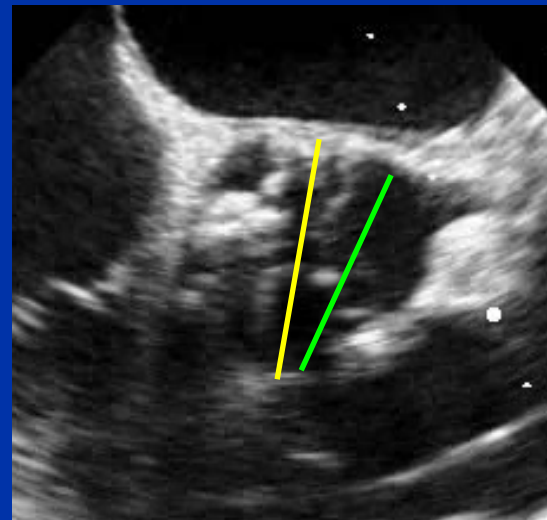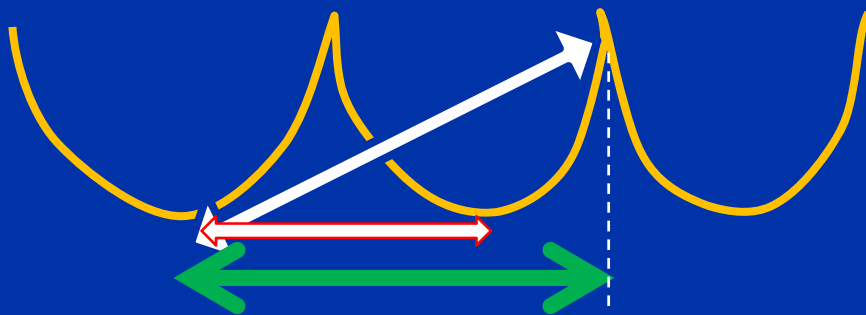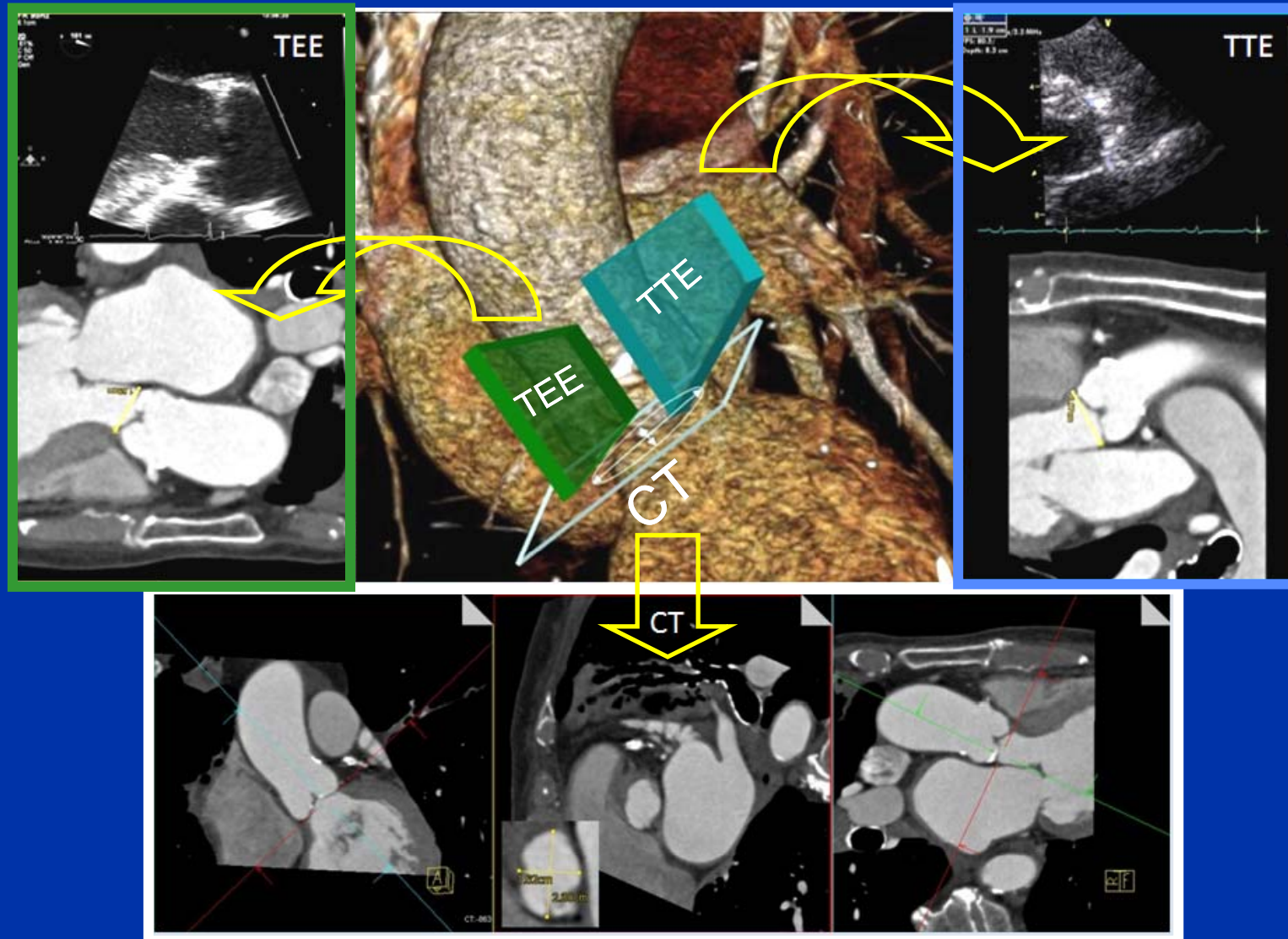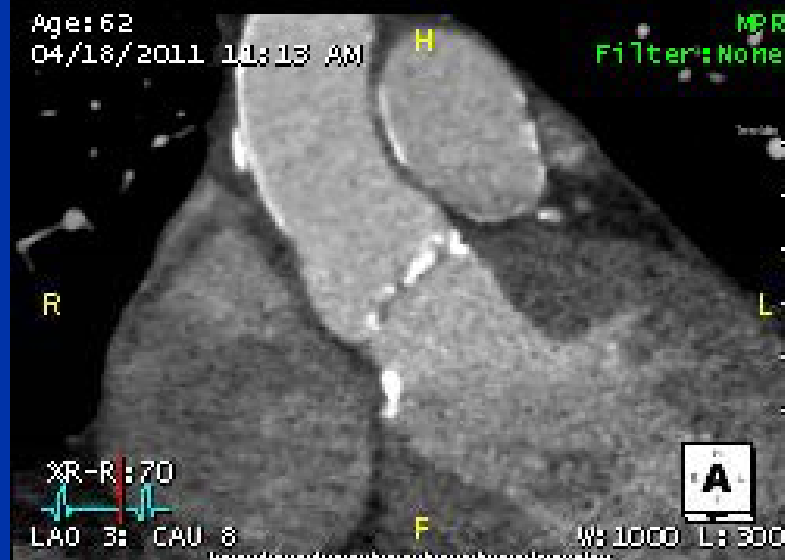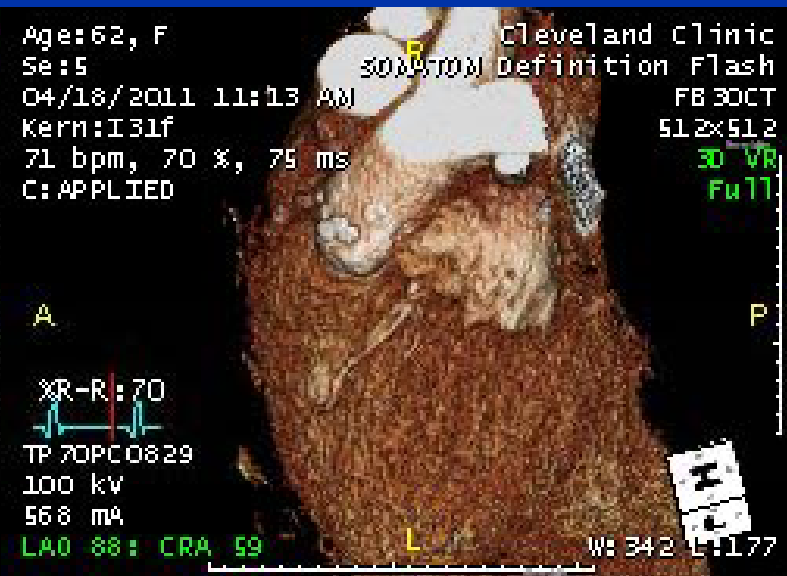# Anatomy of Deployment
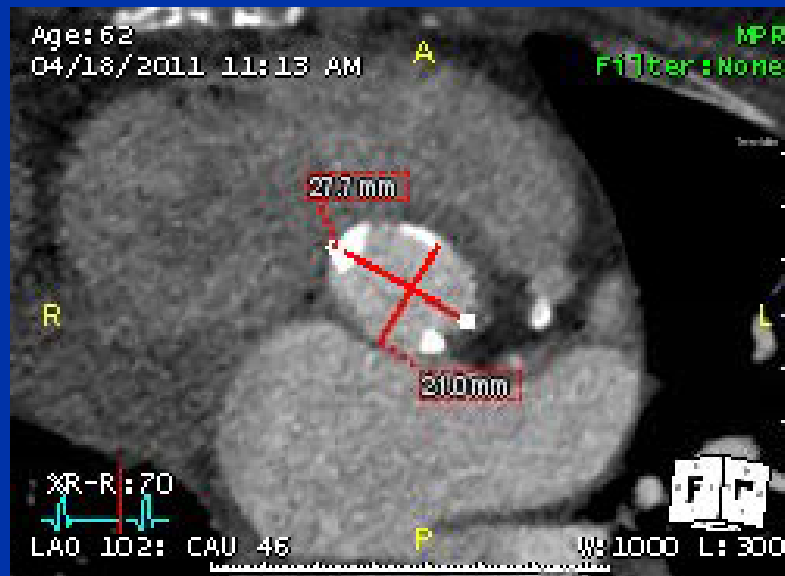
Anatomy of Deployment

Correct Measurement by Echo
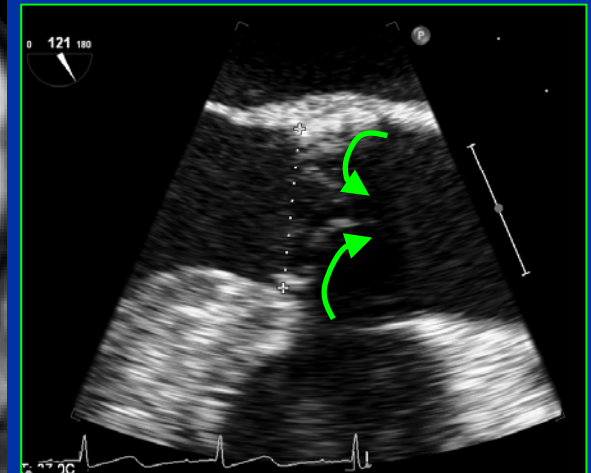
"Hinge" points are "crown shaped"
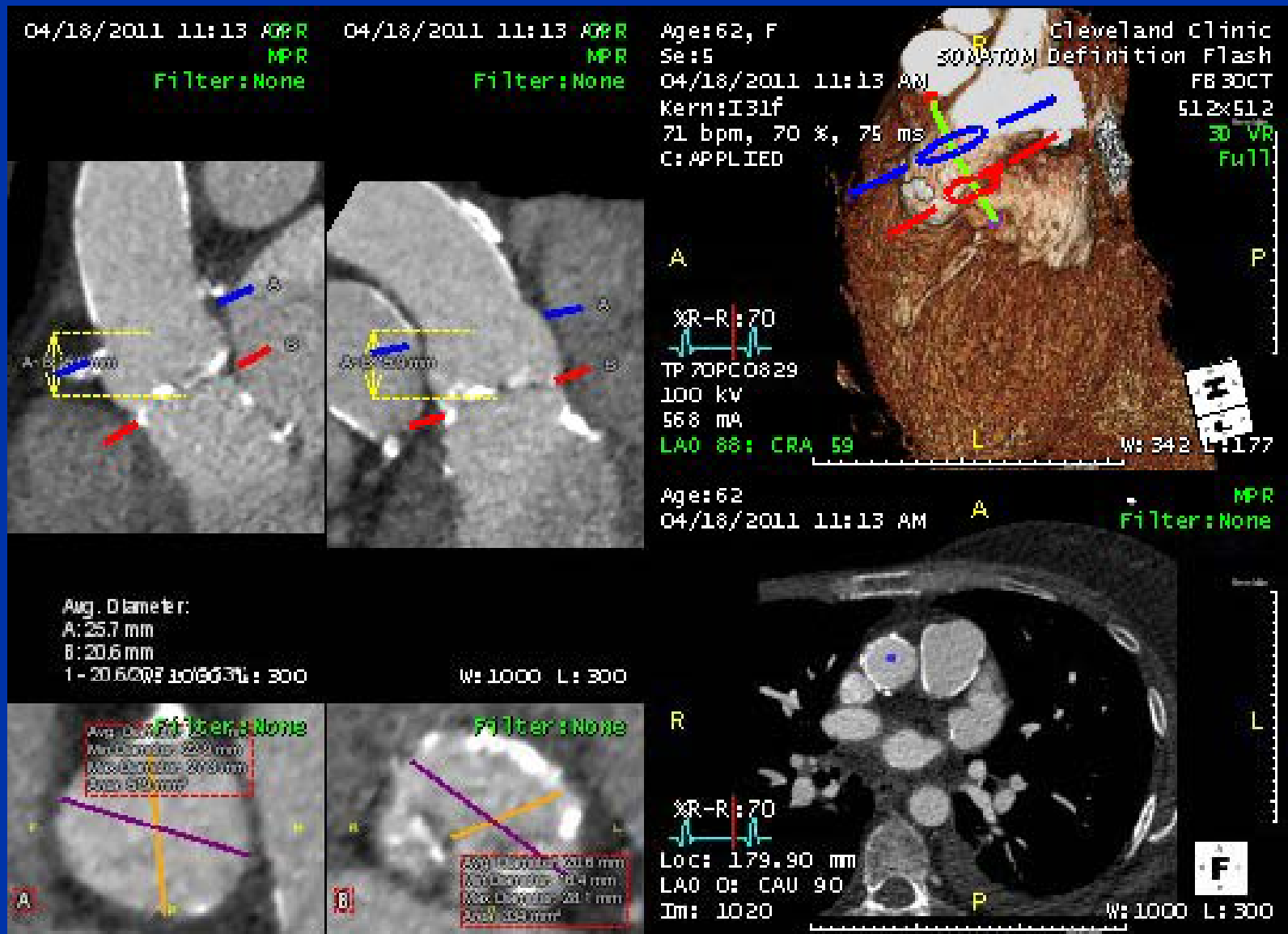
Annulus Measurement
Different Imaging Modalities

Tuzcu et al, JACC, *J Am Coll Cardiol. 2010;55(3):195-7*
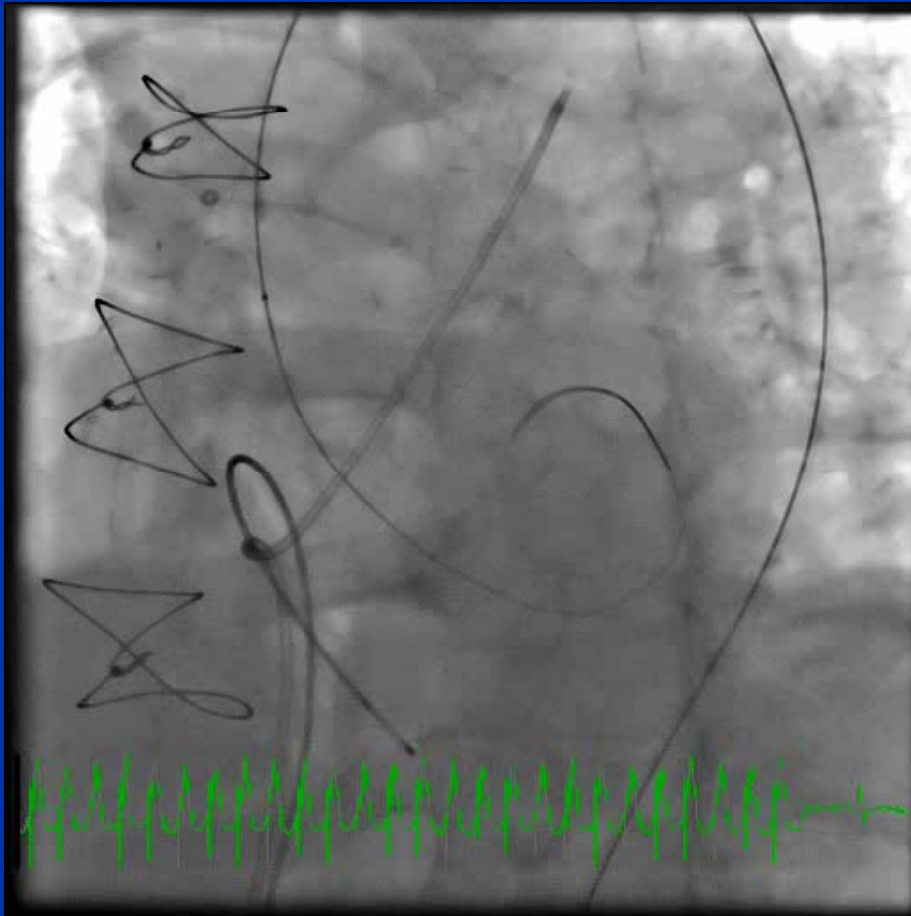
Multi-planar Reconstruction

Curved multi-planer reconstruction (CPR)

Sizing with Balloon

Another Clue for the Size

22 mm

23 mm

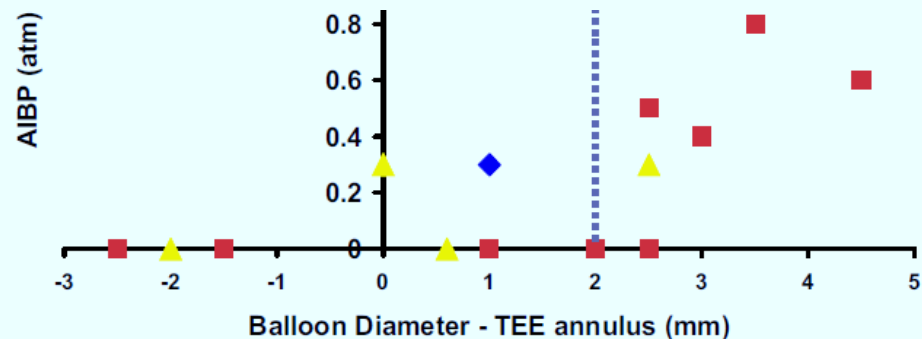Balloon movement with pacing cessation

Intraoperative Measurement of Annulus
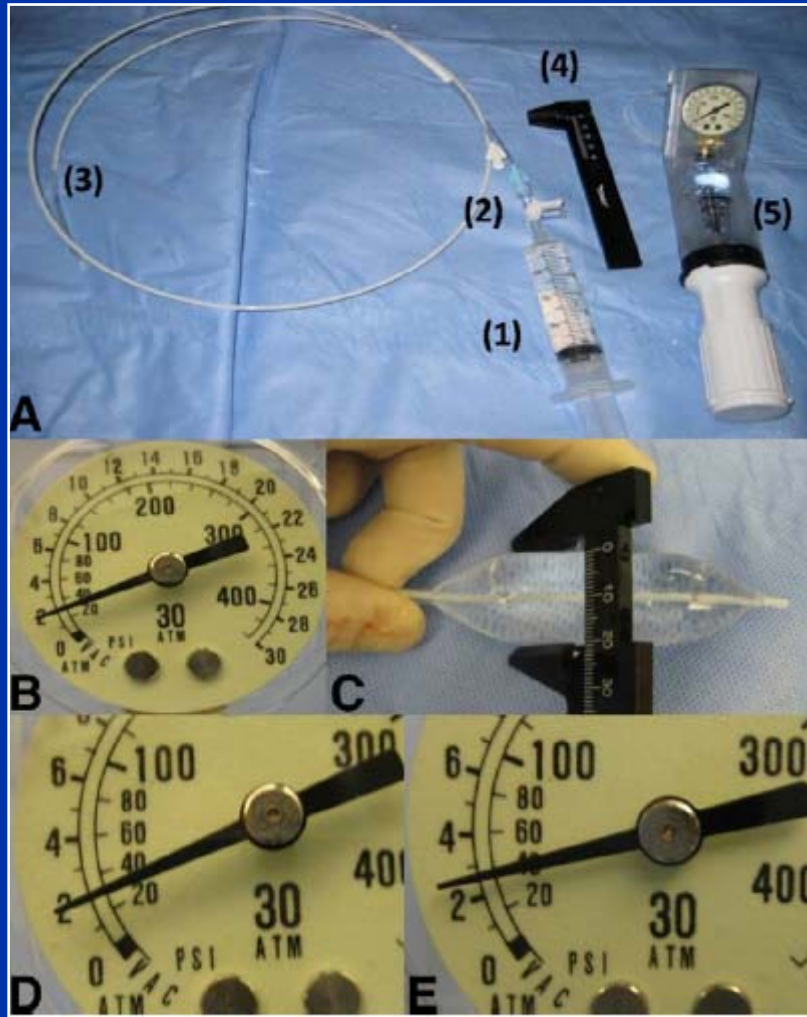

Babaliaros et al, J Am Coll Cardiol Intv 2008;1:580–6
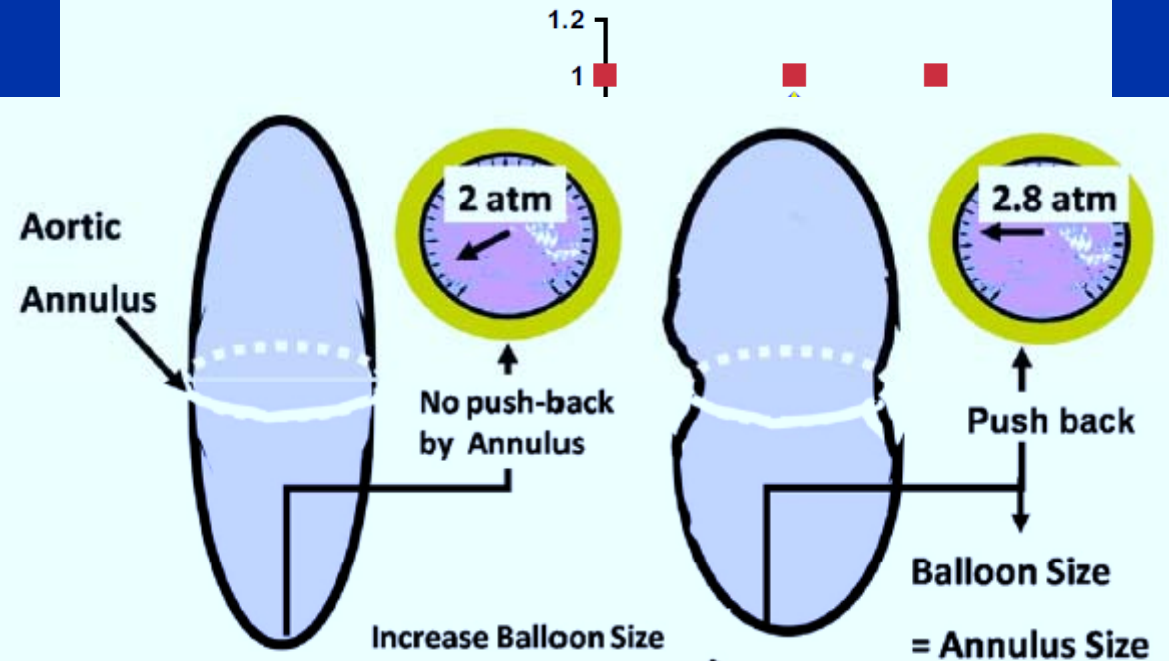
Correlation Between TTE, TEE, MDCT

|	Mean Annulus Diameter (mm)	p Value vs. TEE	R vs. TEE
Echocardiographic measurements			
TTE	23.9 ± 2.1	0.13	0.89
TEE	24.1 ± 2.1	—	—
MSCT measurements			
Virtual basal ring			
Long-axis	27.5 ± 3.1	<0.0001	0.67
Short-axis	21.7 ± 2.3	<0.0001	0.69
Mean	24.6 ± 2.4	0.07	0.77
3-chamber view	23.8 ± 2.6	0.26	0.70

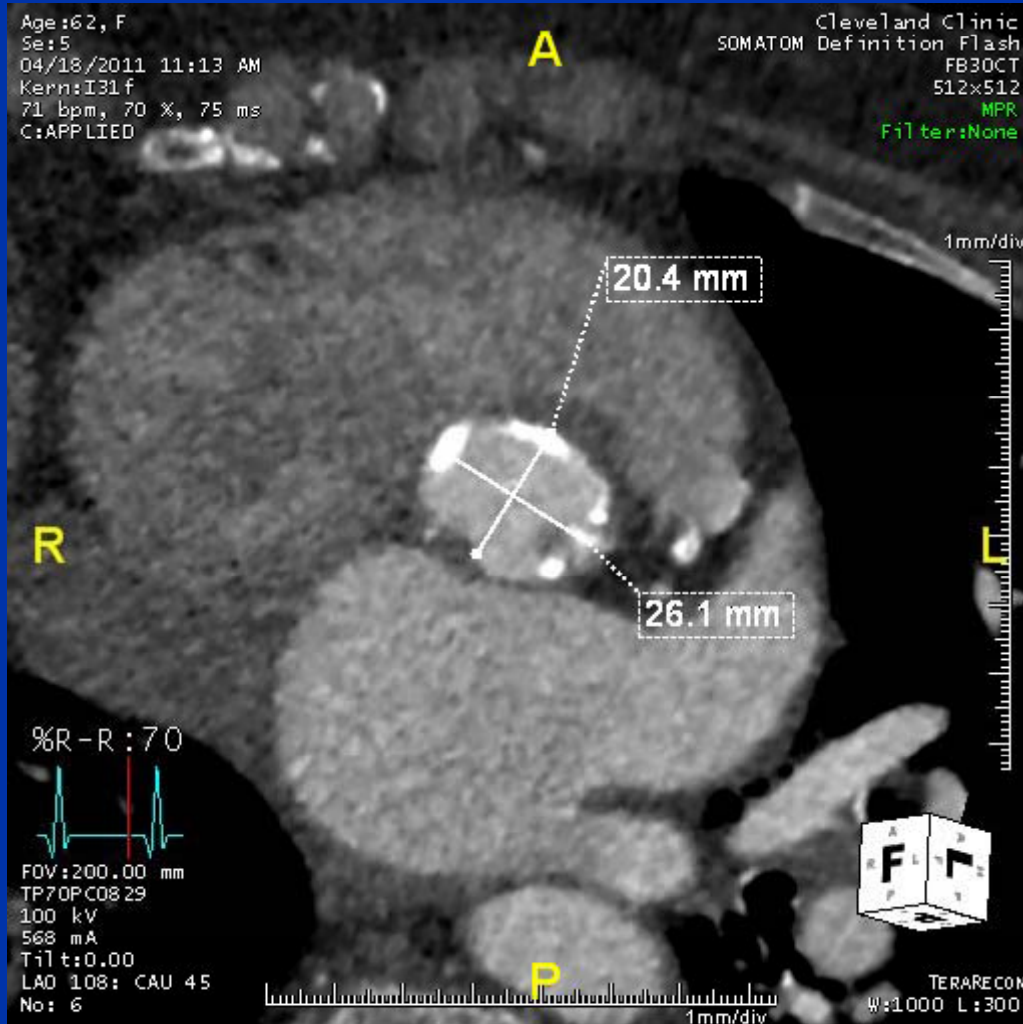# How do you size? – Use all information

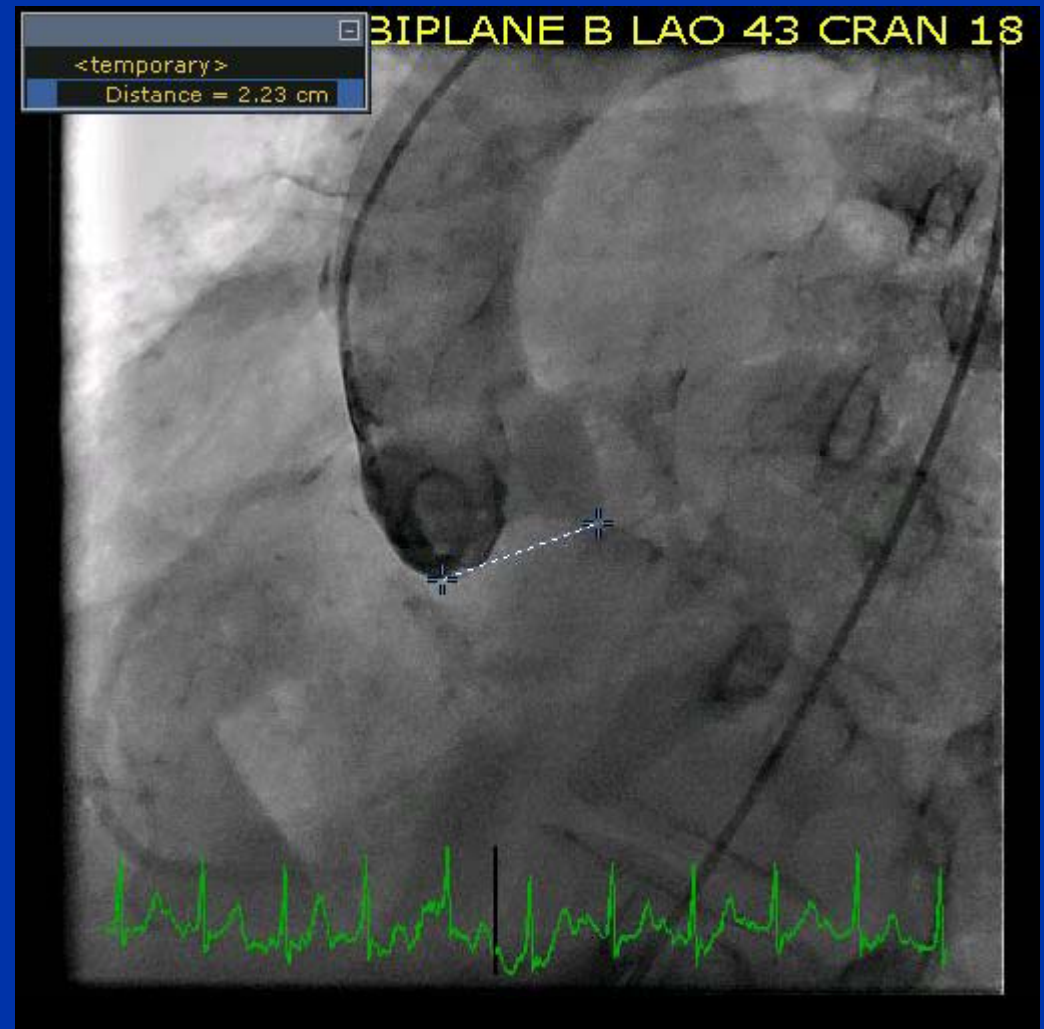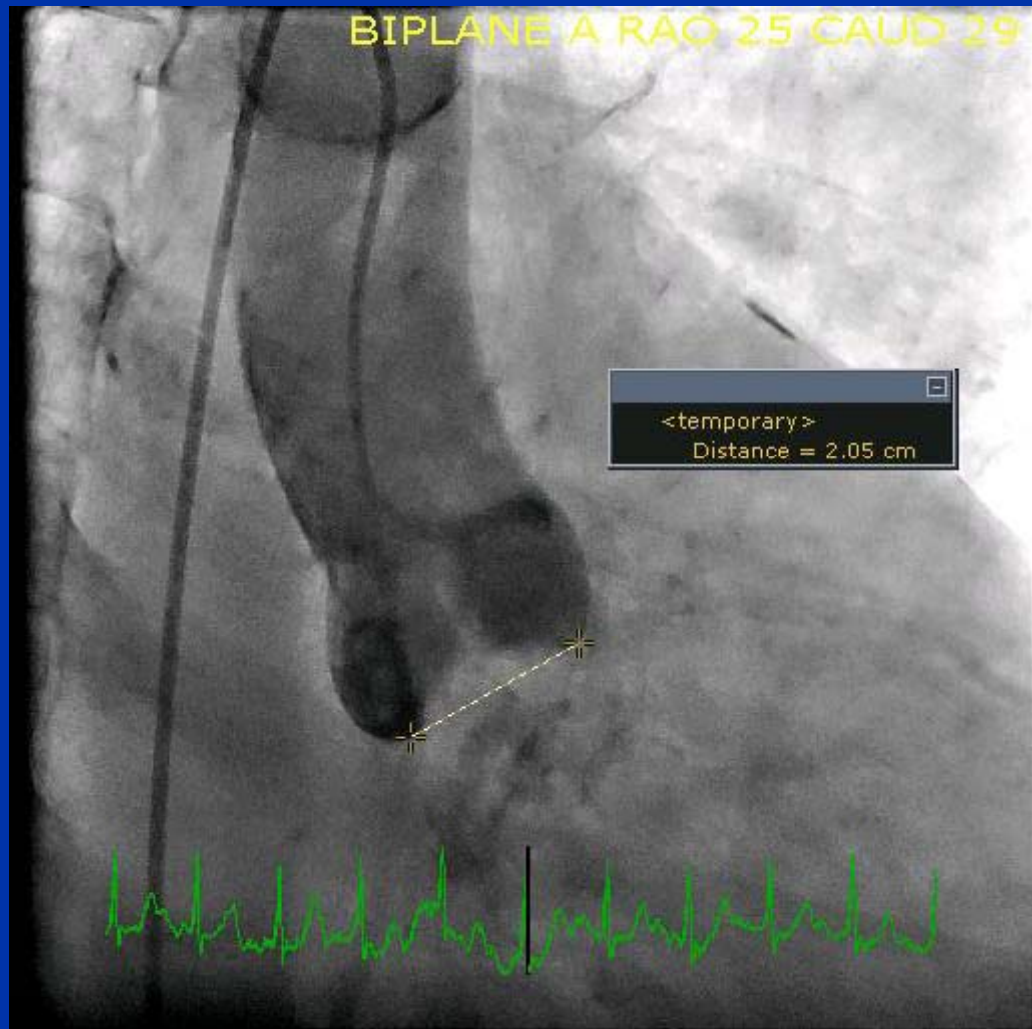60 year old lady with radiation heart disease, referred for TAVI
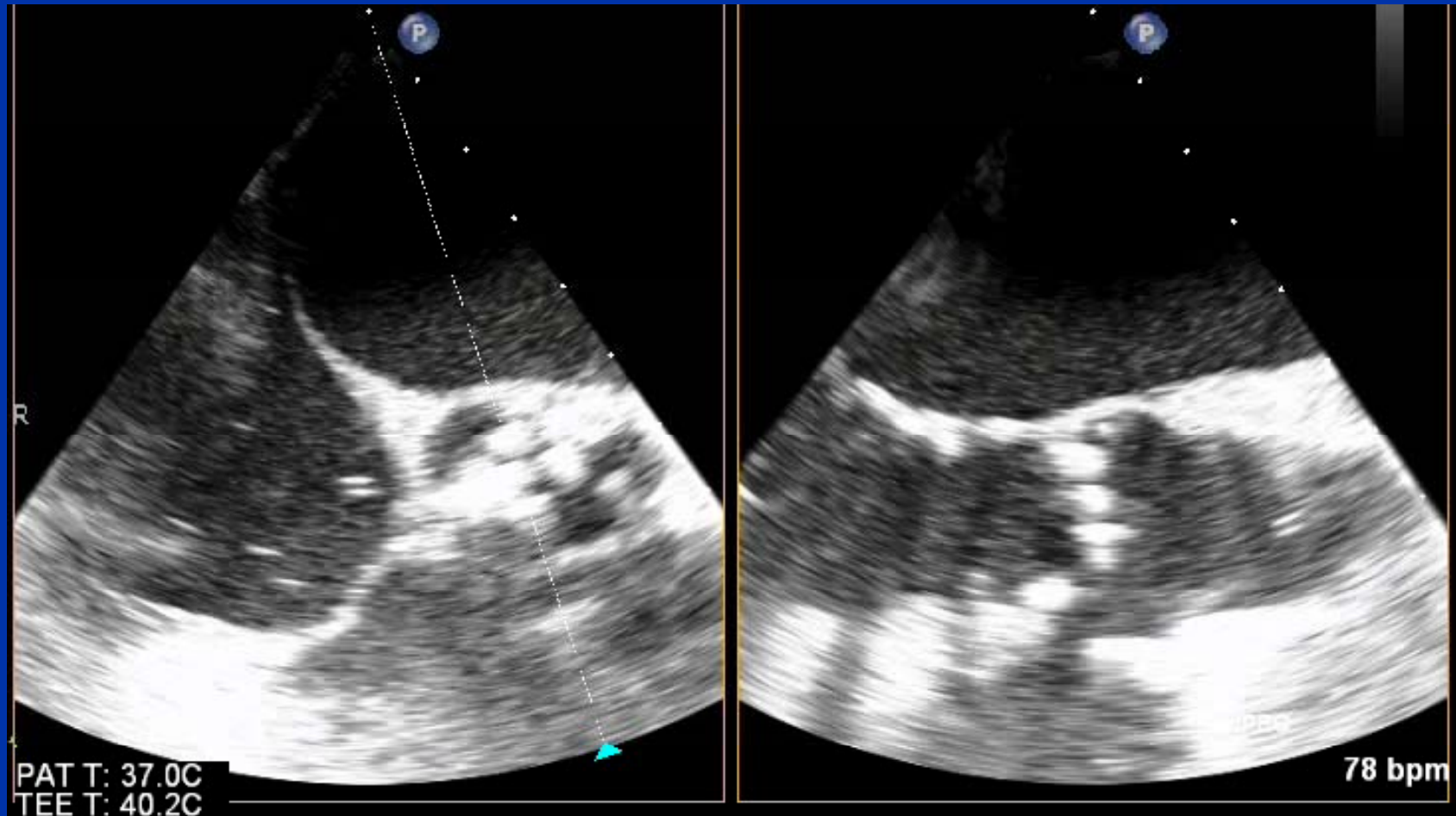
TEE measurements

CT Measurements
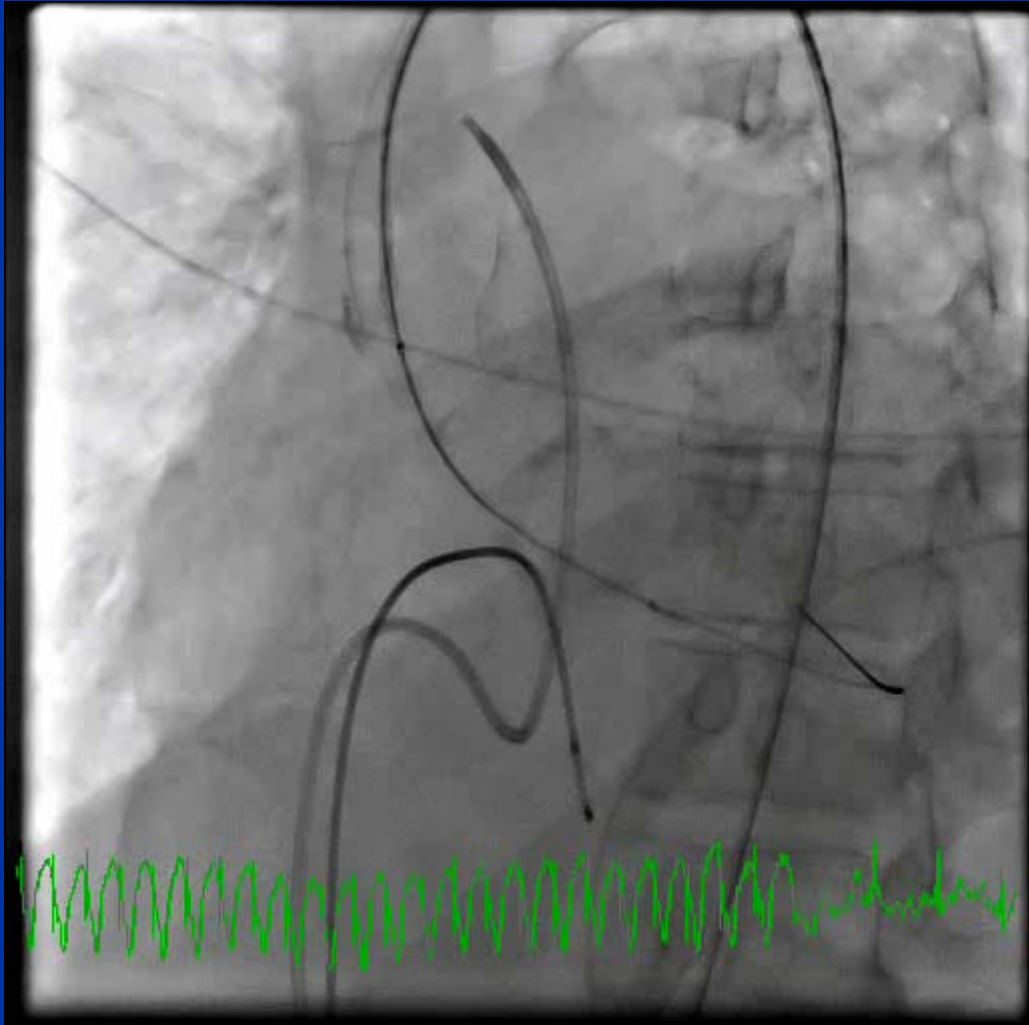

Short axis: 21.2 mm Long axis: 27.0 mm Mean: 24.1 mm
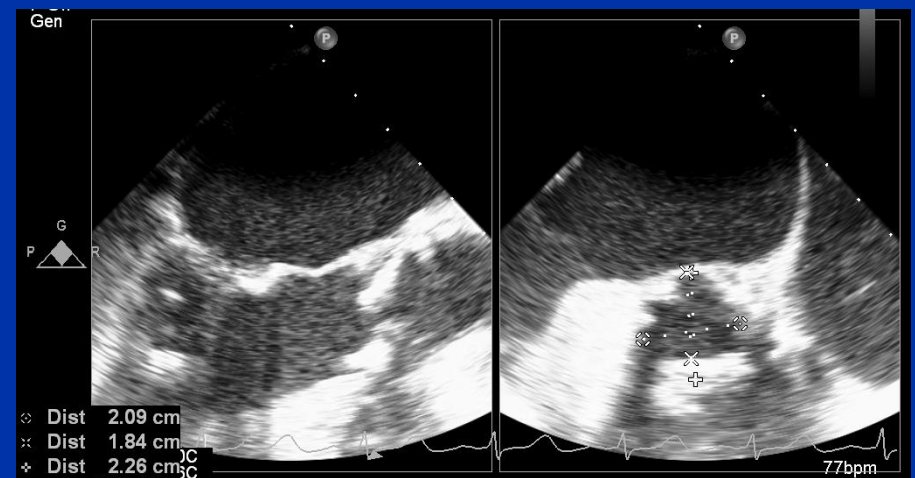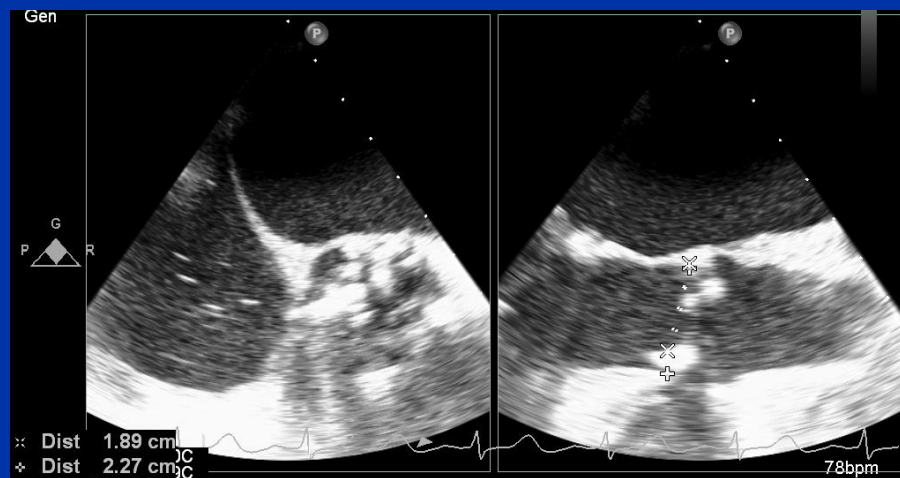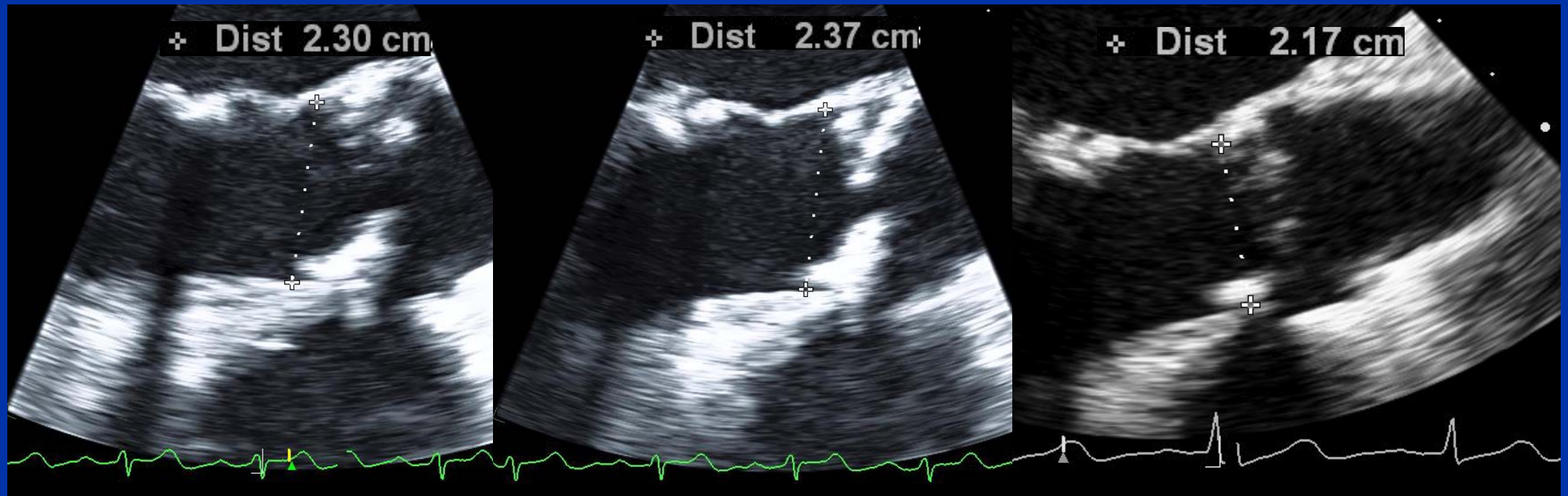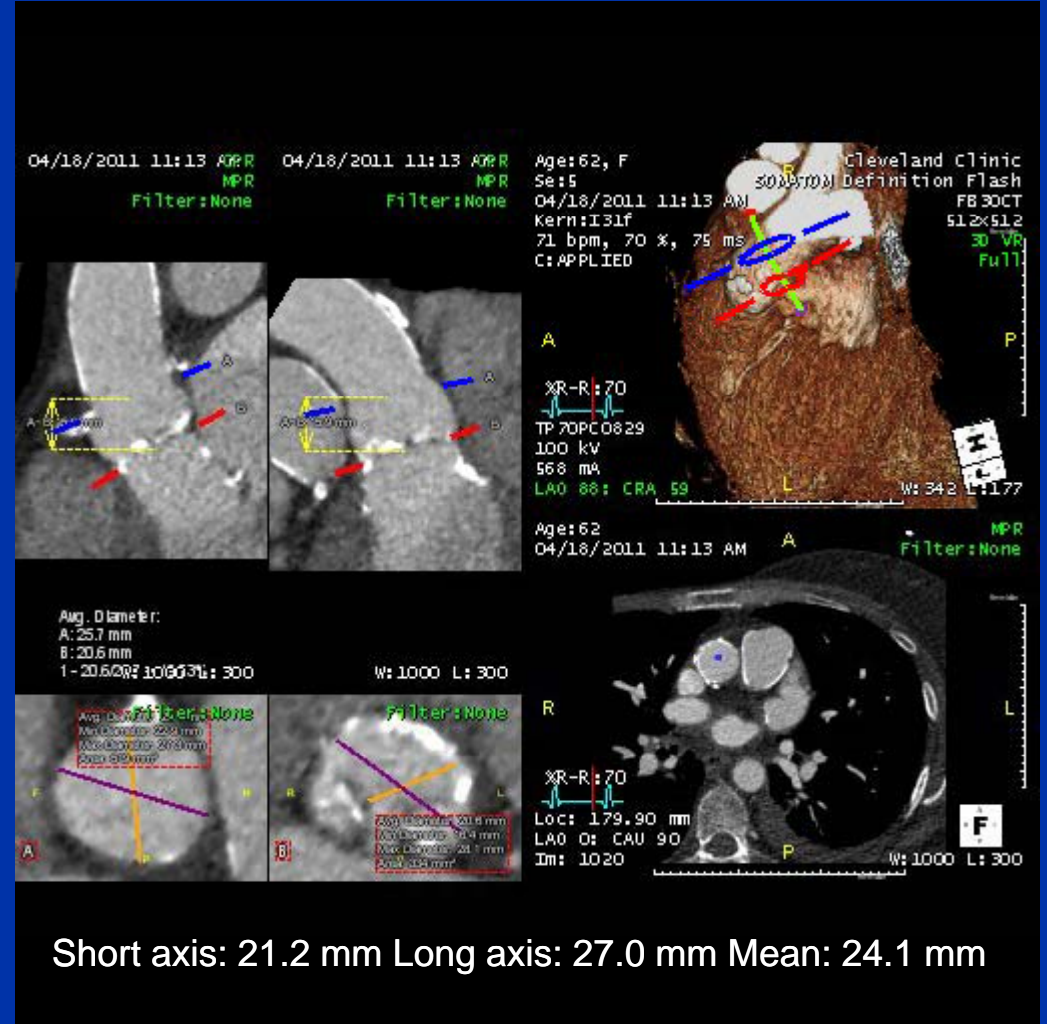
Angiography

Balloon Valvuloplasty

Data Synthesis

- TEE
  - 20.9 to 23.7 mm

- CT
  - Short axis : 20 to 21 mm
  - Long axis : 26 to 27 mm
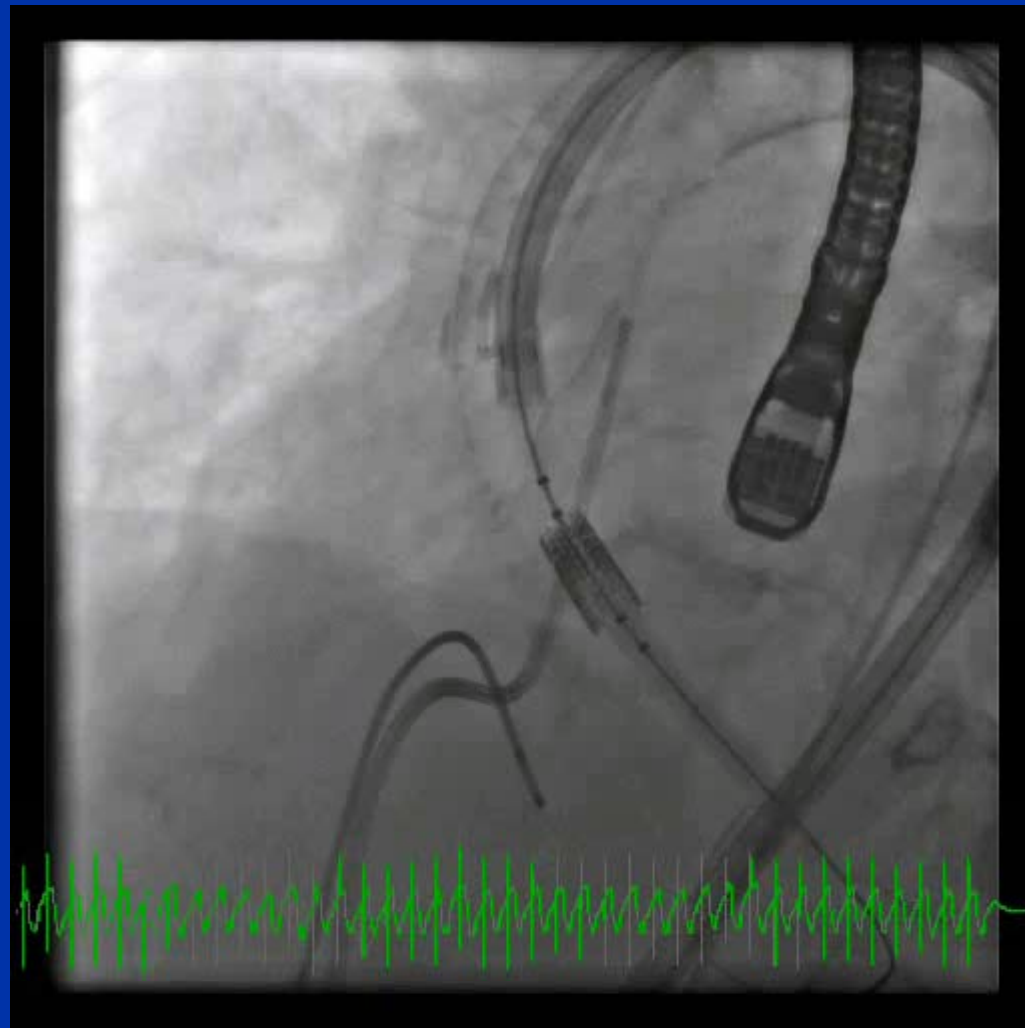 - Mean: 23 to 24 mm

- Angio
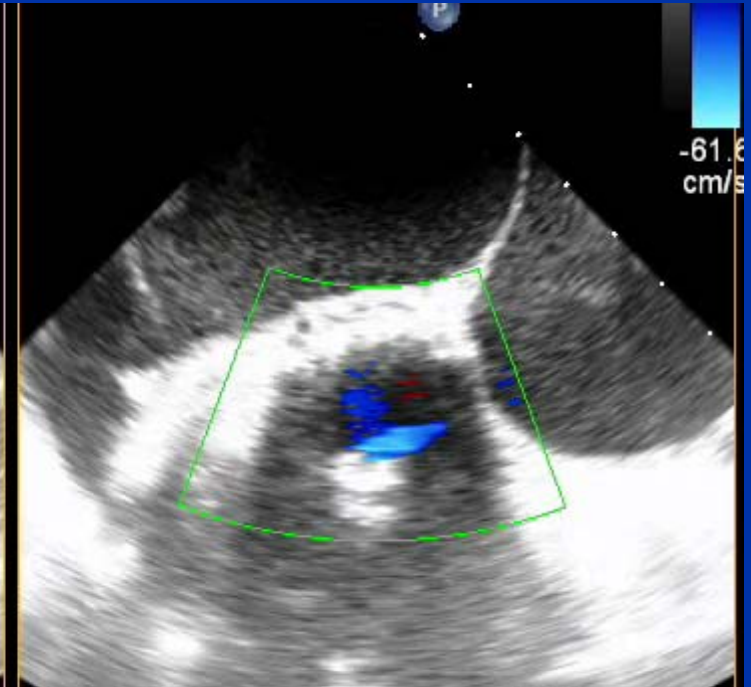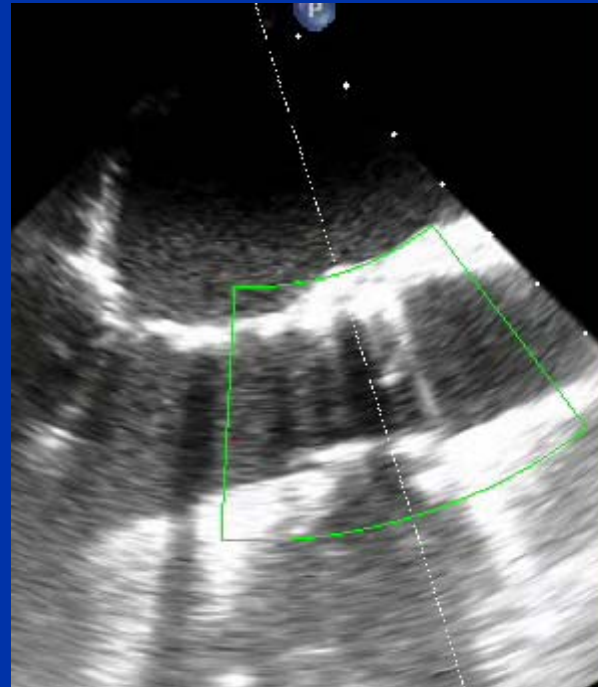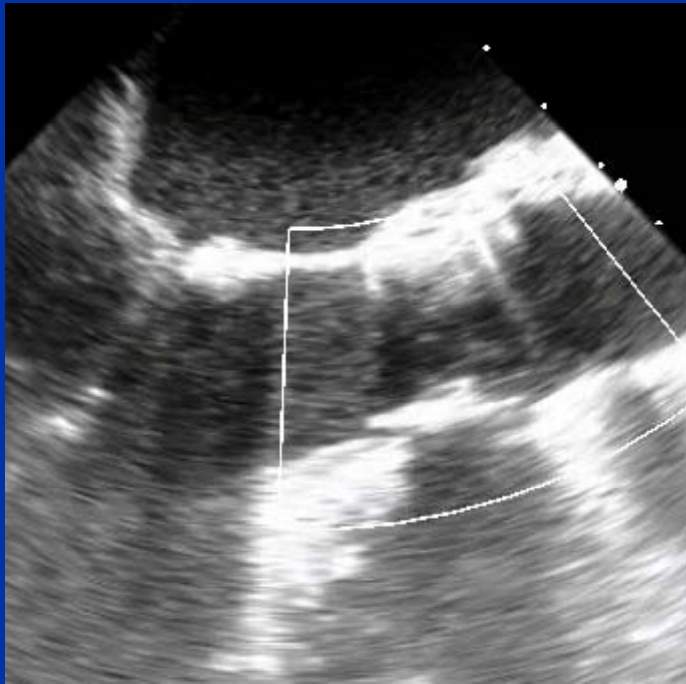 - Coronal : 22.5 mm
  - Sagittal : 20.5 mm
  - Mean: 21.5 mm

- Balloon
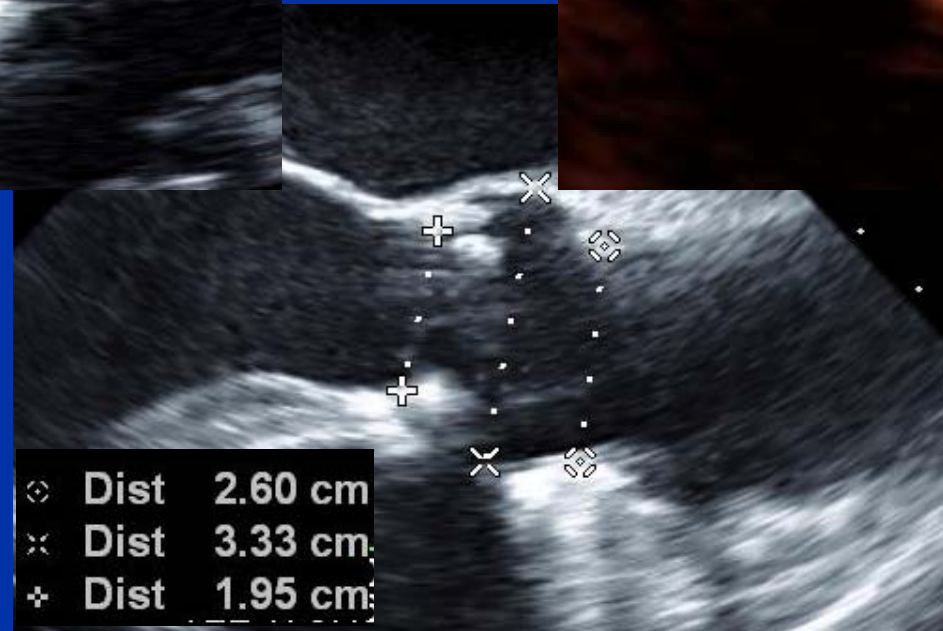 - 23 mm tight fit

Procedure with 23 mm Sapien valve
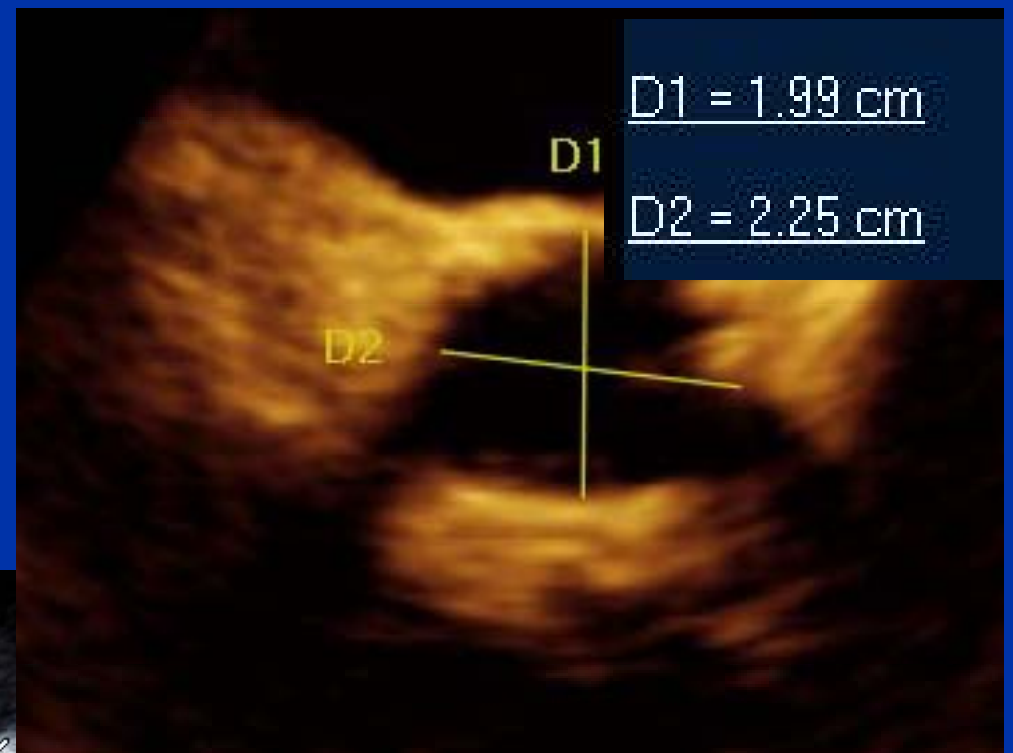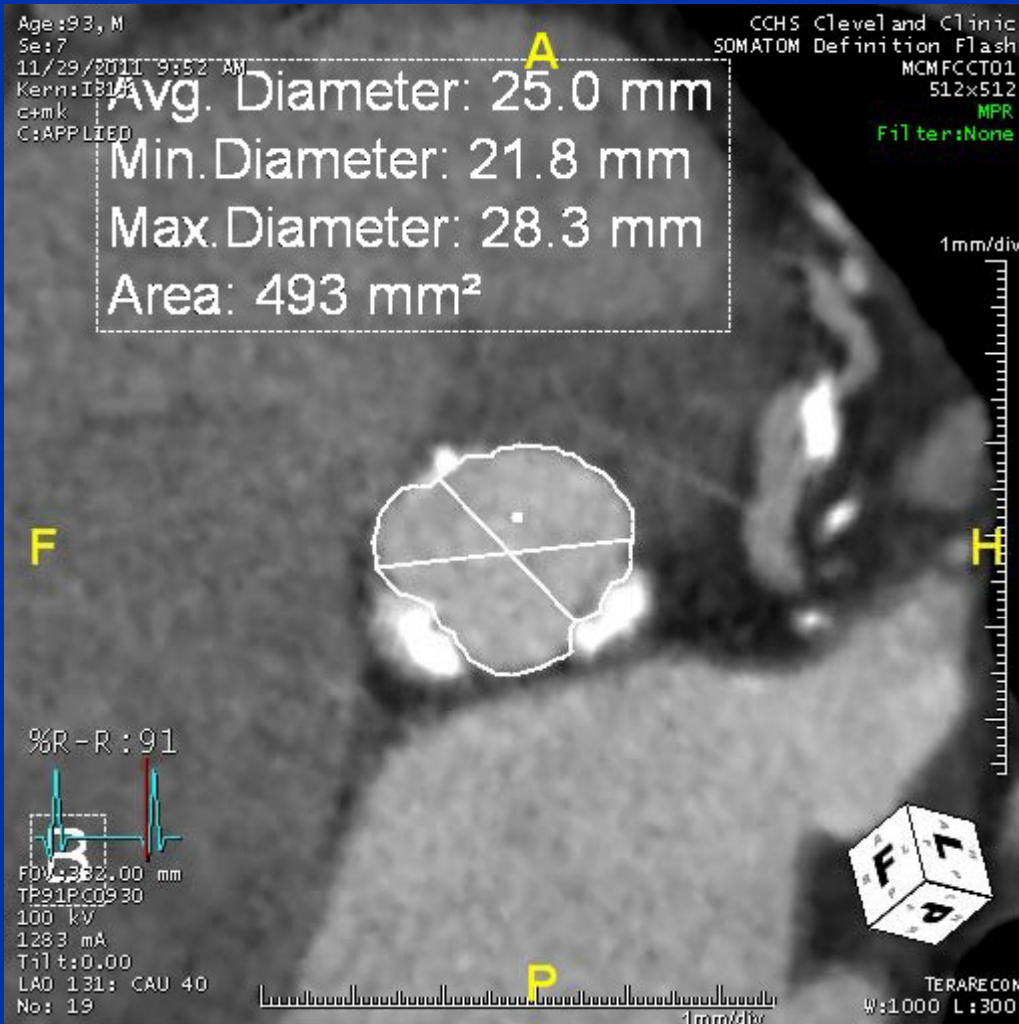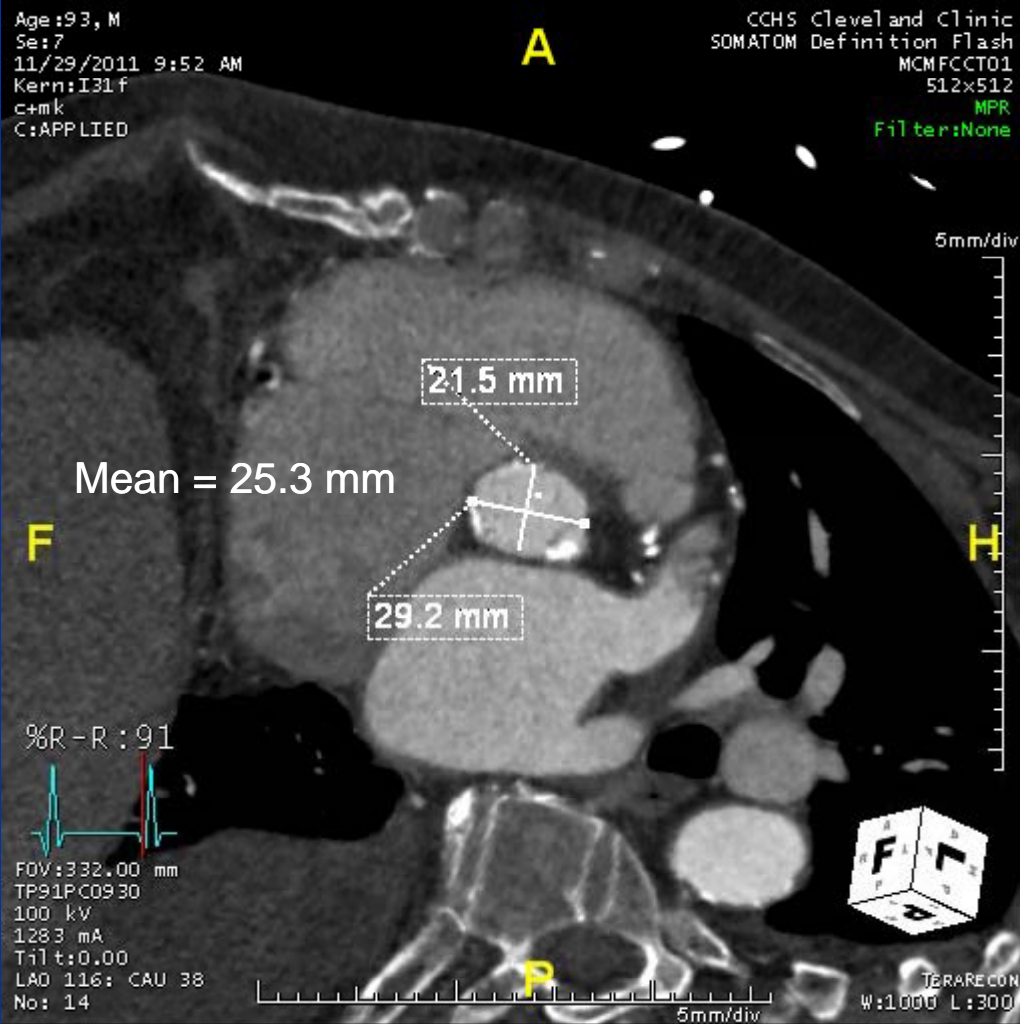
Result

Another Patient
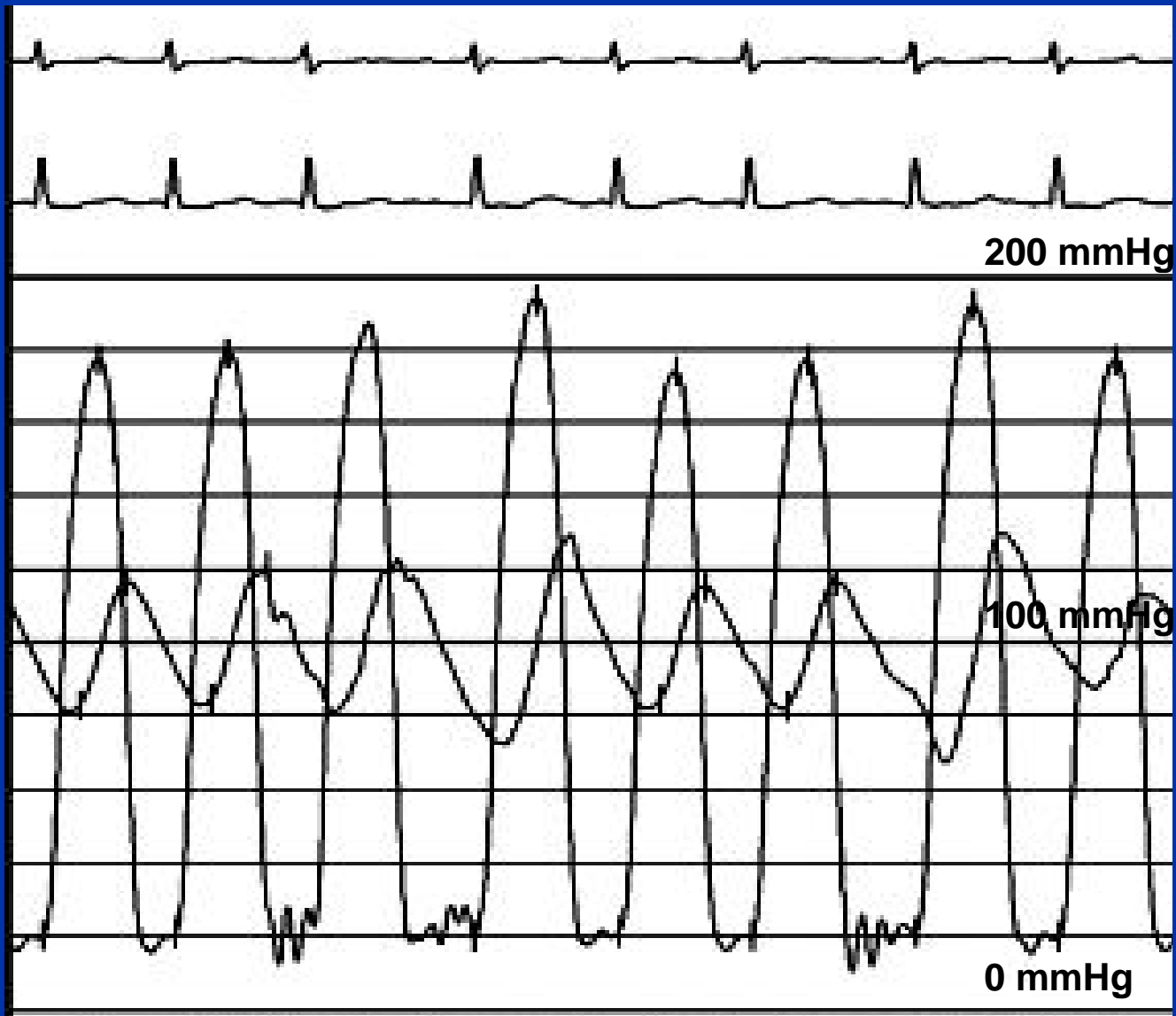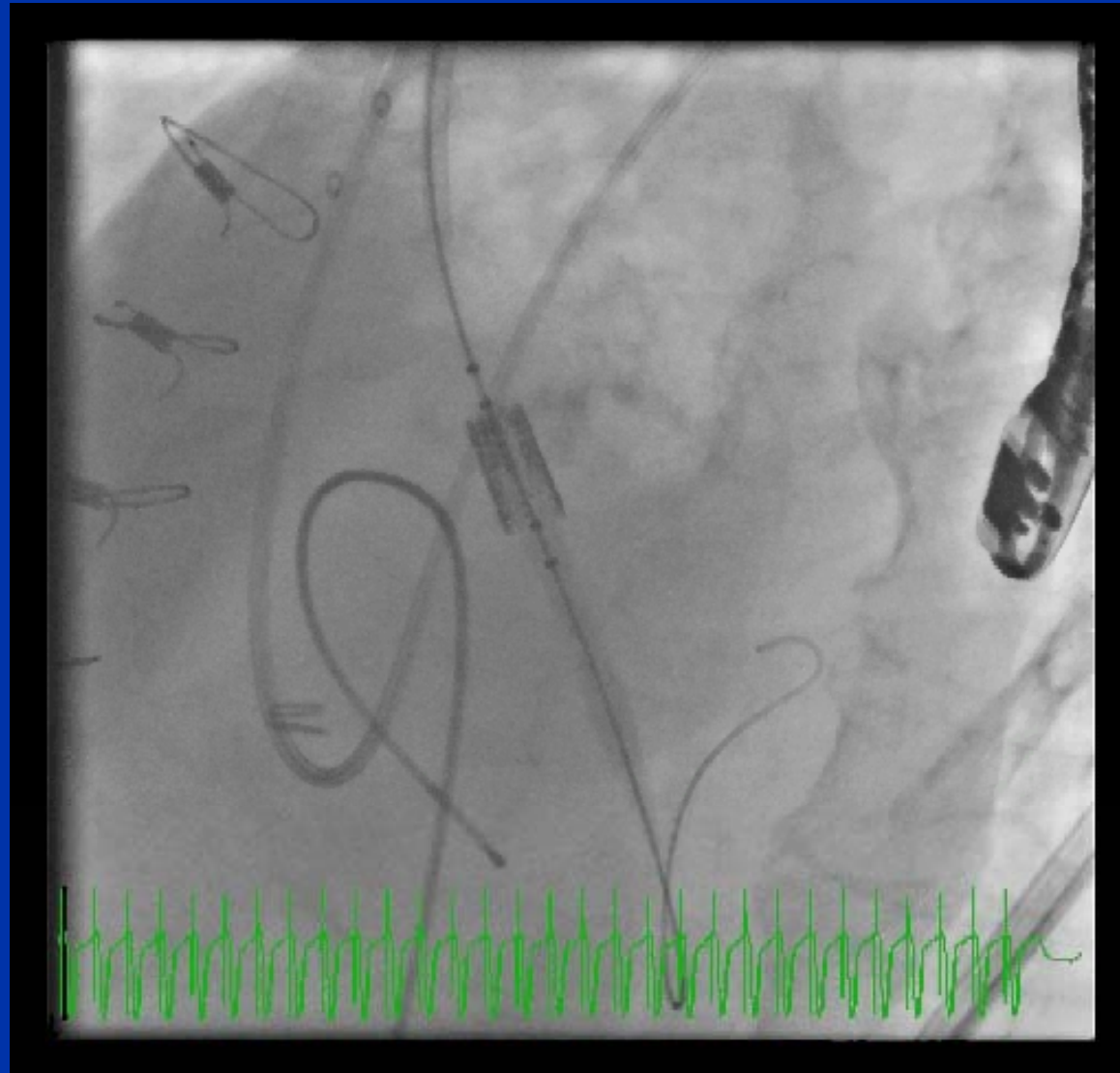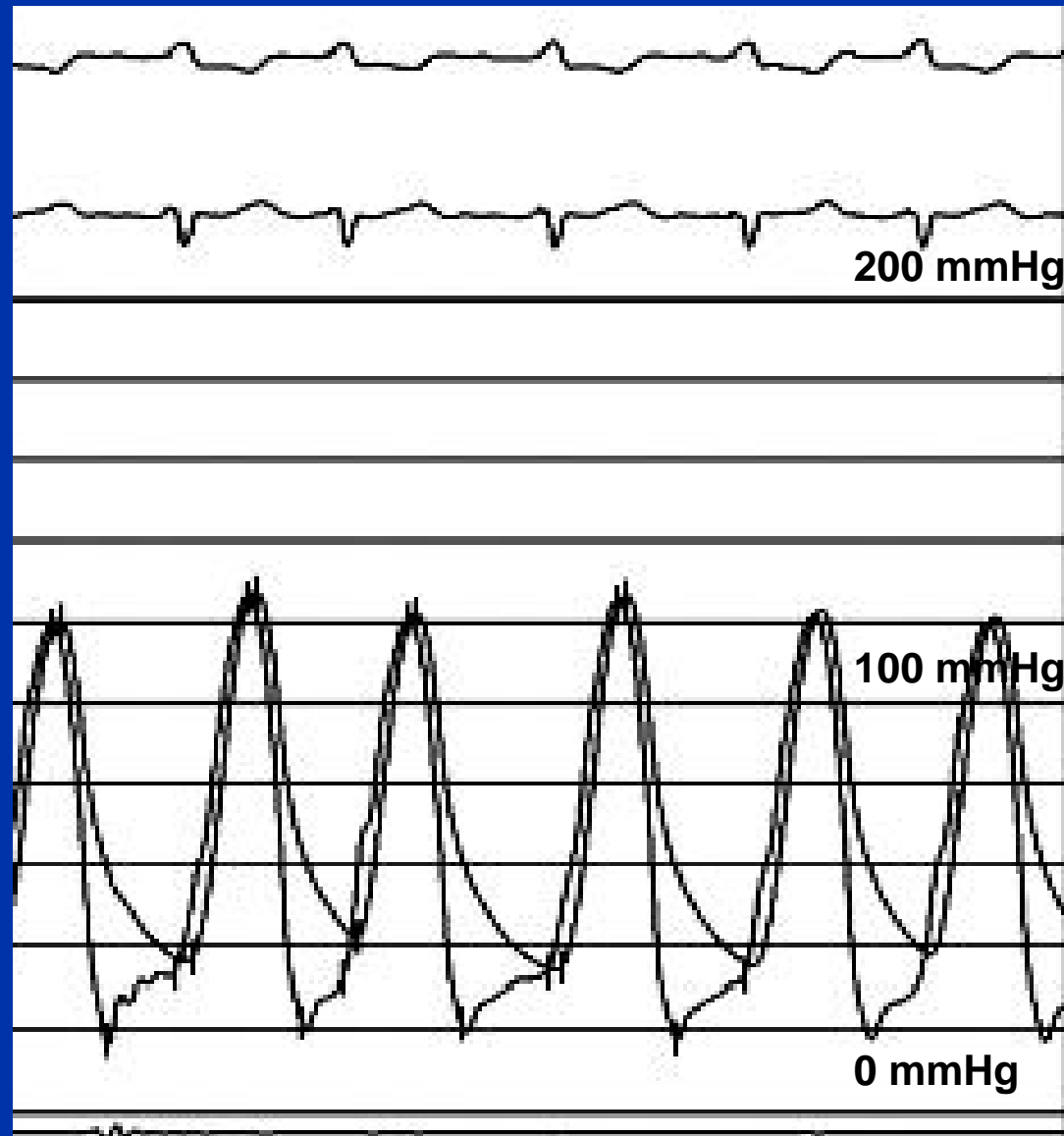## 95 year old man, 5' 3" tall

Another Patient

Initial Hemodynamics

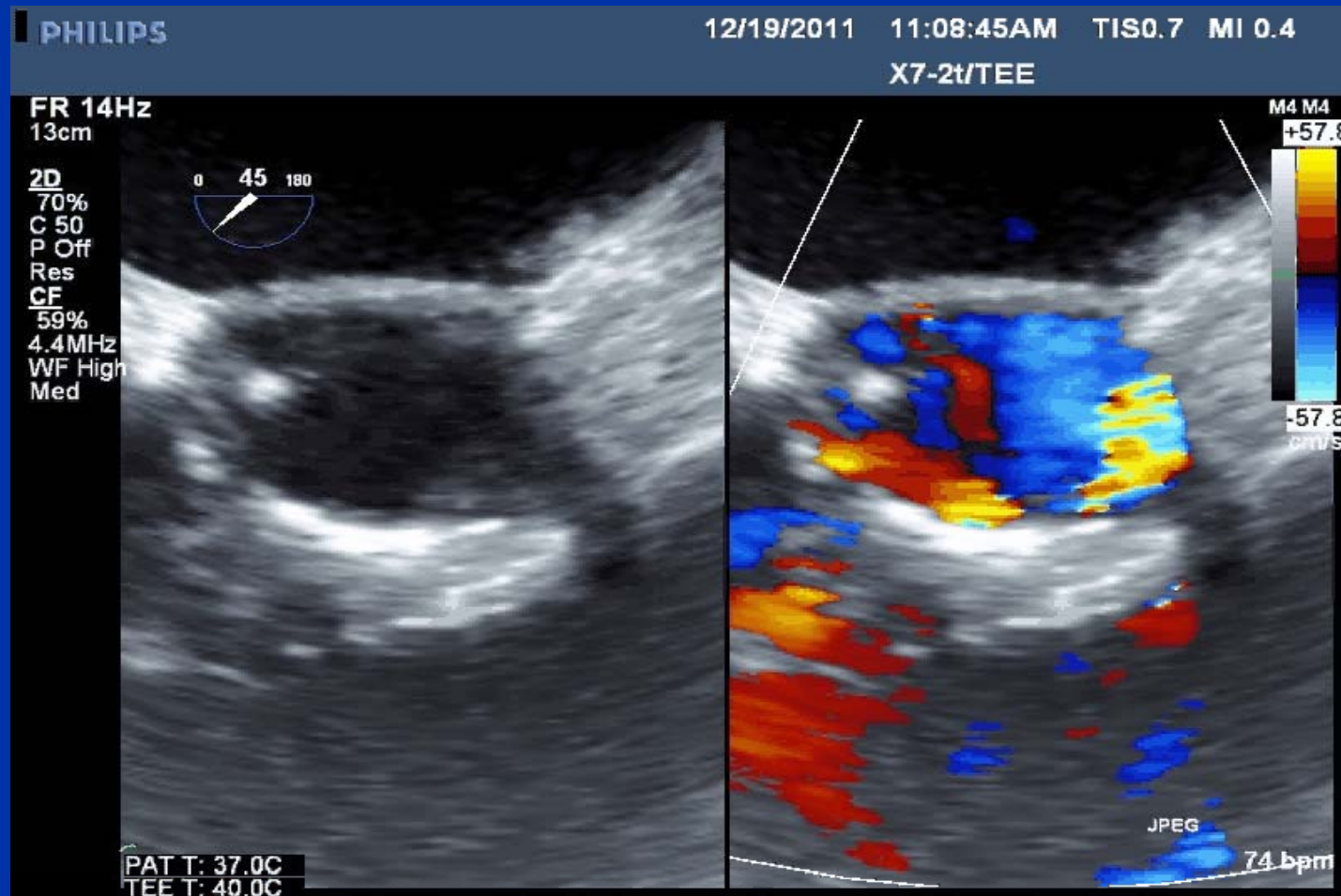200 mmHg

100 mmHg

0 mmHg

23mm SAPIEN

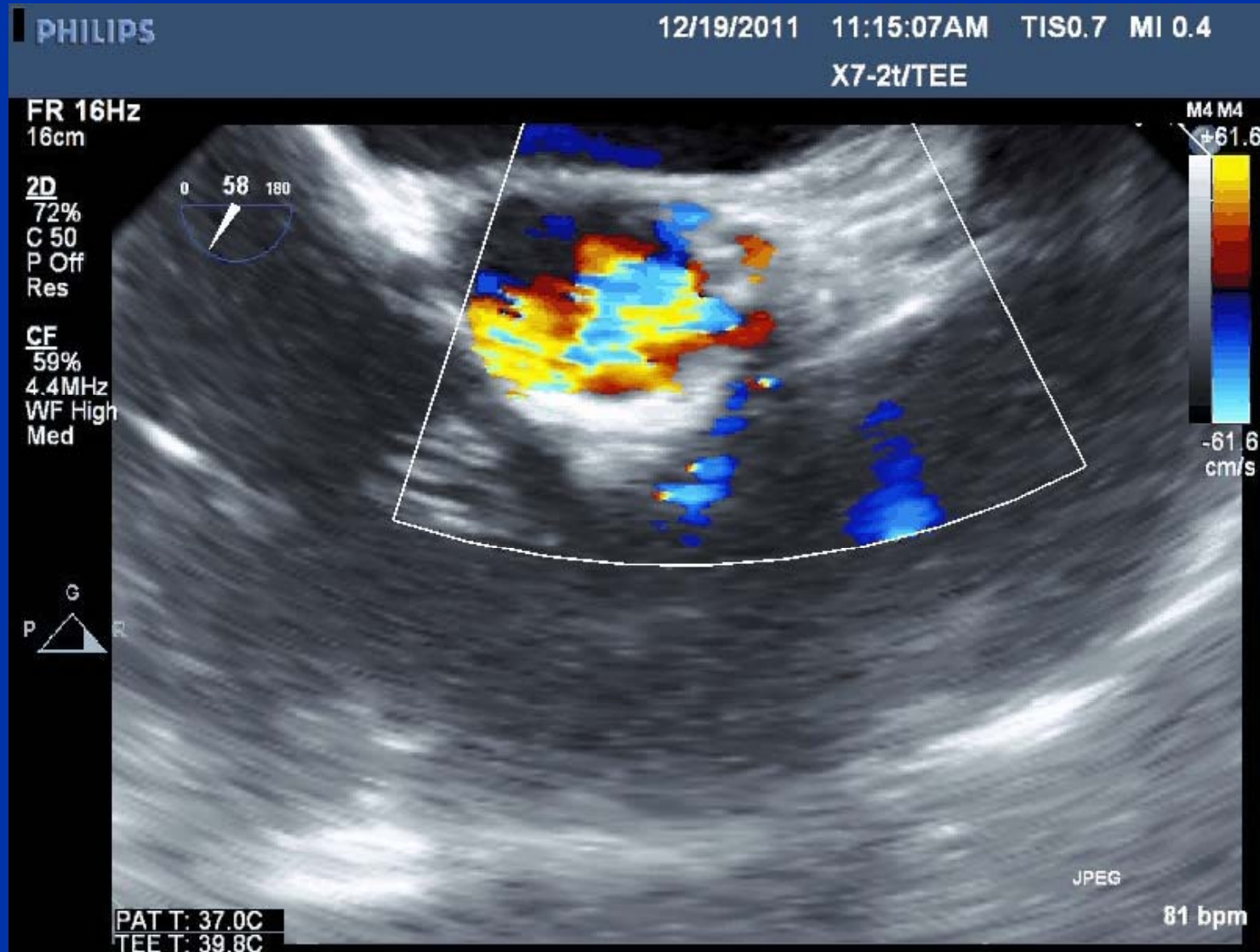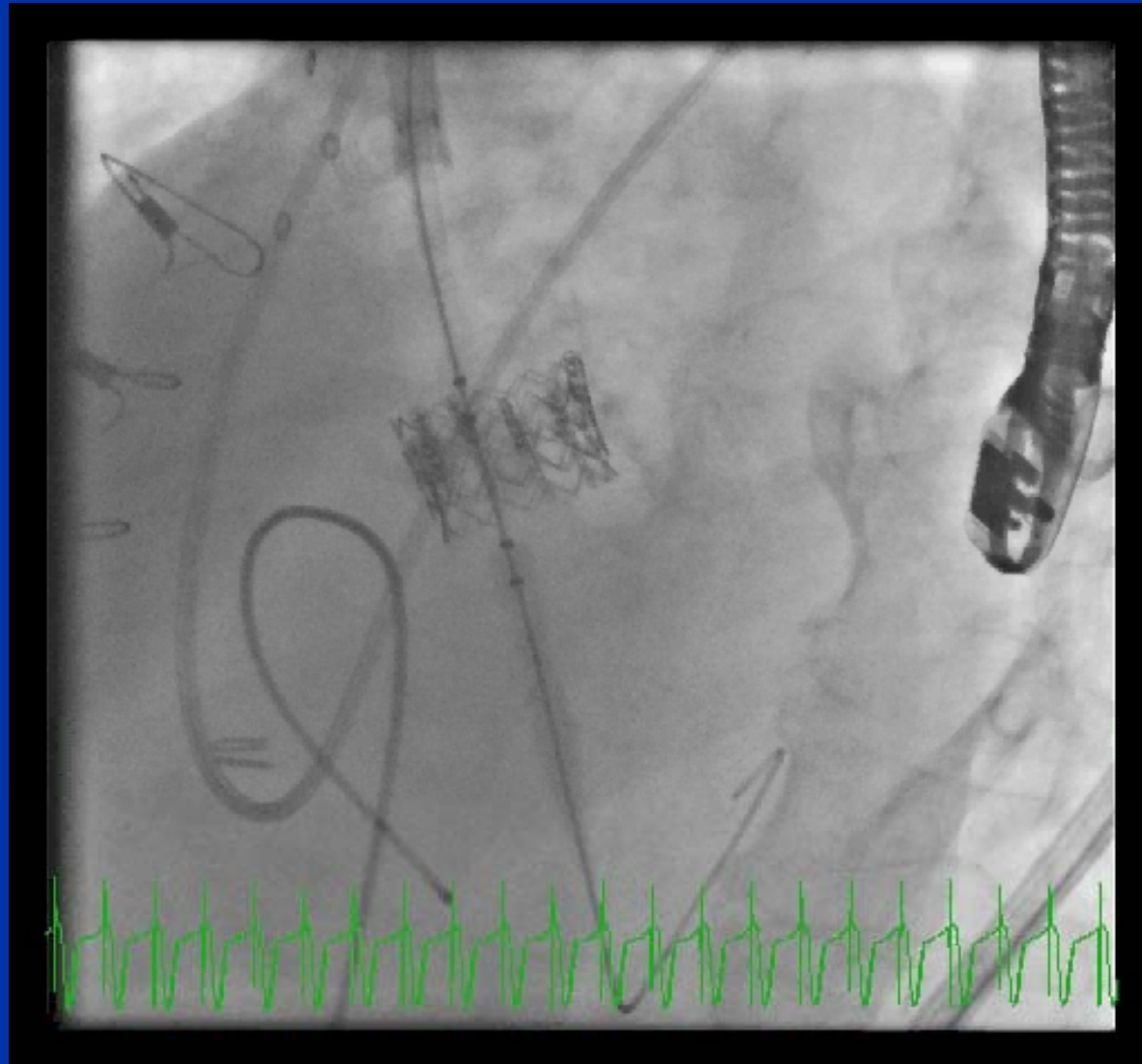# Hemodynamics After Valve Deployment

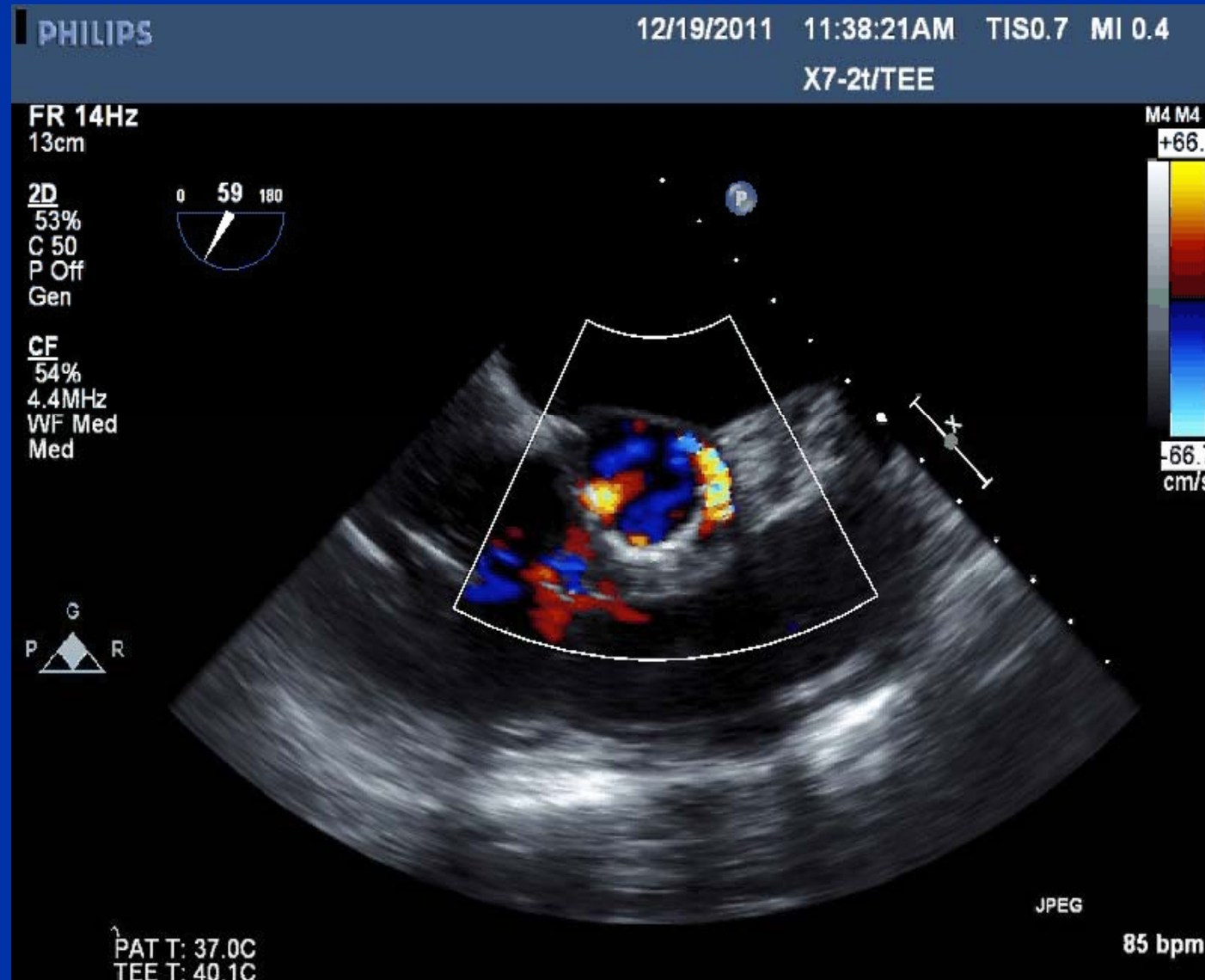# Severe Central and Paravalvular AR

Second 23mm SAPIEN

Central better but Still Severe Paravalvular AR

Balloon Post Dilation

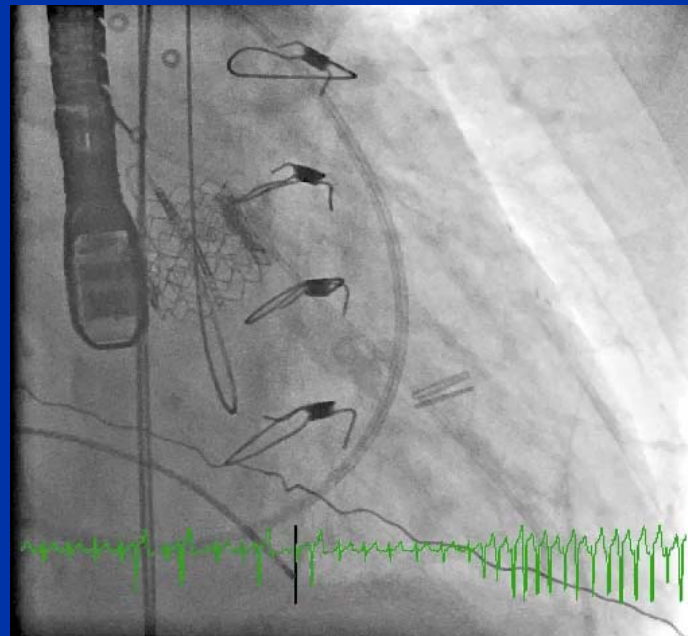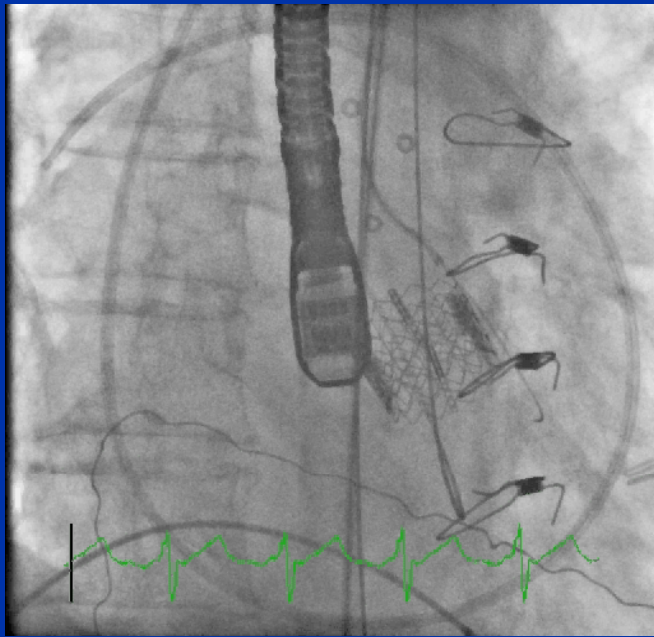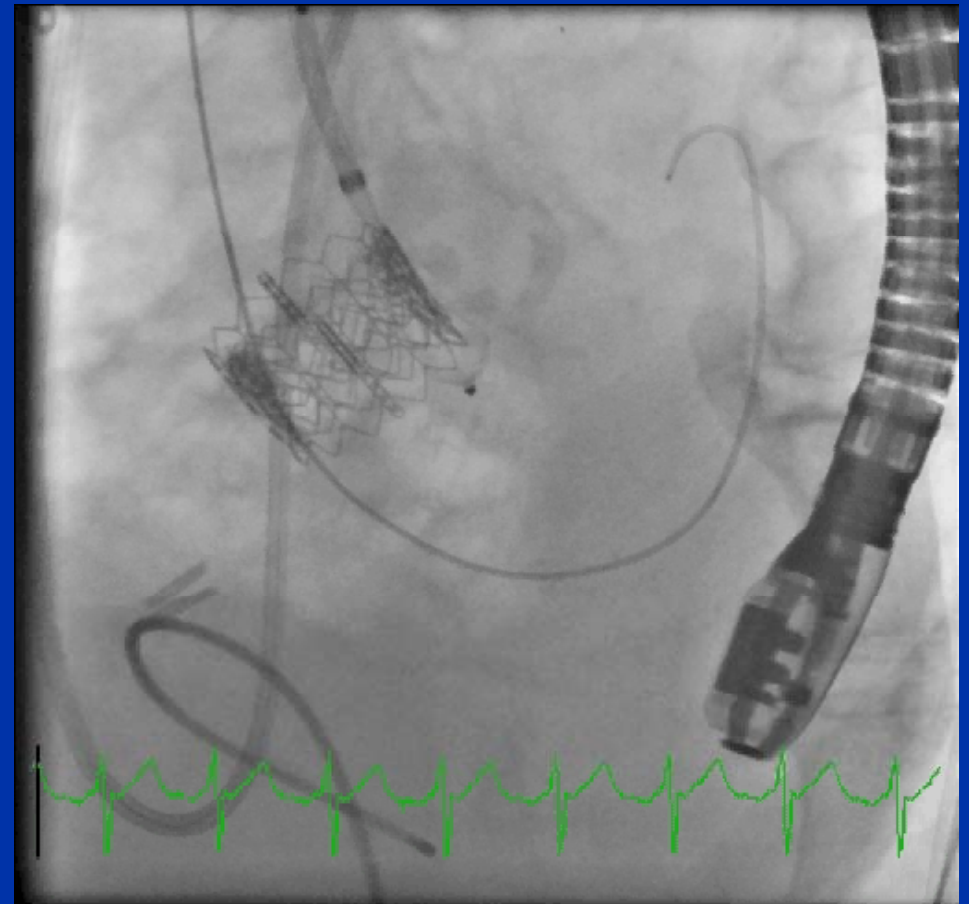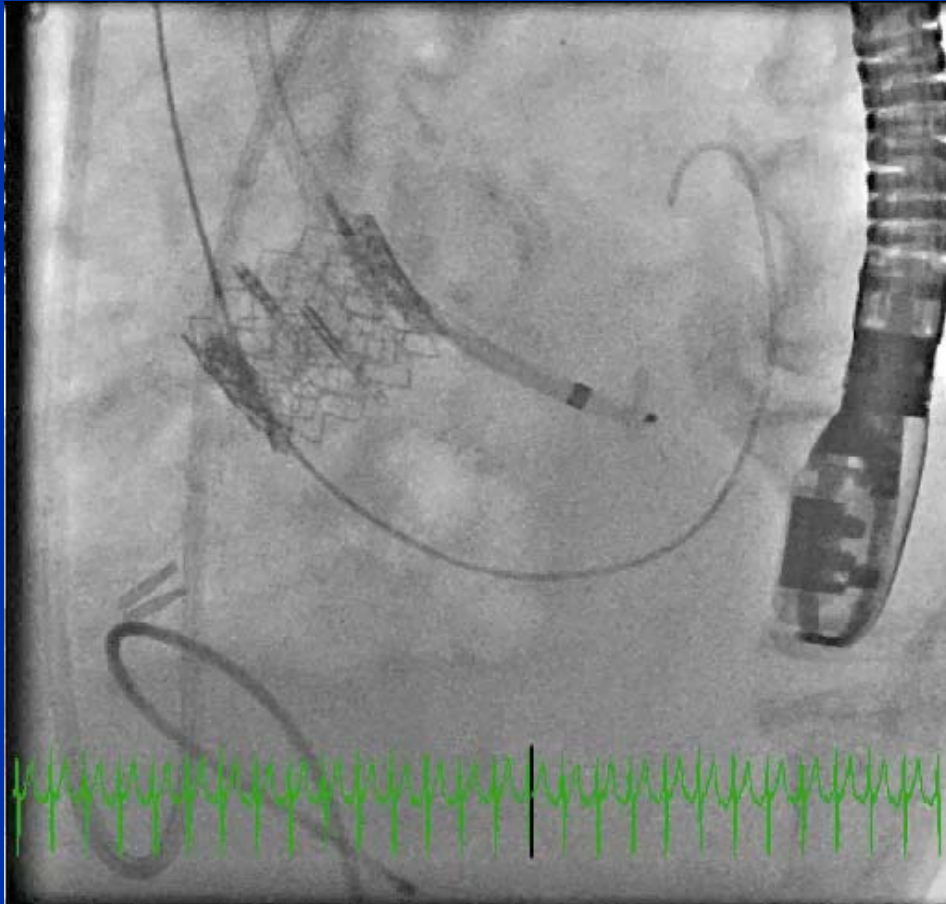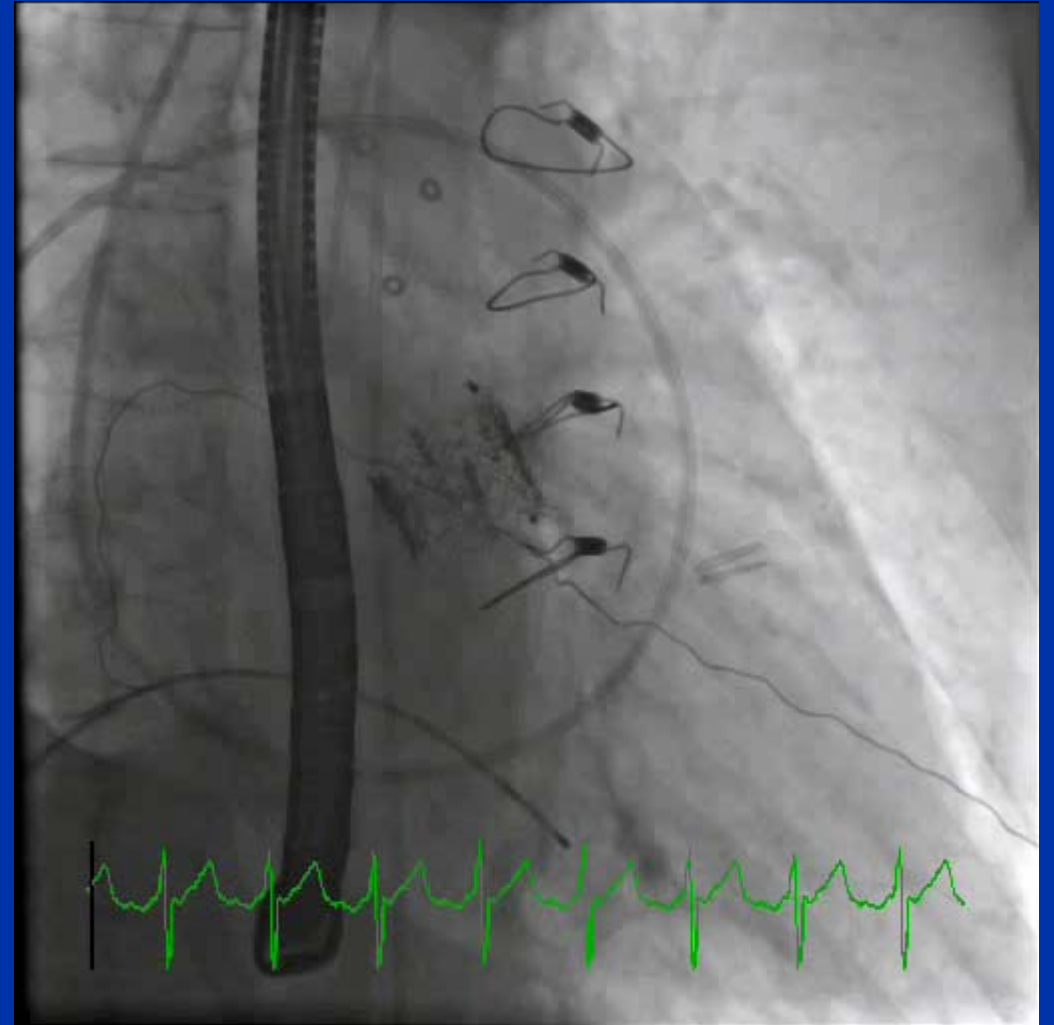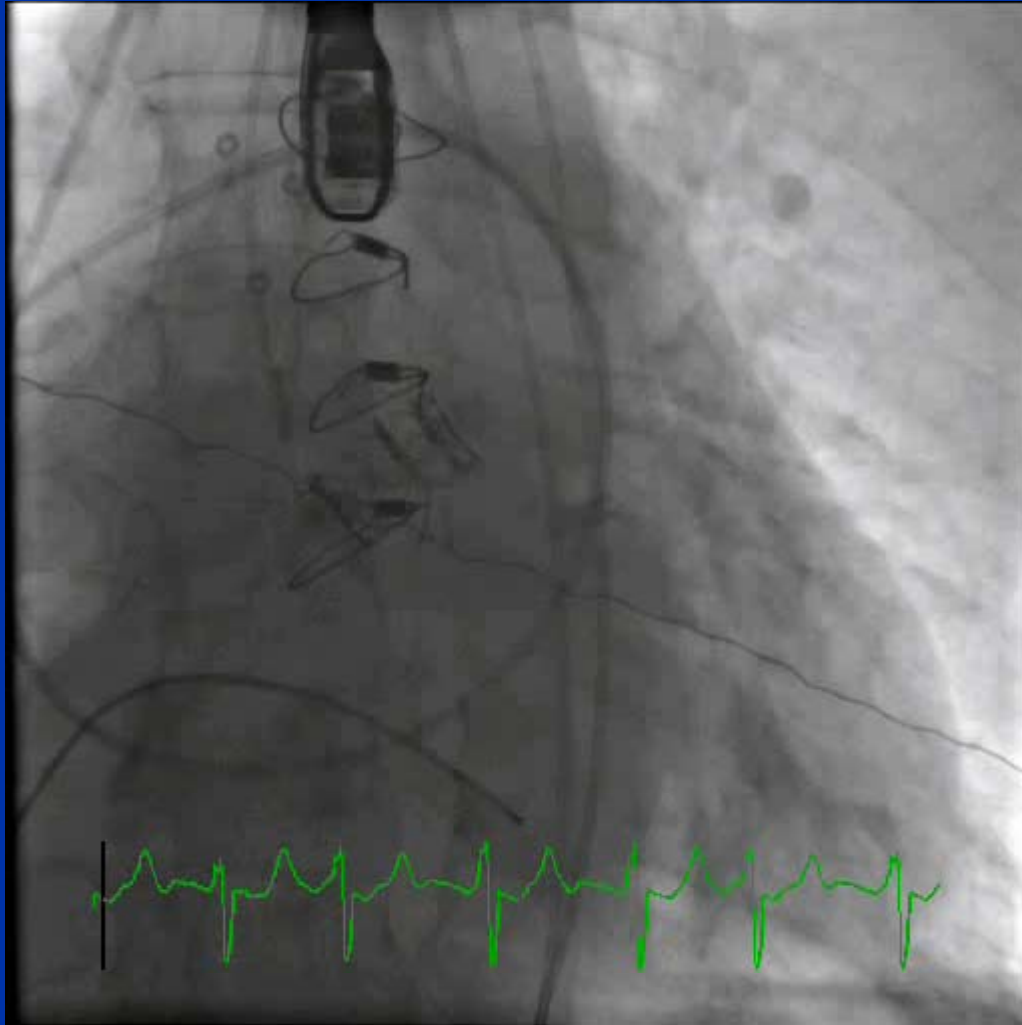# Persistent Severe Paravalvular AR after Balloon

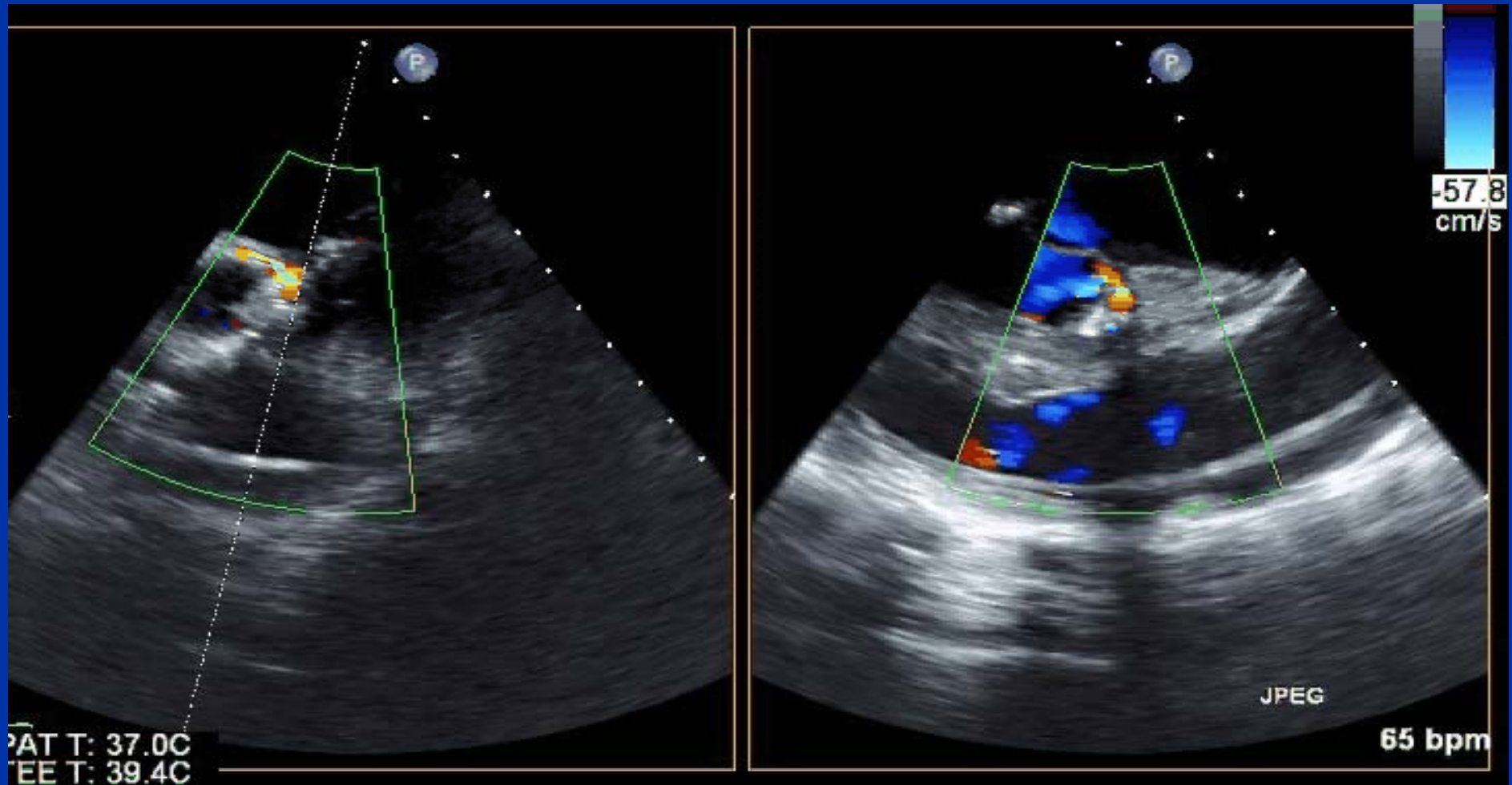# Closure of Paravalvular Leak
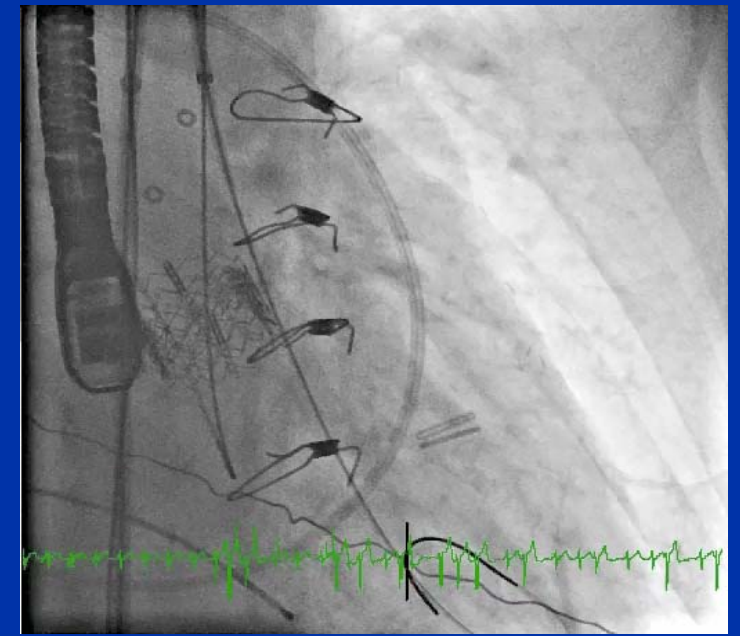
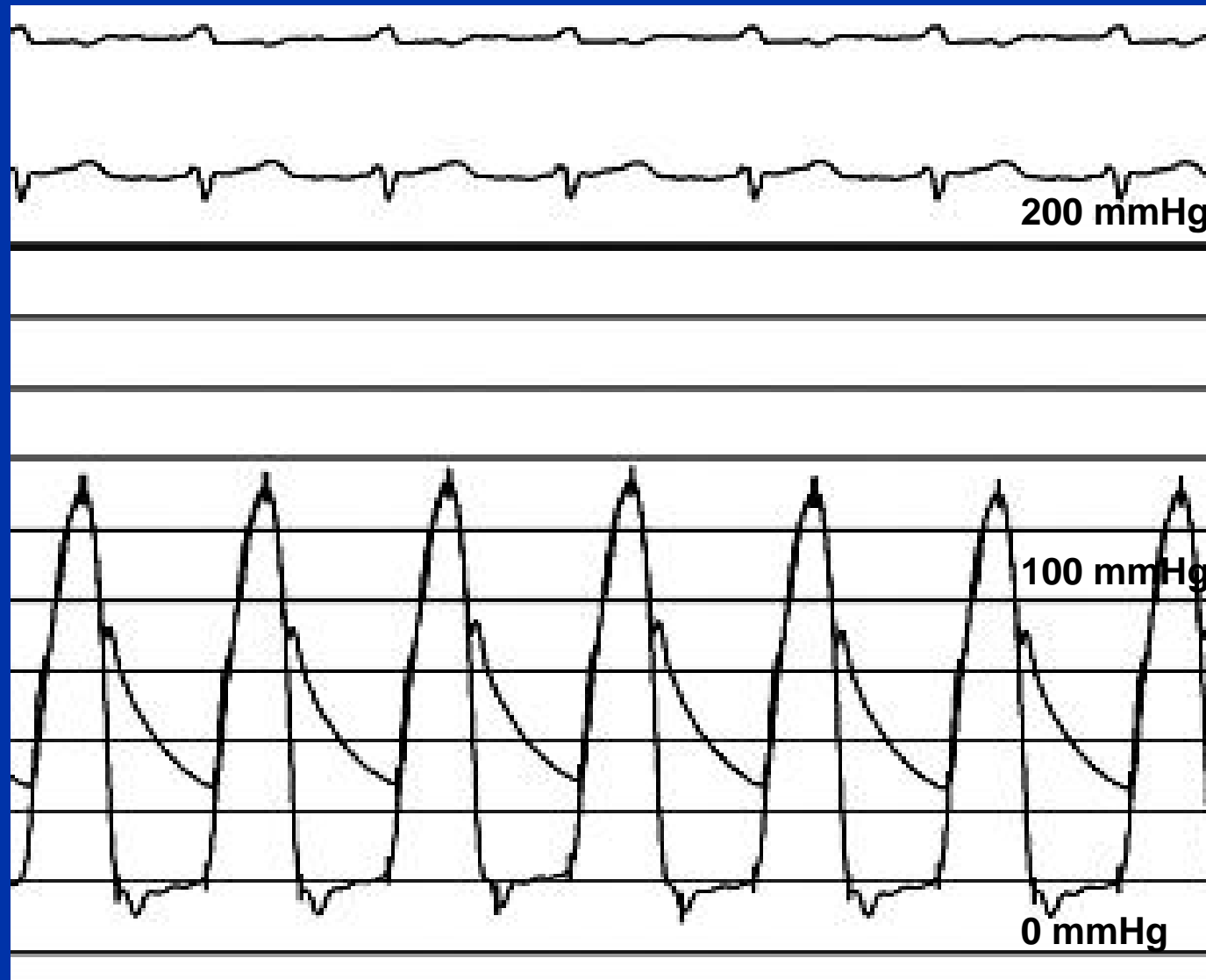# Amplatzer Vascular Plug

AR: Before and After
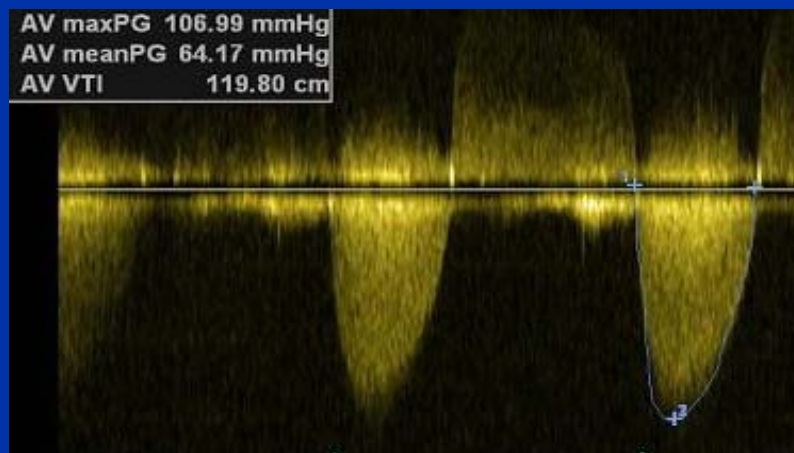
Aortogram Before and After Closure

Significantly Less AR
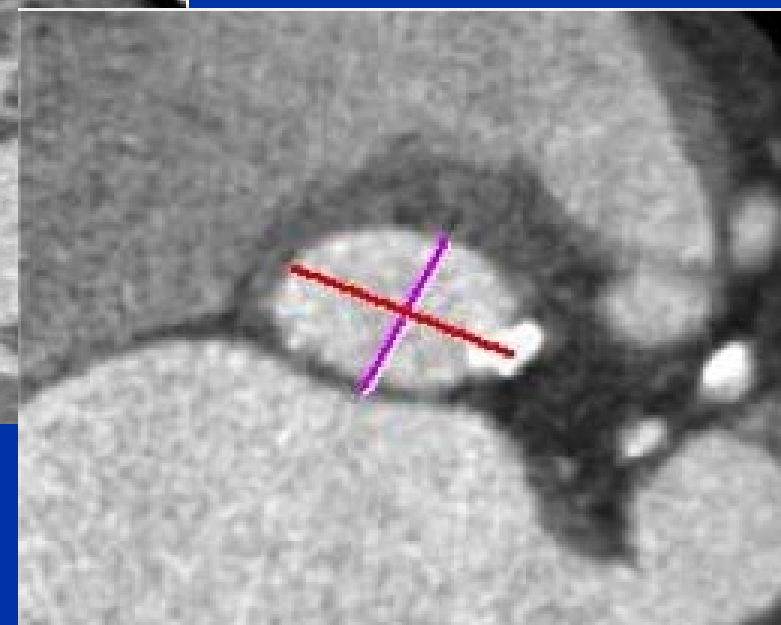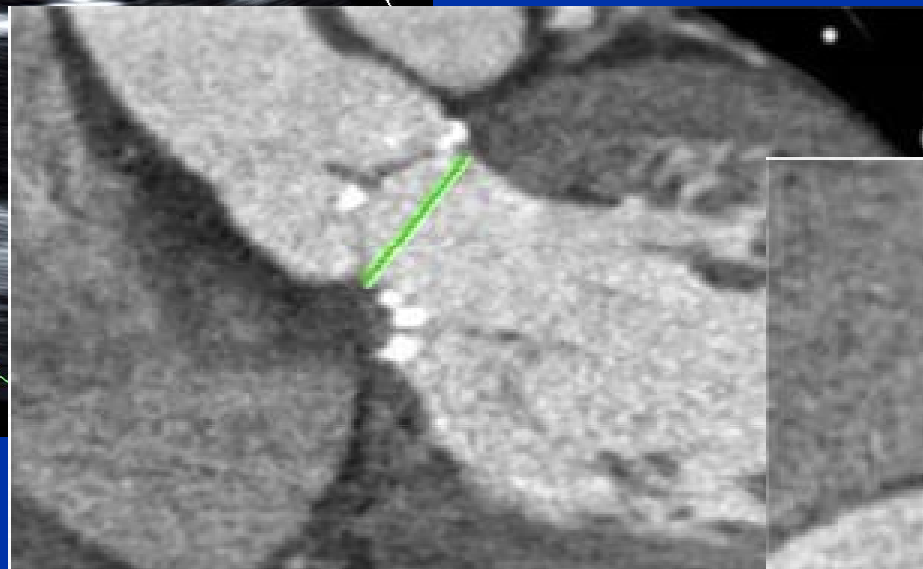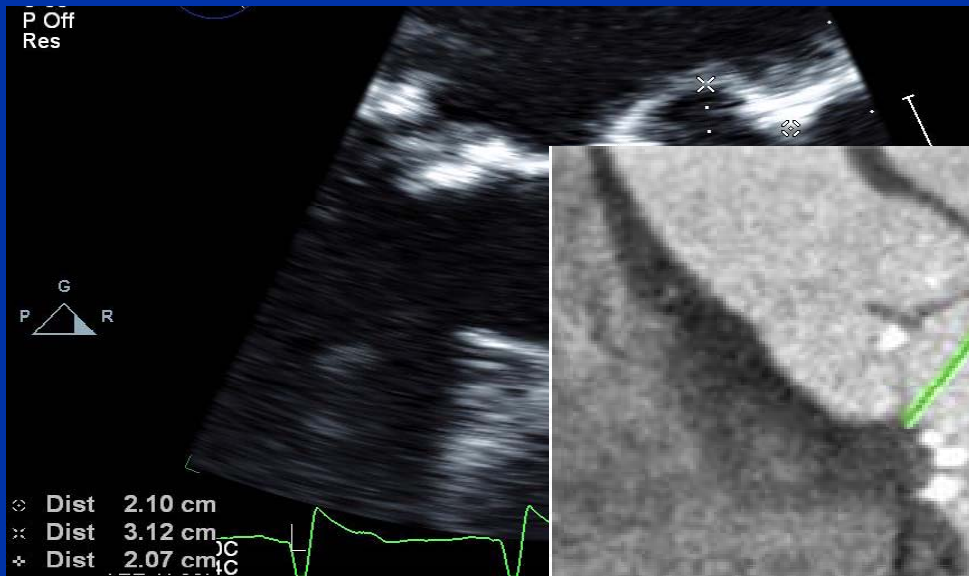
Hemodynamics at Completion

Yet Another Patient
90 year old female

Normal LVEF 55%
Moderate Concentric LVH
Severe Aortic Stenosis

Assessment of Annular Size
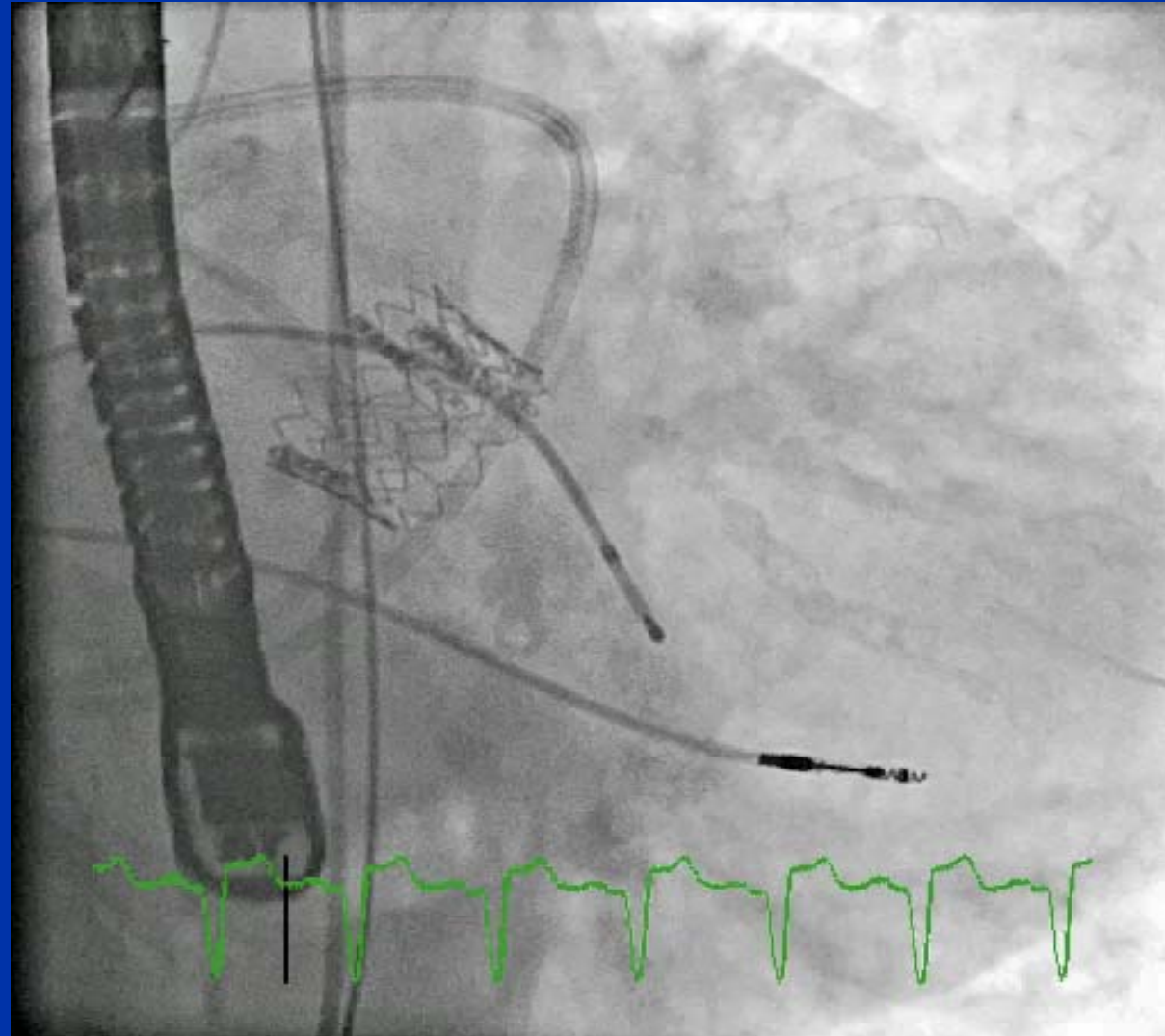

TEE: 21 mm

CT: 22 mm

CT: 18 x 24 mm

Valve Deployment – 23mm Sapien

TEE Post Deployment

Aortogram Post Deployment

Summary

- Measurement of "annulus" is very critical for successful TAVR

- 3D data set provides the most useful information because the "annulus" is not circular

- Decision making is evolving with increasing experience and availability of different sizes