Endovascular treatment of Mitral Paravalvular Leaks

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Disclosure Statement of Financial Interest

Saibal Kar, MD, FACC

Within the past 12 months, I or my spouse/partner have had a financial interest/arrangement or affiliation with the organization(s) listed below.

Affiliation/Financial Relationship	Company
• Grant/Research Support	• Abbott Vascular, Atritech, AGA Medical , St Jude Medical, Circulite, Coherex
• Consulting Fees/Honoraria	• Abbott Vascular, AGA Medical, Atritech, Gore
• Other Financial Benefit	• Coherex

Paravalvular Leaks

- Occurs in 5-17% of surgically implanted prosthetic valves
  - Difficult to diagnose
  - Asymptomatic
  - Heart Failure or Hemolysis or both
  - Difficult to treat

Precipitating factors of Leaks

- Reoperation
- History of endocarditis
- Mitral annular calcification
- Chronic steroid usage

Endovascular treatment of Mitral paravalvular leak

- Anatomical considerations
- Diagnosis
- Treatment principles
- Results
- Complications

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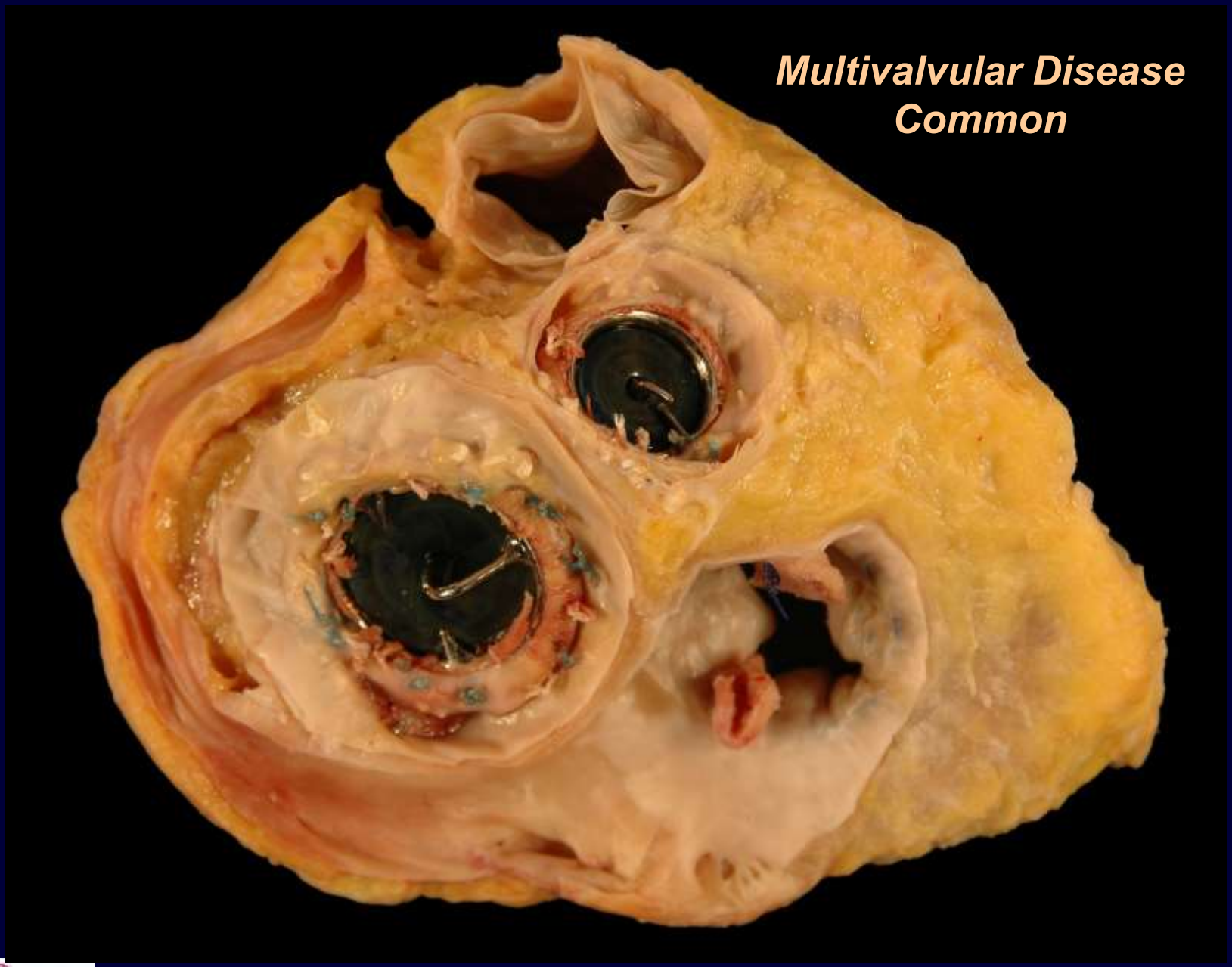


Defects are typically crescenteric in nature

Favorable

Unfavorable

tesy: Dr Bill Edwards

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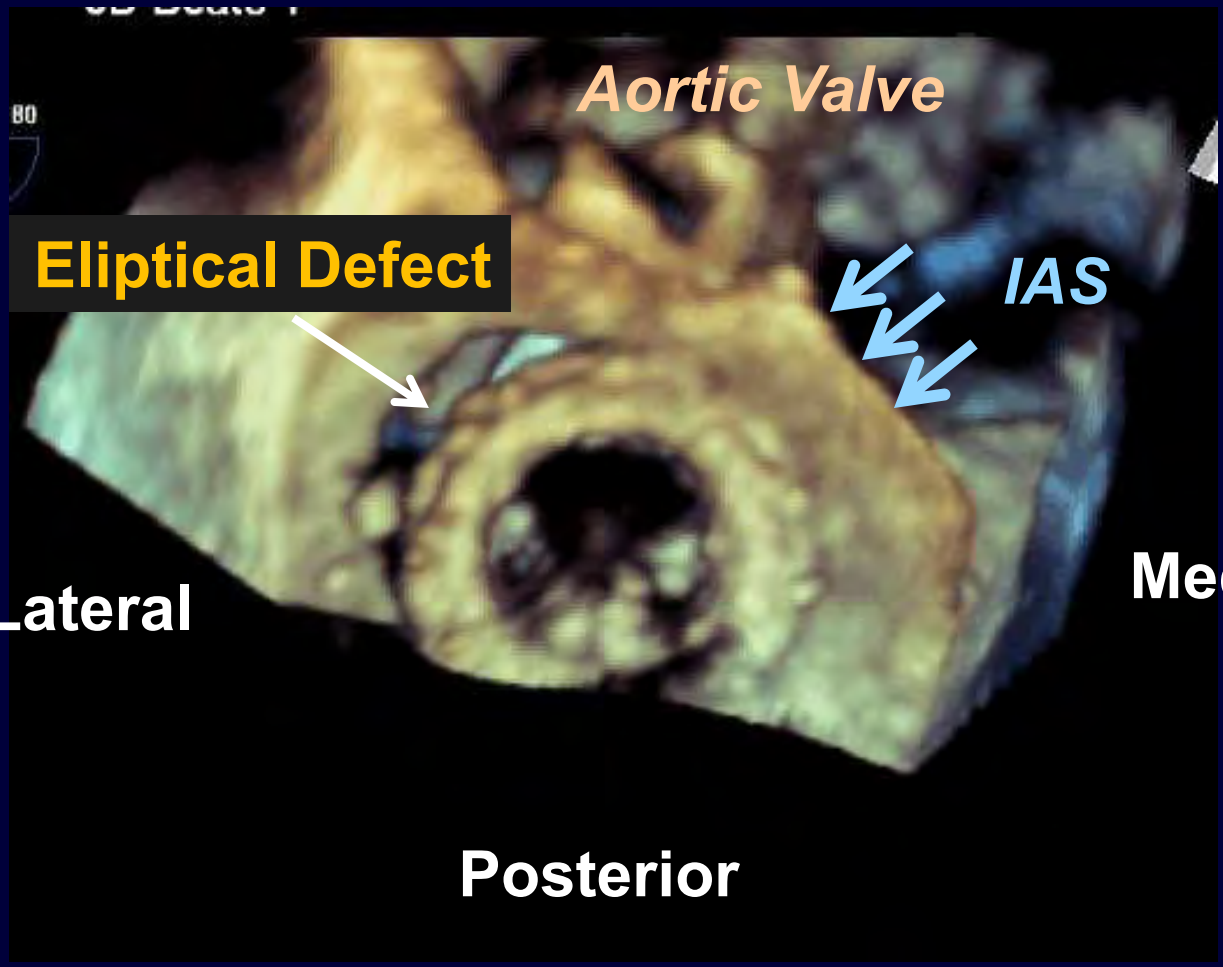
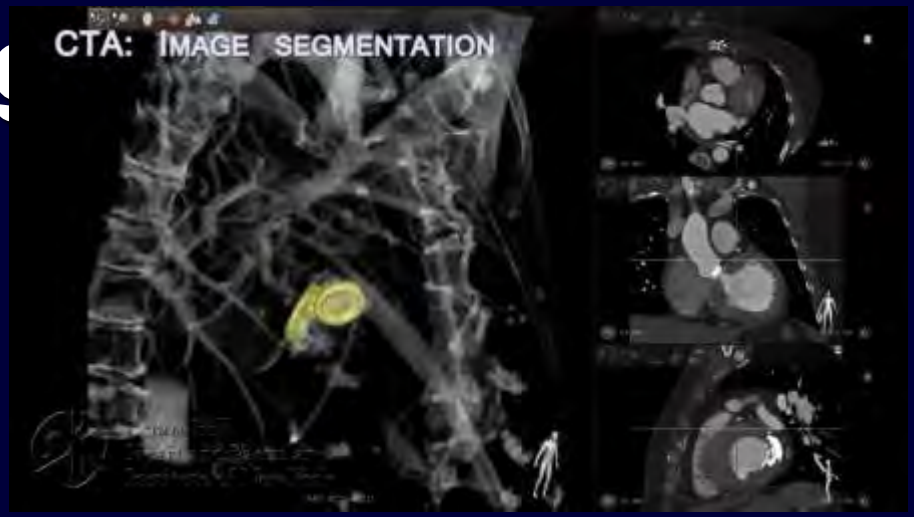
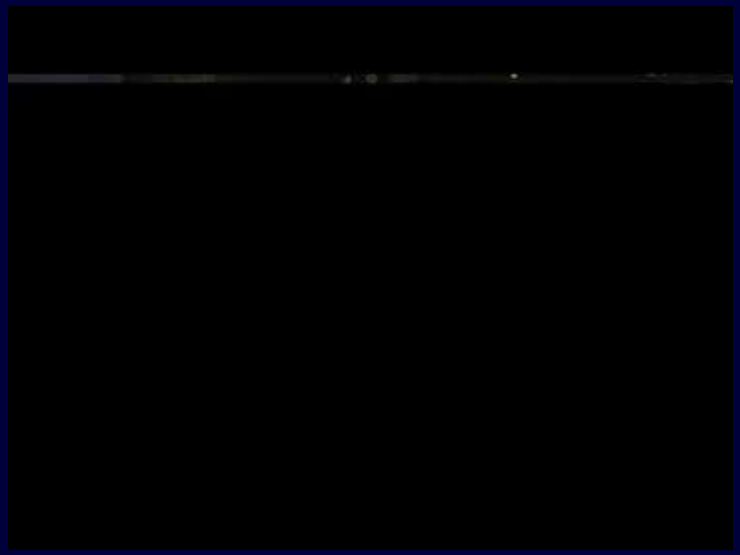
Real time 3-dimensional TEE is essential

- Size
- Location
- Shape
- Guidance



MultiModality Imaging: Fusion Imag





- **The realm of patient-specific, multi-modality fusion imaging – TRIPLE FUSION**

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Transcatheter Devices for PVL Closure

Vascular Structures

ASD

VSD

PVL

No Specifically Designed Devices

Shape

Track

- *Parallel*
- *Perpendicular*
- *Serpiginous*

Shape of PVL not correct for devices (round/oval vs. crescentric)

- Multiple smaller devices – better sealing/less interference
- Simultaneous vs. sequentially

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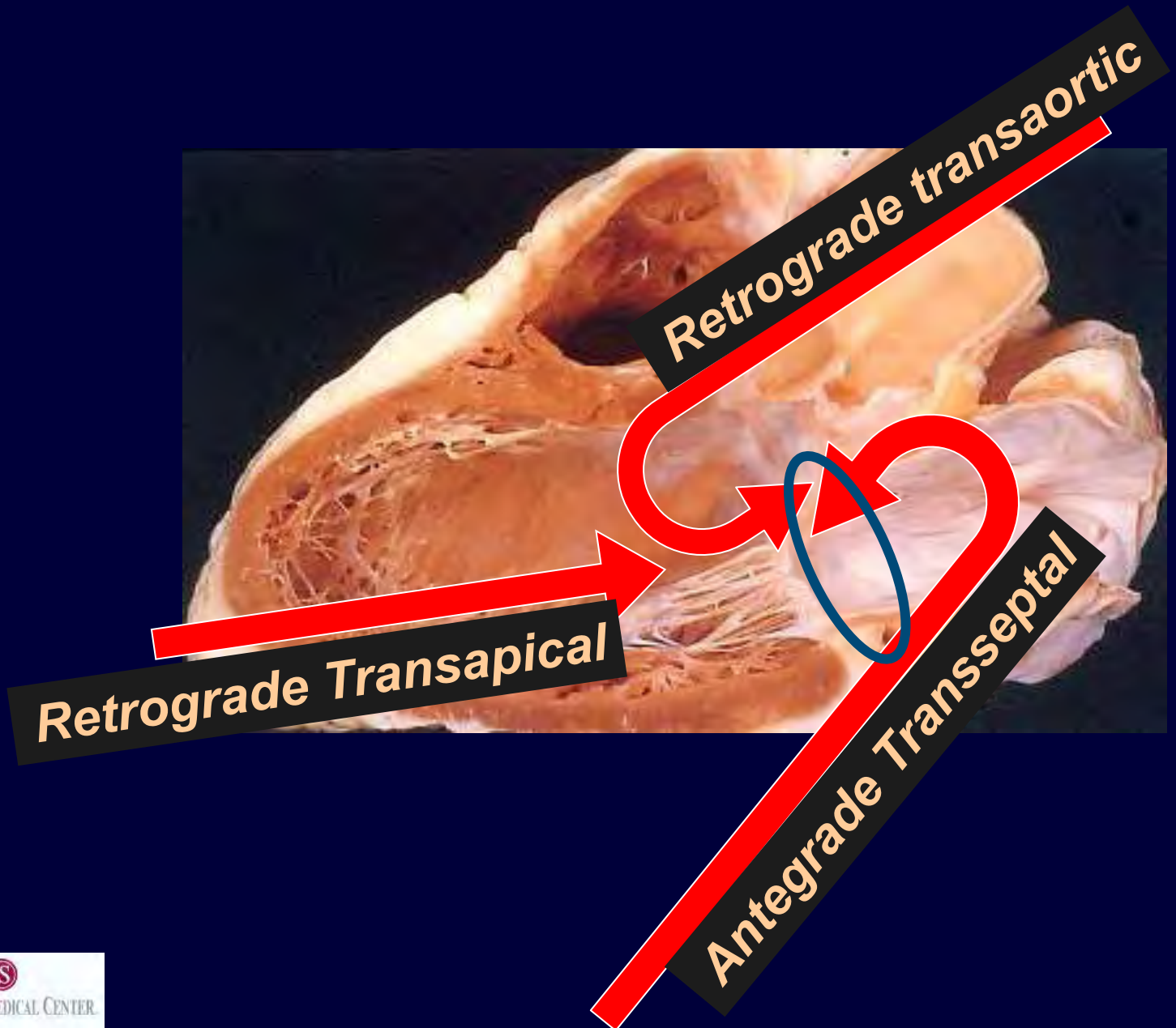
Courtesy: Chad Kliger

Access routes for Mitral PVL



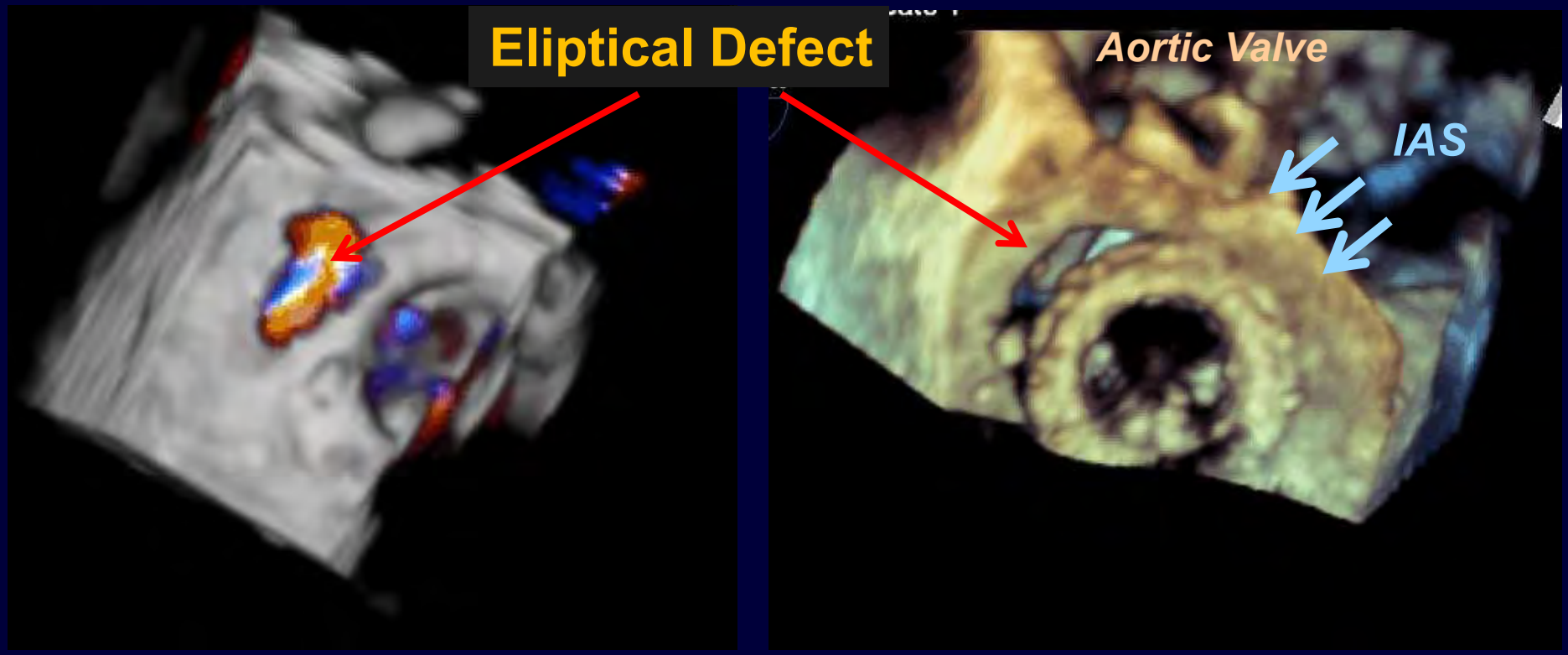
Transseptal puncture for mitral paravalvular leak

- Antero lateral leak
  - Mid fossa puncture
  - Medium curve Agilis
- Posterior and medial leak
  - Puncture needs to be low and posterior on the septum
  - Small curve Agilis sheath

Case 1

Percutaneous Transseptal closure of a medial mitral valve paravalvular leak

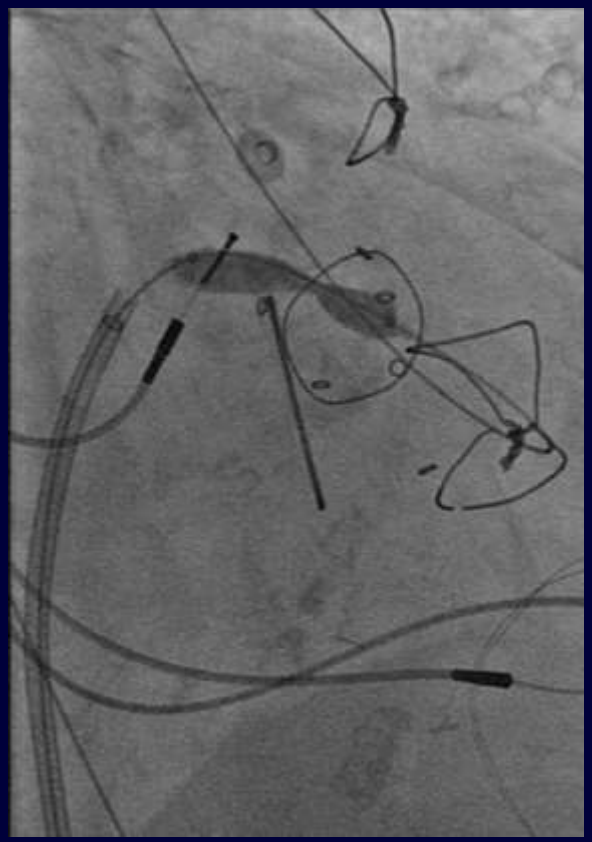
87 yr old lady s/p bioprosthetic AVR and MVR: severe hemolysis and CHF



Antegrade approach

Crossed defect
With Agilis catheter,
MP catheter and
18 supracore wire

Creation of AV loop
Using 0.035 “ Terumo
Wire

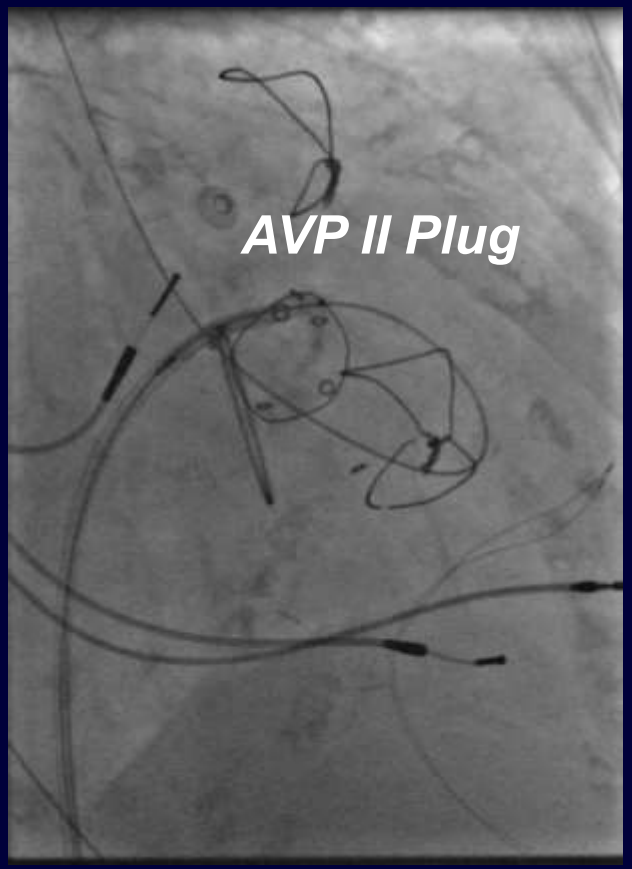


Balloon sizing defect
Using a 8 x 20 mm
EverCross balloon

Closure of defect using 12 mm AVP II plug

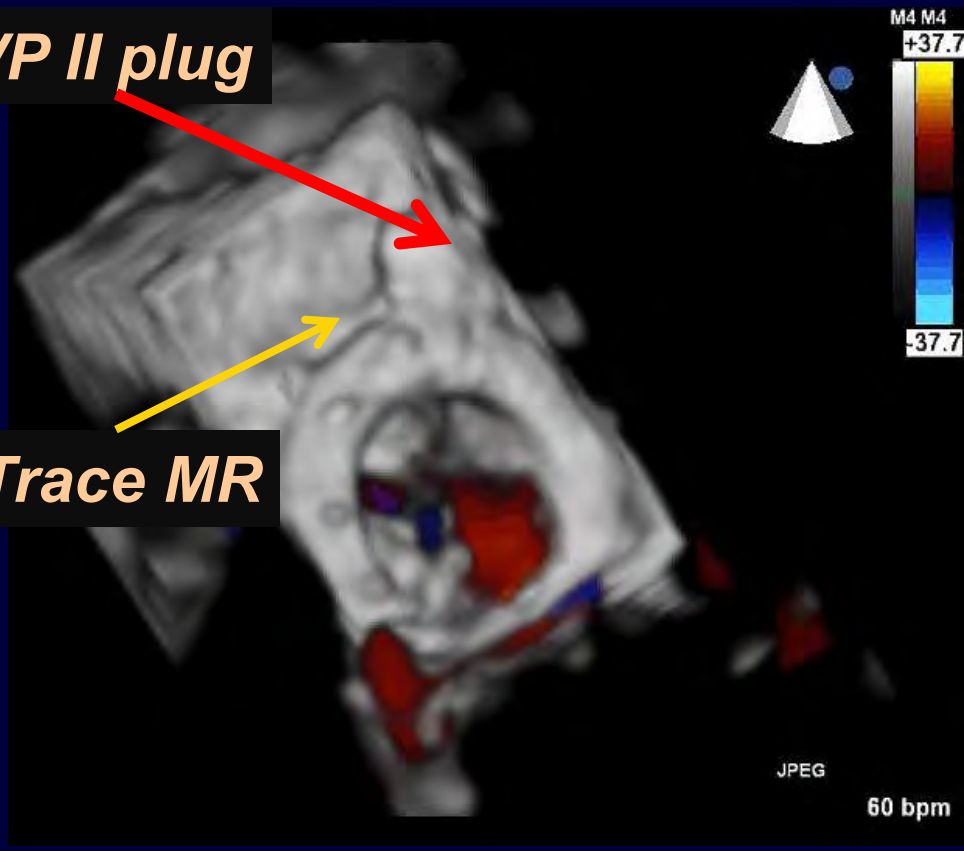
Advancement of 8F Shuttle sheath across defect

Deployment of the left Disc of the 12 mm AVPII Plug



Deployment of the right Disc of the AVP II Plug

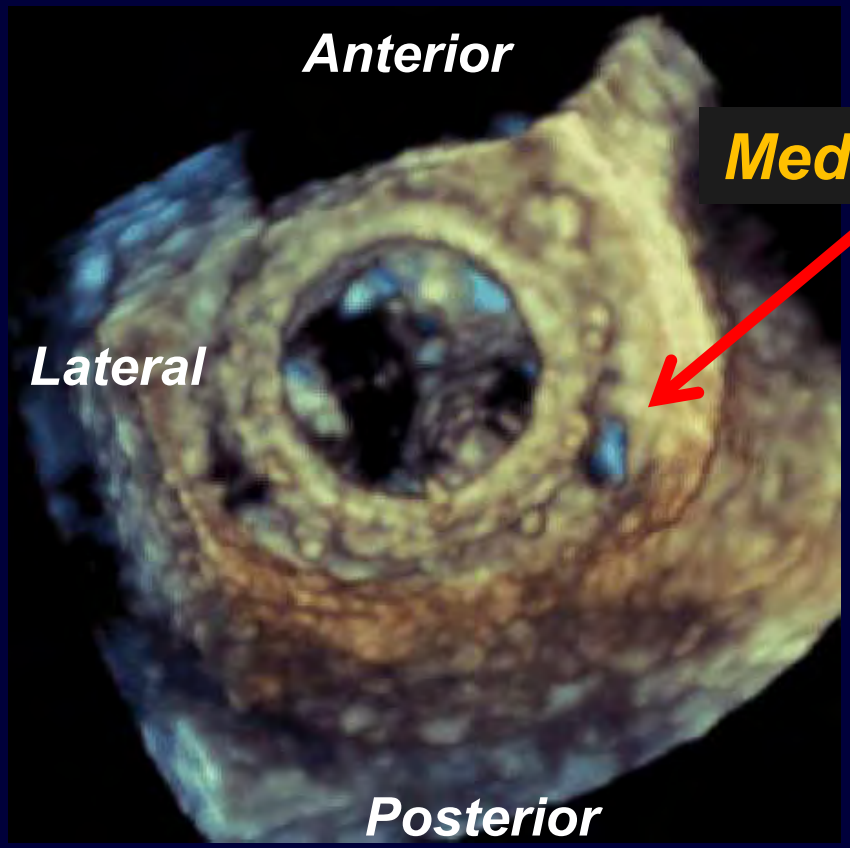
Final Echo showing successful closure

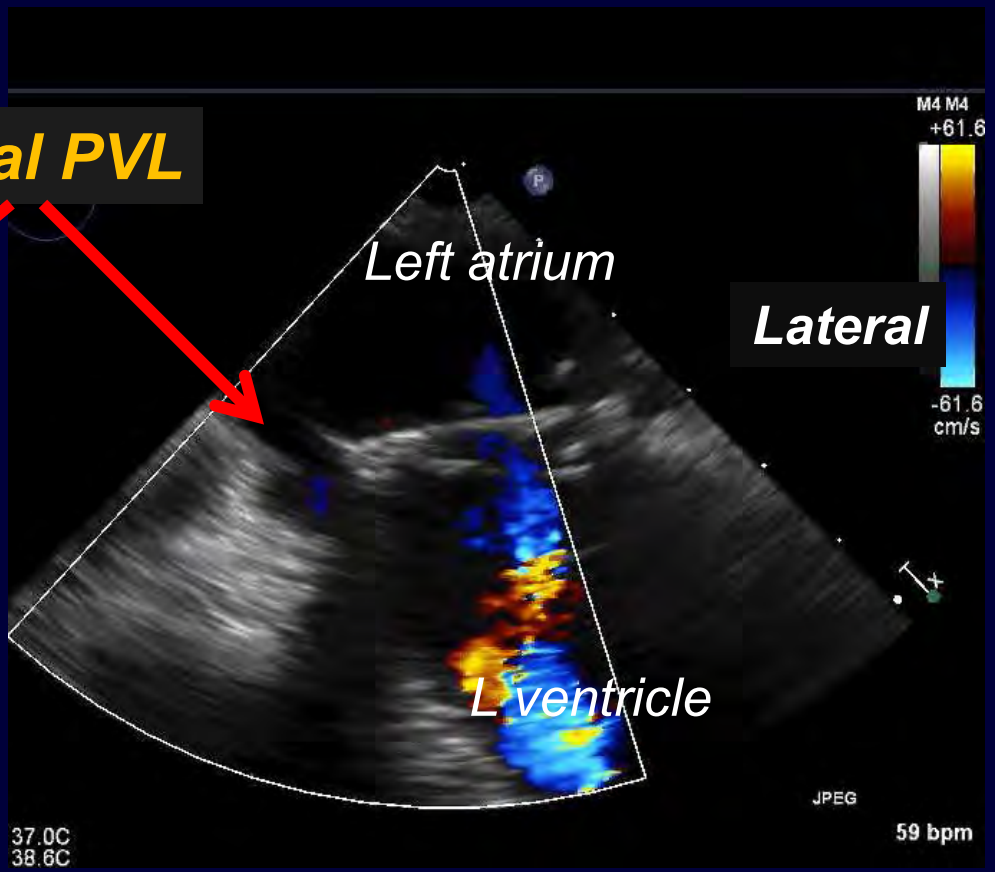


Case 2

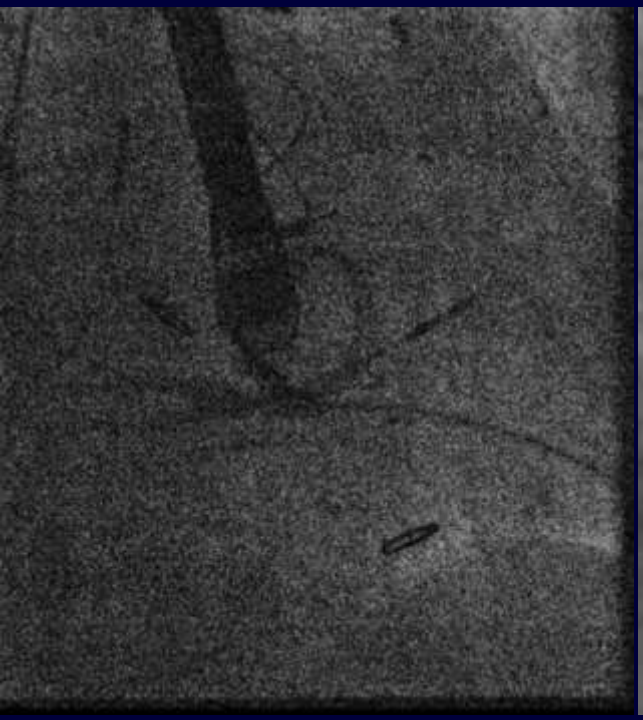
Percutaneous Transapical closure of a medial mitral valve paravalvular leak

82 yr old lady h/o bioprosthetic MVR presents with worsening CHF

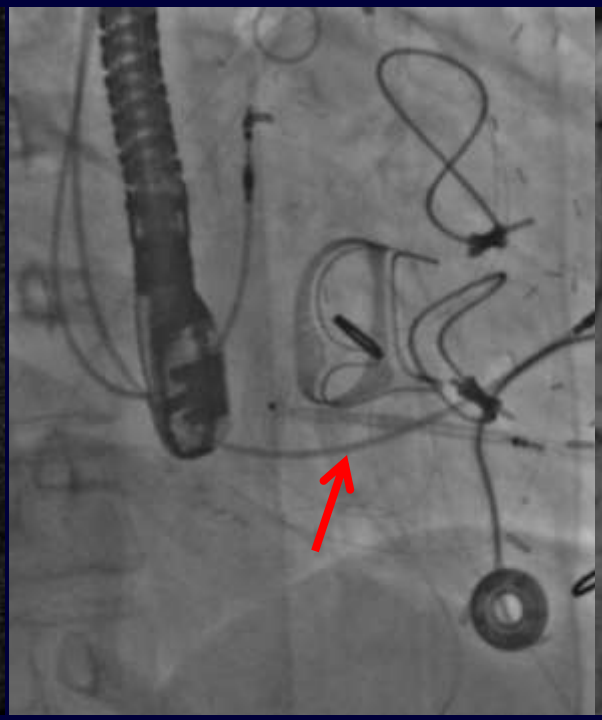




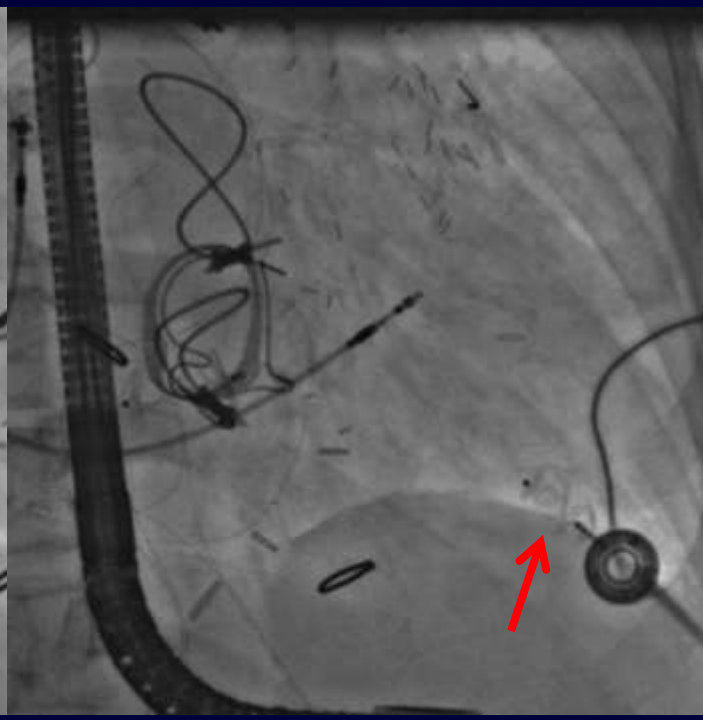
Transapical deployment of 12 mm AVP II Plug in medial mPVL



Crossed defect Transapically, and Balloon sizing defect

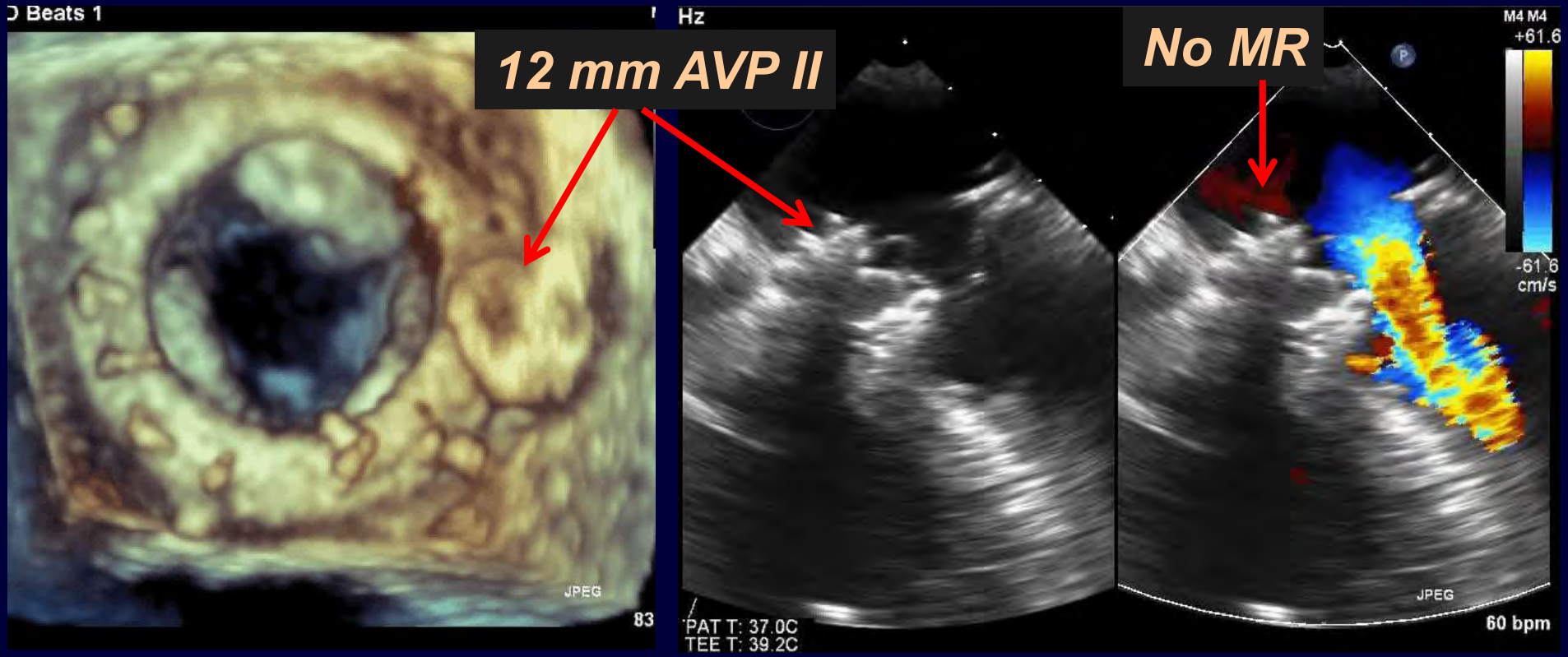


Deployment of the AVP II Plug



Deployment of 6 mm AVP II plug at the apex of heart

Successful closure with one plug



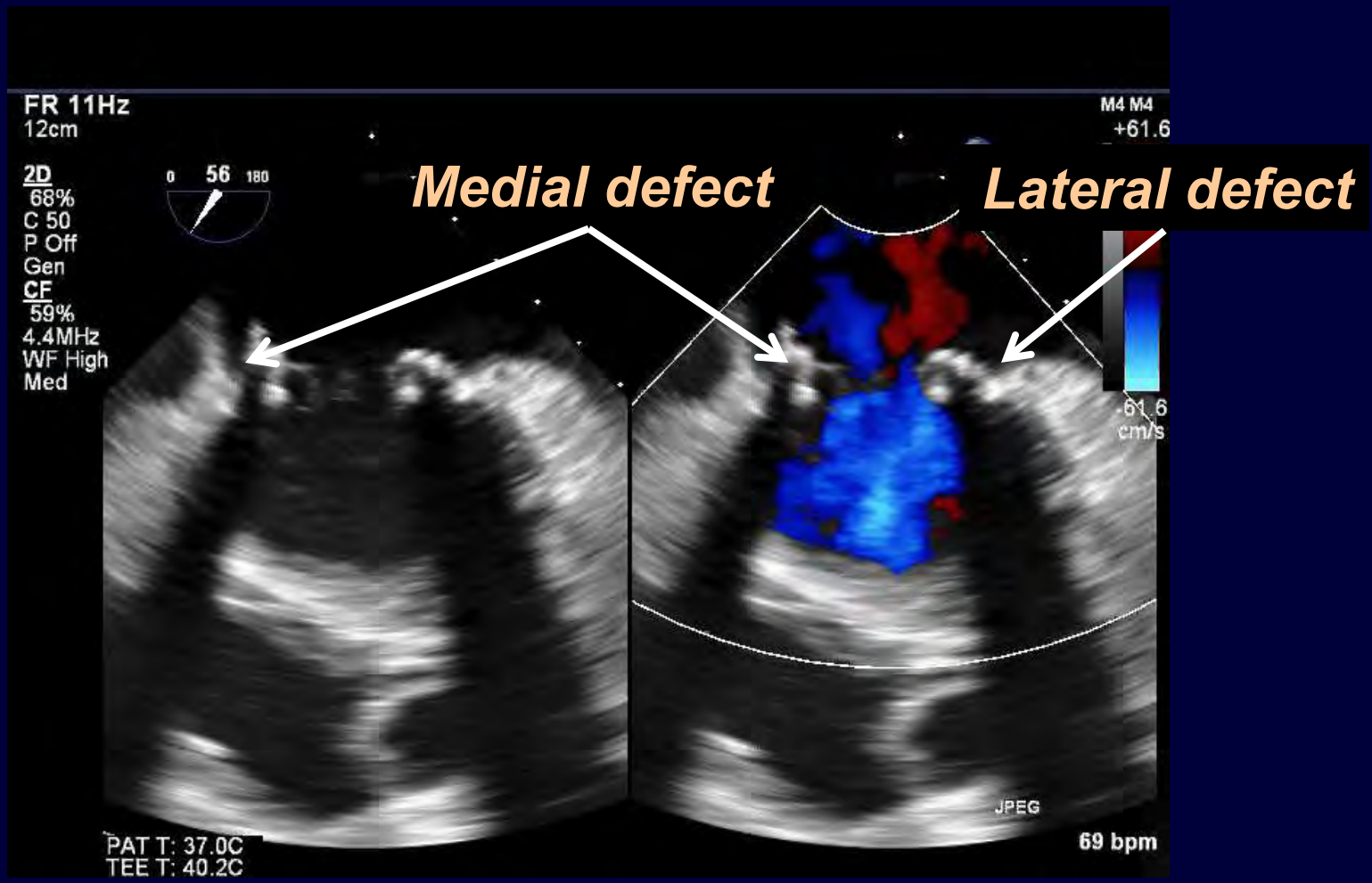
Case 3

Latest Techniques of closing multiple defects using the antegrade transseptal technique

Principles

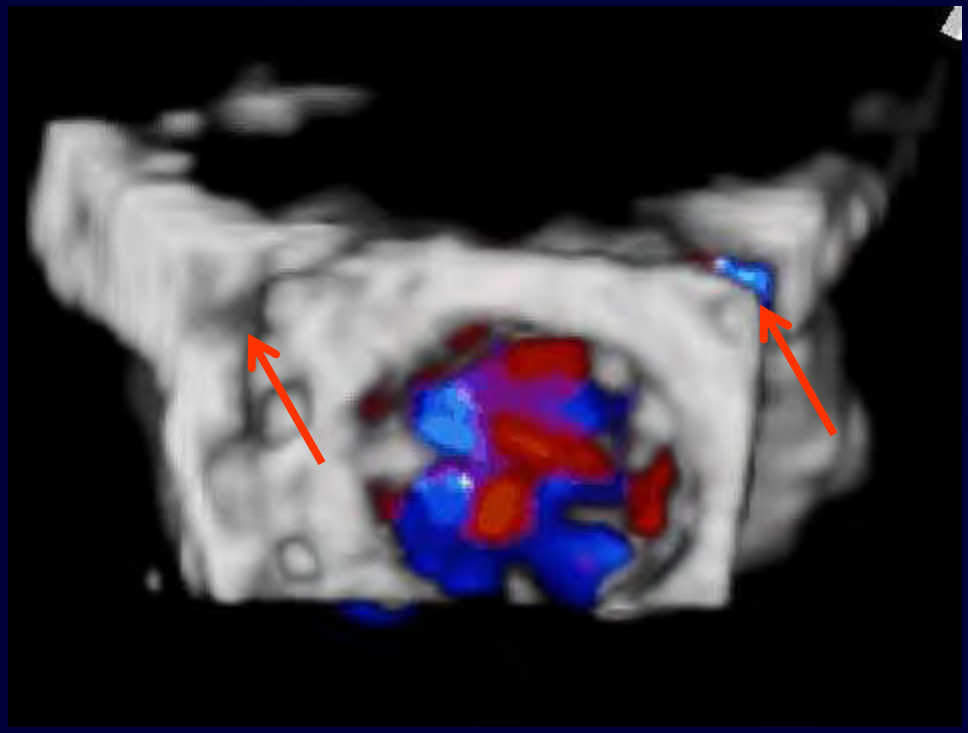
- 14 F sheath in the vein
- Agilis catheter
- Maintaining a rail vein to defect to aorta
- Use of 7 or 8F shuttle sheath to deliver devices

73 yr old male s post bioprosthetic MVR and AVR four months ago
Presenting in CHF, and severe hemolysis



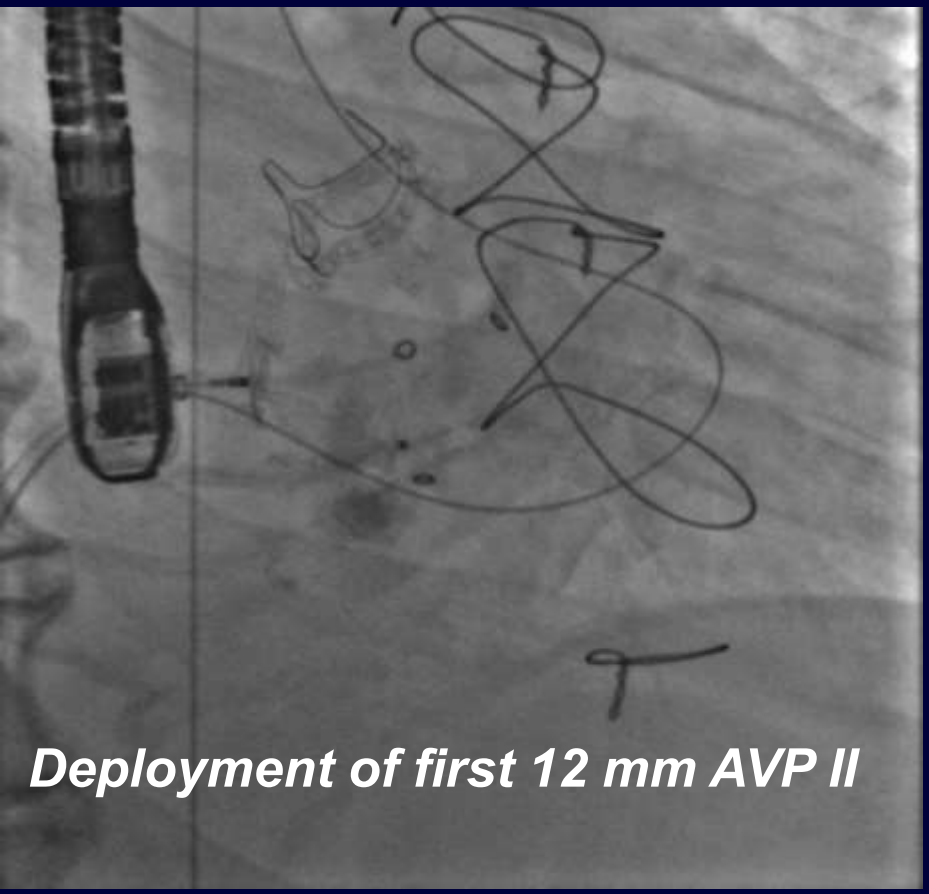
3D enface view of the Mitral valve

Anterior

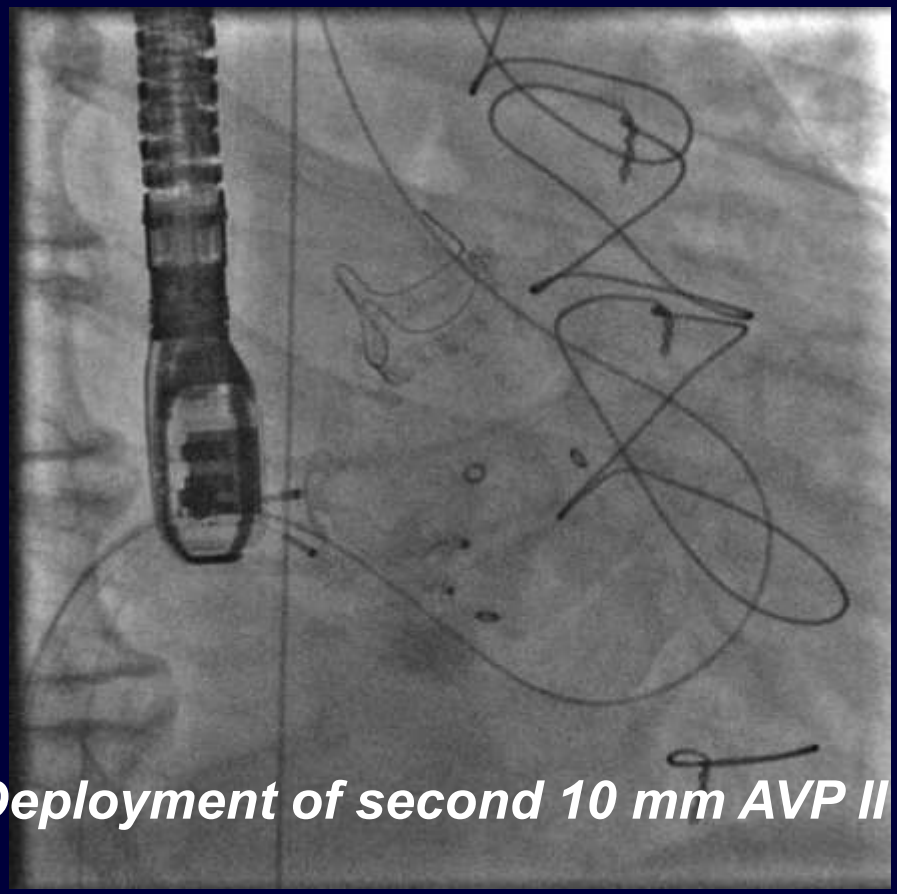


Posterior

Deployment of multiple devices while maitaining the VA rail



Deployment of first 12 mm AVP II

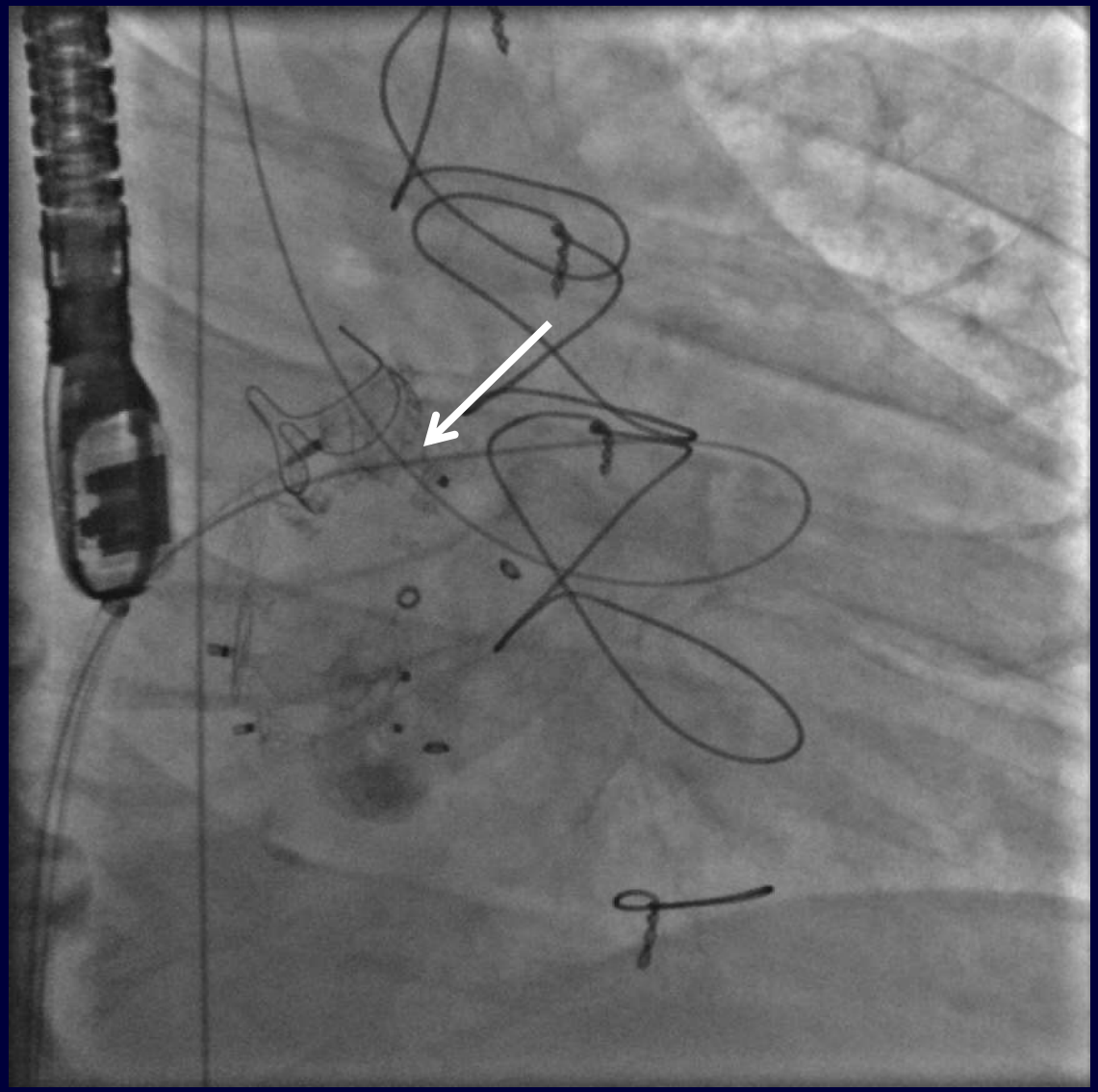


Deployment of second 10 mm AVP II

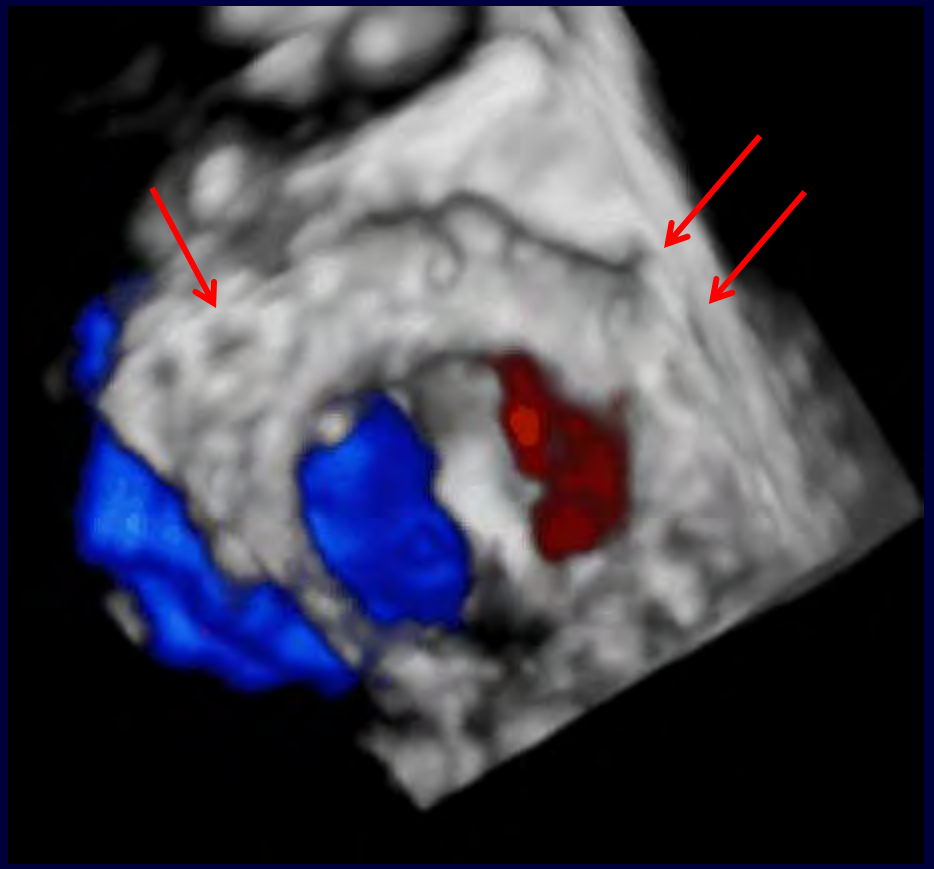
Deployment of 3rd AVP II 10 mm Plug in the anterolateral defect

Required recrossing

The defect and creating an AV loop



Closure of medial and anterolateral leaks with multiple devices



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Original Articles

Percutaneous Repair of Paravalvular Prosthetic Regurgitation

Acute and 30-Day Outcomes in 115 Patients

Paul Sorajja, MD; Allison K. Cabalka, MD; Donald J. Hagler, MD; Charanjit S. Rihal, MD

Background–
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Surgeons r
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the 30-day
bleeding.
deaths occ
Conclusions–
procedural
Increased

Clinical Researc

Clinical Outcomes in Patients Undergoing Percutaneous Closure of Periprosthetic Paravalvular Leaks

Carlos E. Ruiz, MD, PHD, Vladimir Jelnin, MD, Itzhak Kronzon, MD, Yuriy Dudiy, MD, Raquel Del Valle-Fernandez, MD, Bryce N. Einhorn, Paul T. L. Chiam, MD, Claudia Martinez, MD, Rocio Eiros, MS, Gary Roubin, MD, PHD, Howard A. Cohen, MD

New York, New York

Ob

Clinical Research

Long-Term Follow-Up of Percutaneous Repair of Paravalvular Prosthetic Regurgitation

Paul Sorajja, MD,* Allison K. Cabalka, MD,† Donald J. Hagler, MD,† Charanjit S. Rihal, MD*

Rochester, Minnesota

Objectives The goal of this study was to determine the long-term clinical efficacy of percutaneous repair of paravalvular prosthetic regurgitation.

Background Percutaneous repair has emerged as an effective therapy for patients with paravalvular prosthetic regurgitation.

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Acute Outcomes

115 Patients

67±12 yrs, 54% men

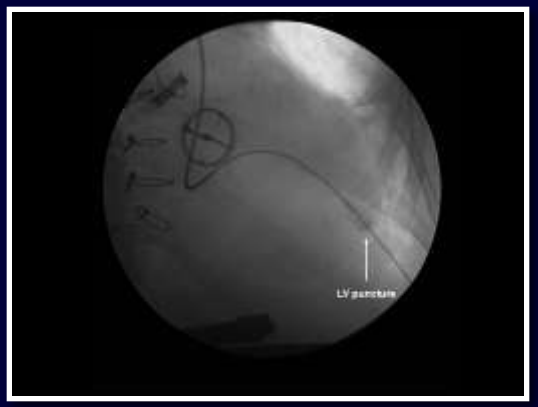
Procedure time: 149 ±59 min

25% required AV rai

77%: 0/1+ residual regurgitation

Complications – 8.7%

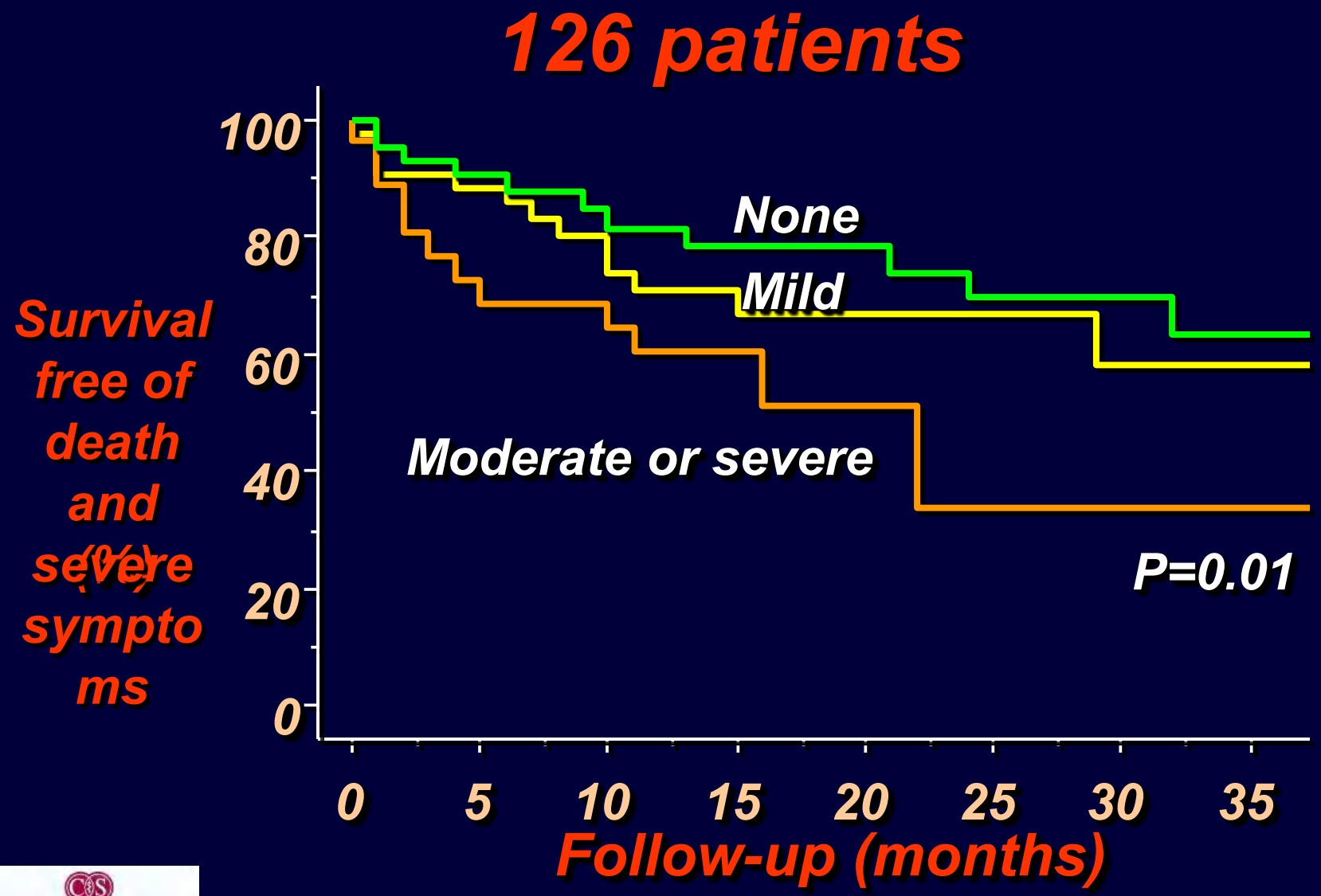
- majority were bleeding



CEDARS-SINAI MEDICAL CENTER

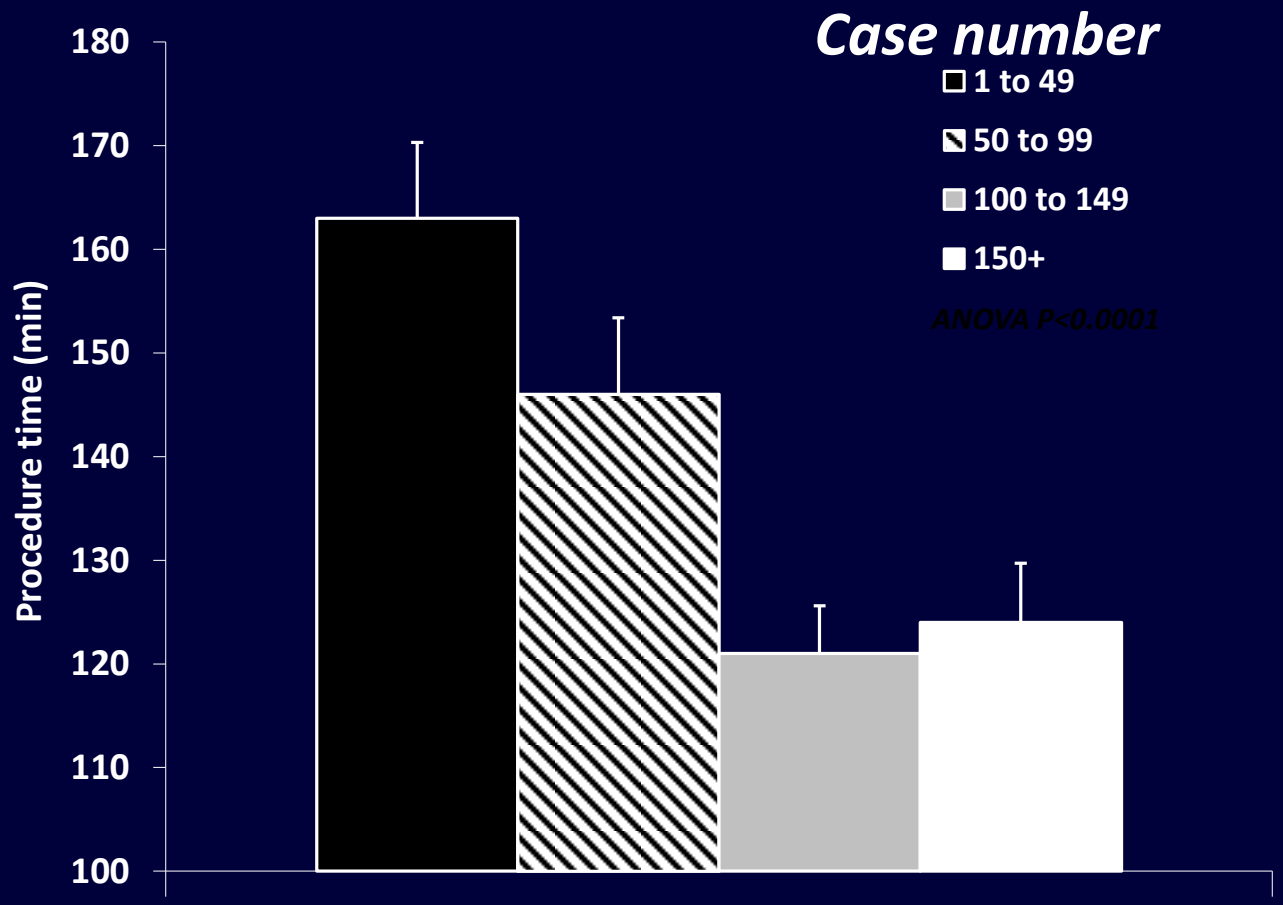
Sorajja, Cabalka, Hagler, Rihal, Circ Interv 2011

Residual Regurgitation and Outcome



Sorajja, Cabalka, Hagler, Rihal, JACC 2011

Learning Curve



Unpublished Data

Complications

- Heart failure responds better than hemolysis
- In some cases hemolysis cant get worse
- Bleeding
- Device embolization
- Valve obstruction

Conclusions

- Mitral paravalvular regurgitation is common and underdiagnosed
- Percutaneous closure is feasible, safe and effective
- Proper imaging, and planning are key to success
- Residual regurgitation is the key determinant of outcome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Paravalvular leak post TAVR

Pooled estimate of moderate/severe AR

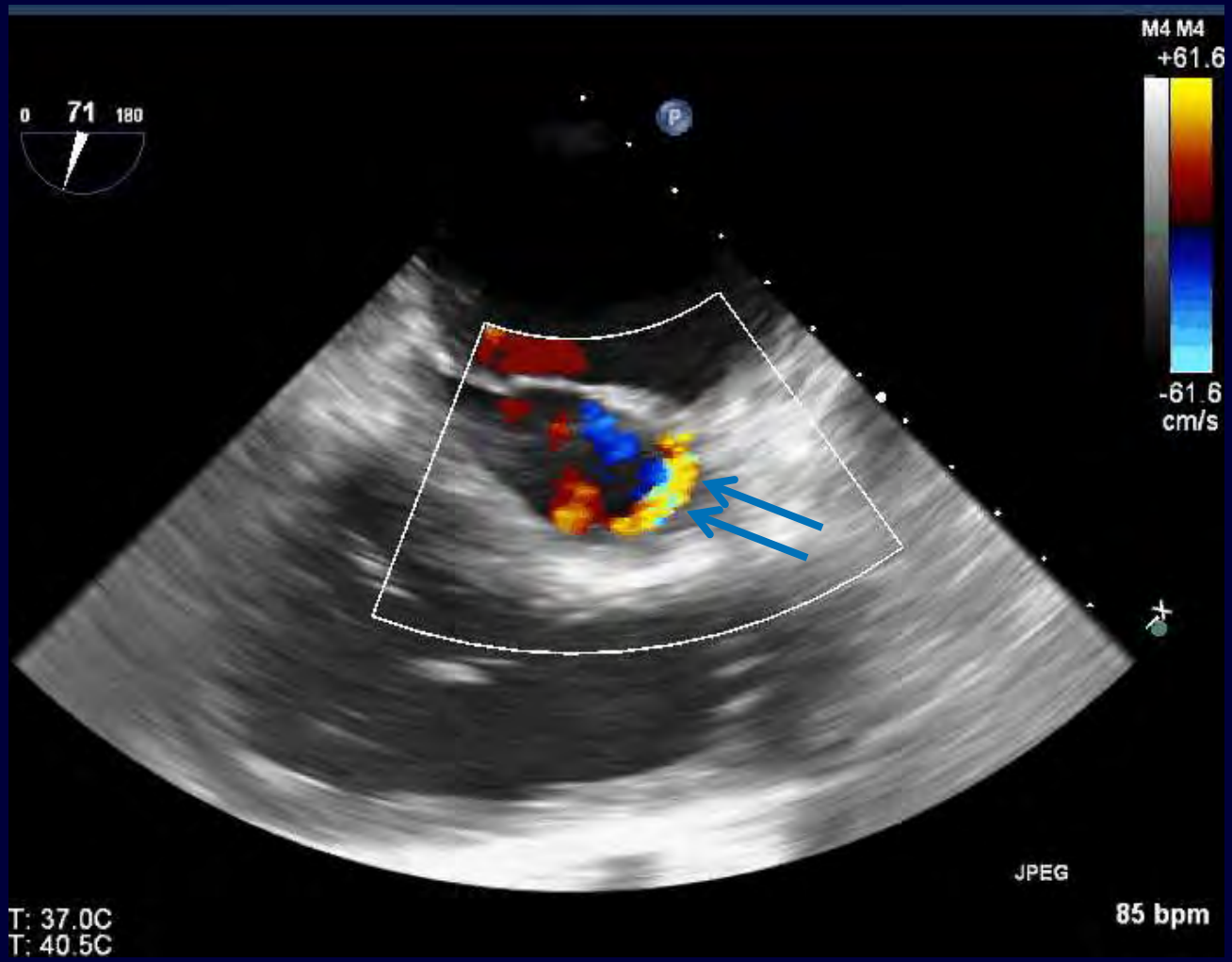
11.7%

(95% CI 9.6-14.1)

CEDARS-SINAI MEDICAL CENTER

Athappan G. et al. JACC 2013

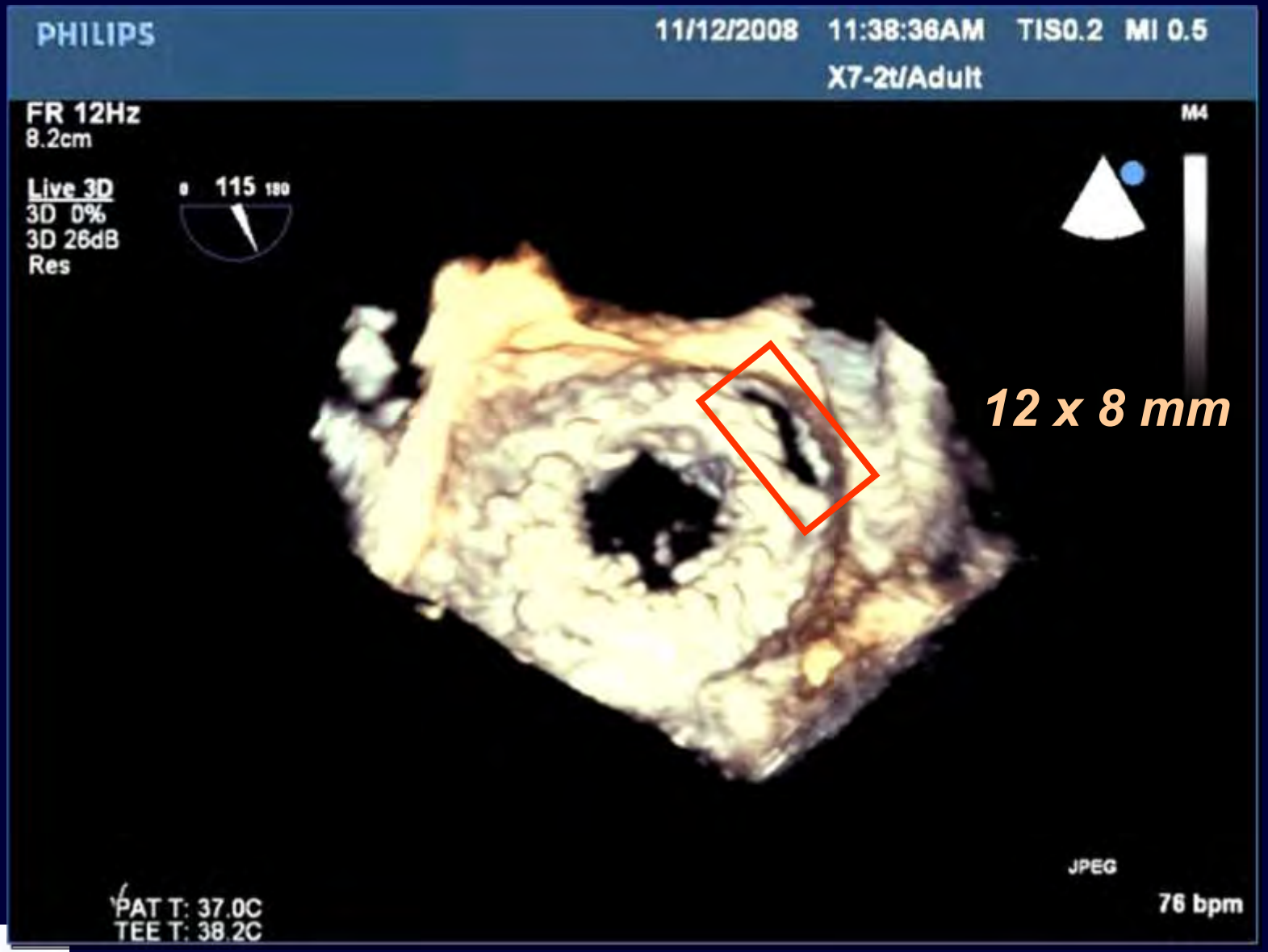
91 yr old male s/p TAVR 3 years ago presenting with persistent CHF and BNP>3000



Latest Closure Techniques

Double wire, dual delivery system and simultaneous device deployment.

Measurements and Sizing



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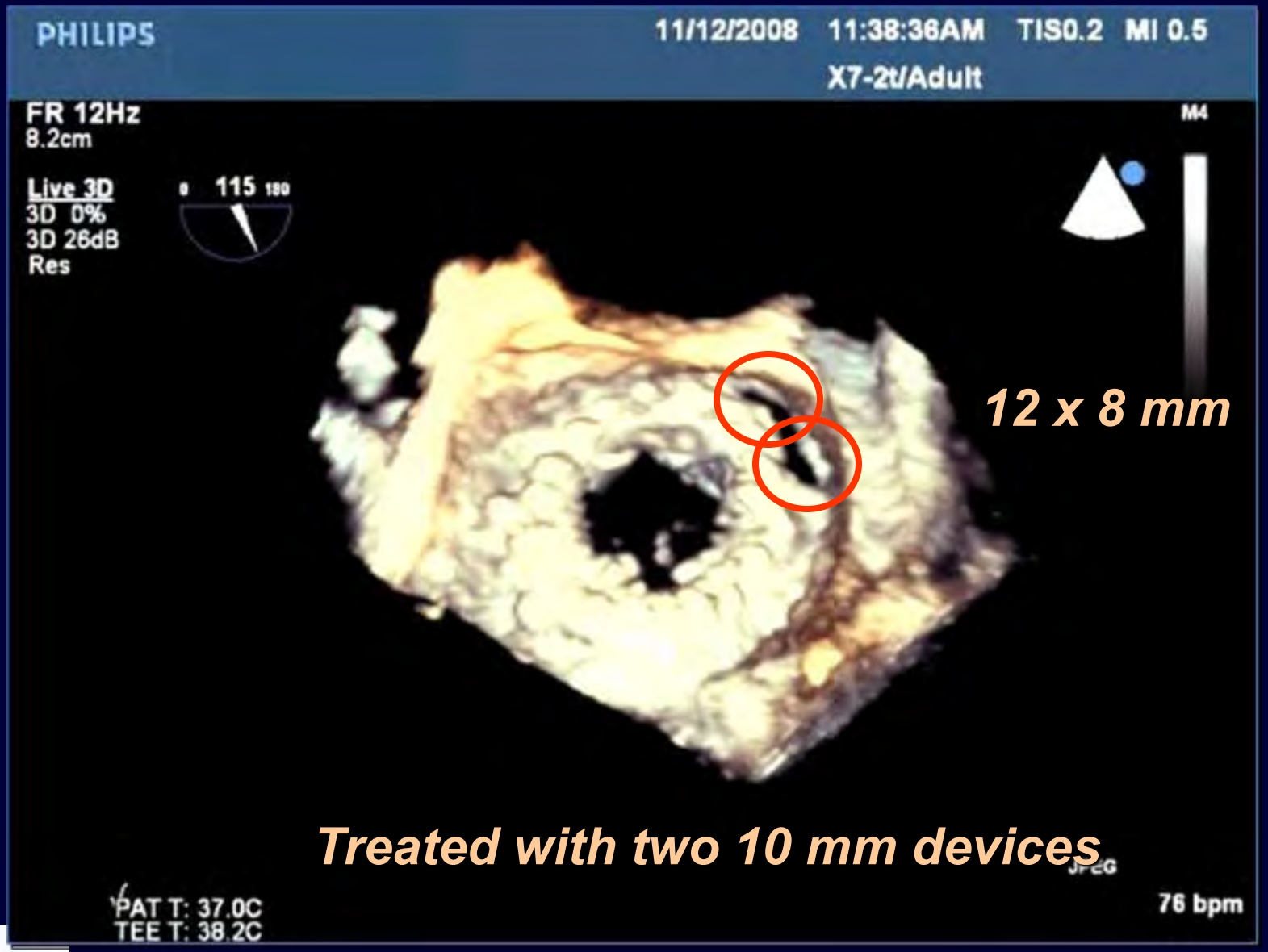

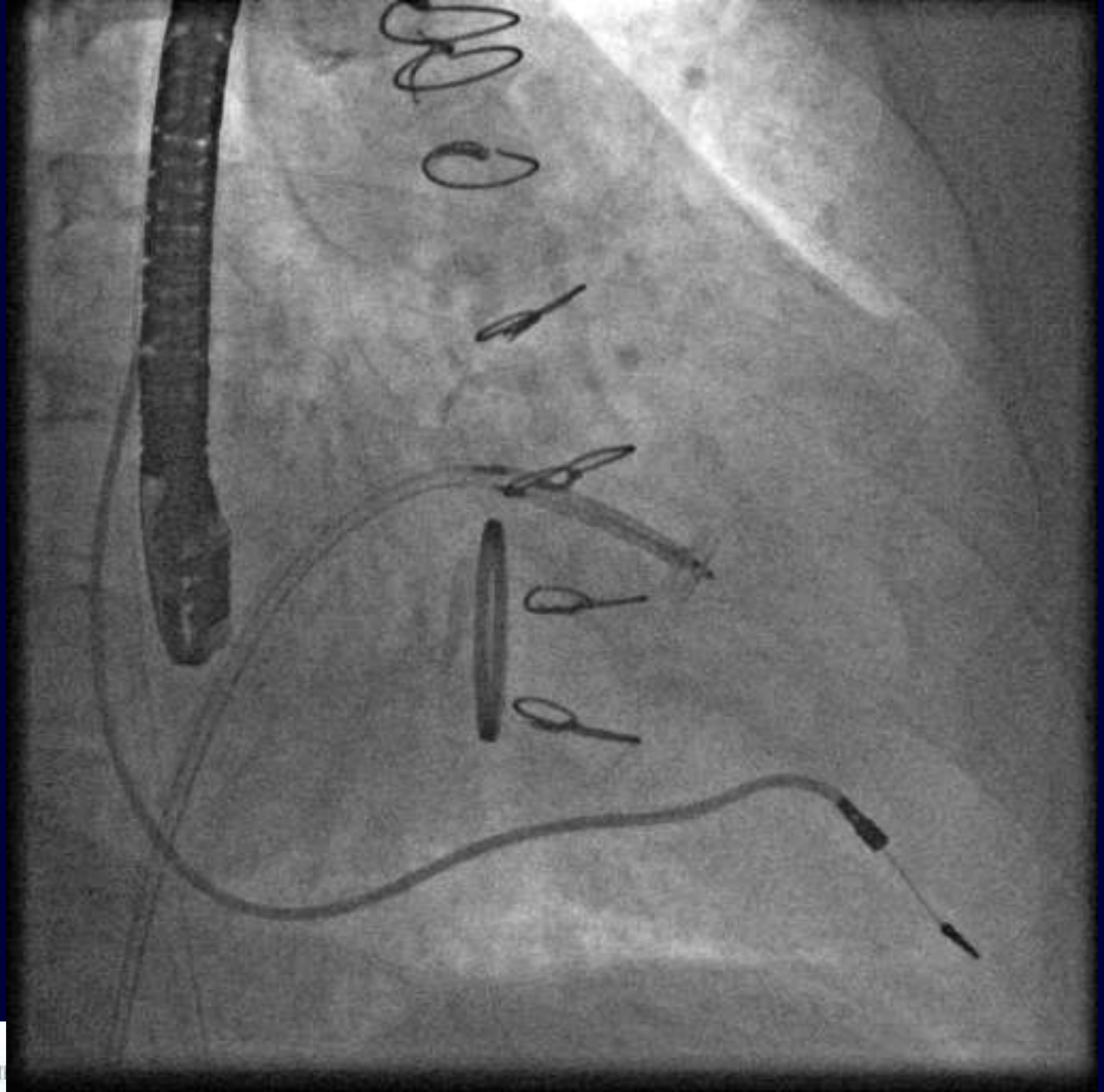

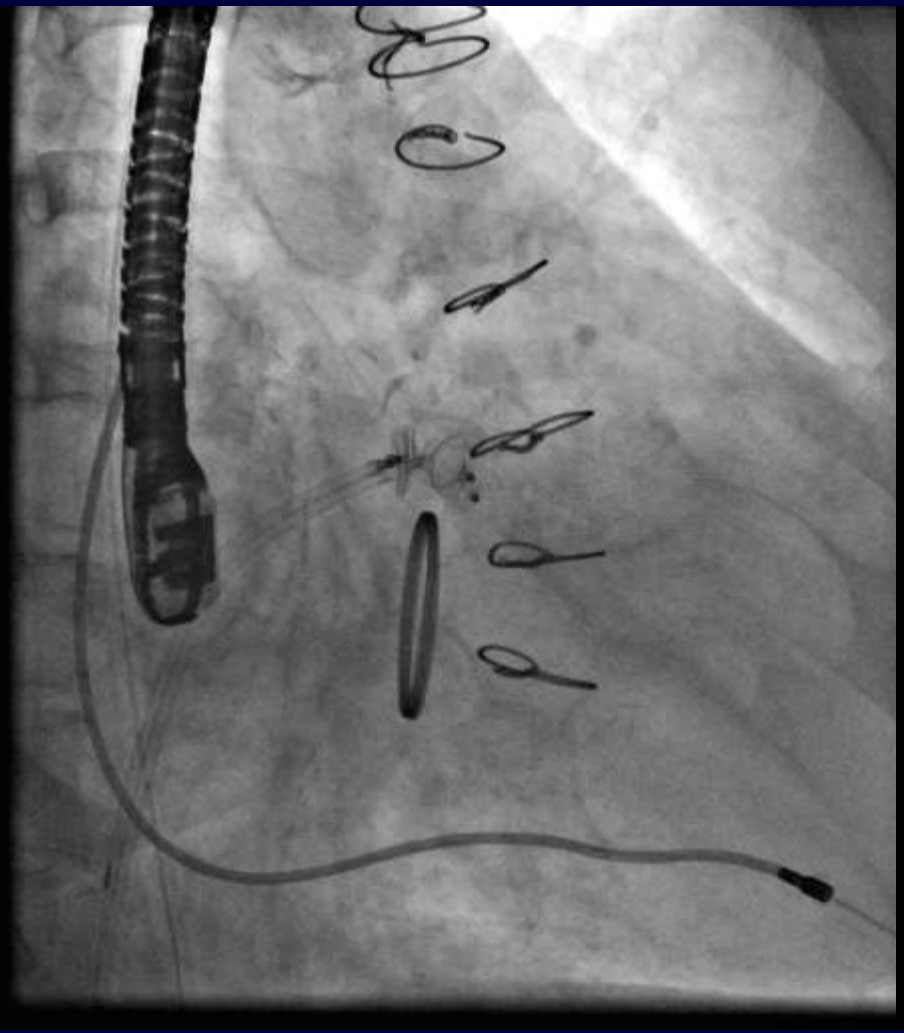

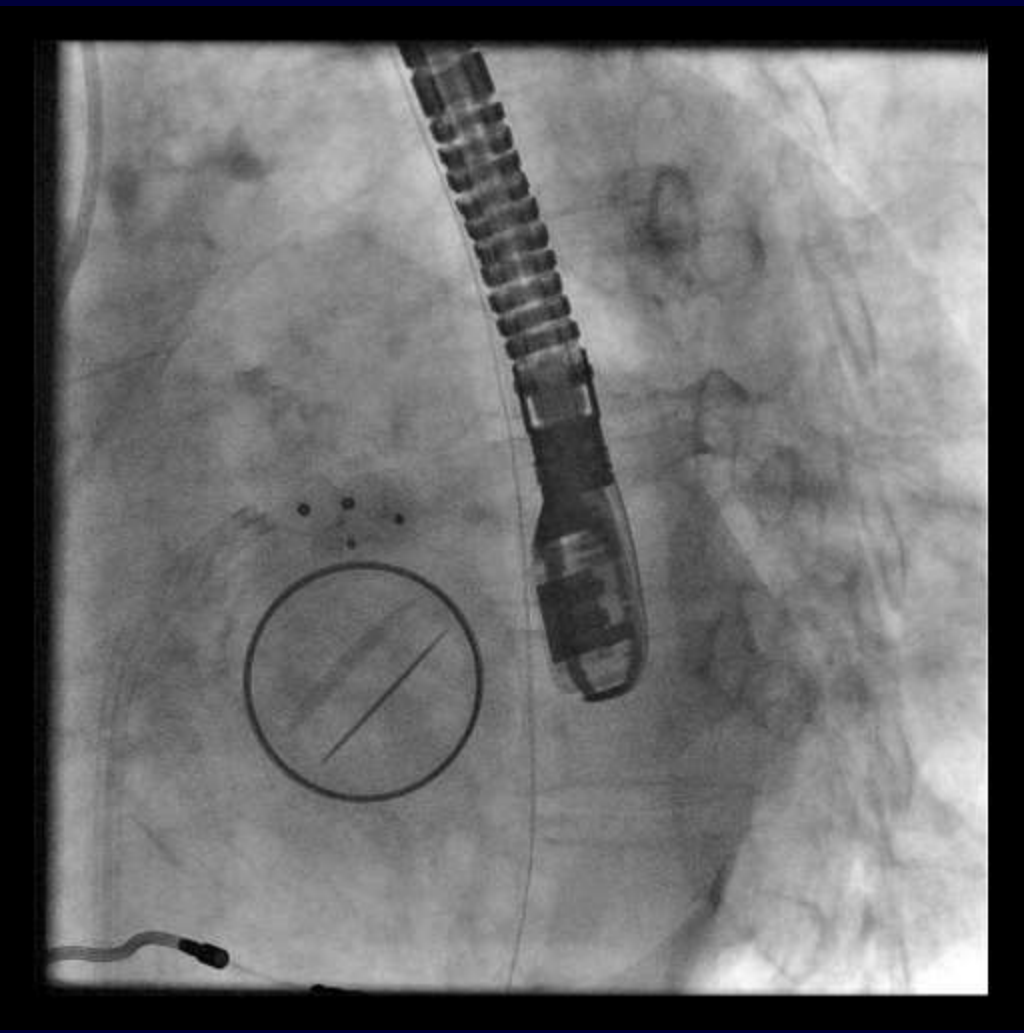

mPVL: Retrograde Transapical Closure