Percutaneous Approaches to Periprosthetic Regurgitation

Charanjit S. Rihal MD MBA
Professor of Medicine
Director, Cardiac Catheterization Laboratory

Mayo Clinic and Foundation
Rochester, MN, USA

DISCLOSURES

Relevant Financial Relationship(s)

None

Off Label Usage

AGA

Percutaneous Approaches to Periprosthetic Regurgitation

5 - 17% of valves

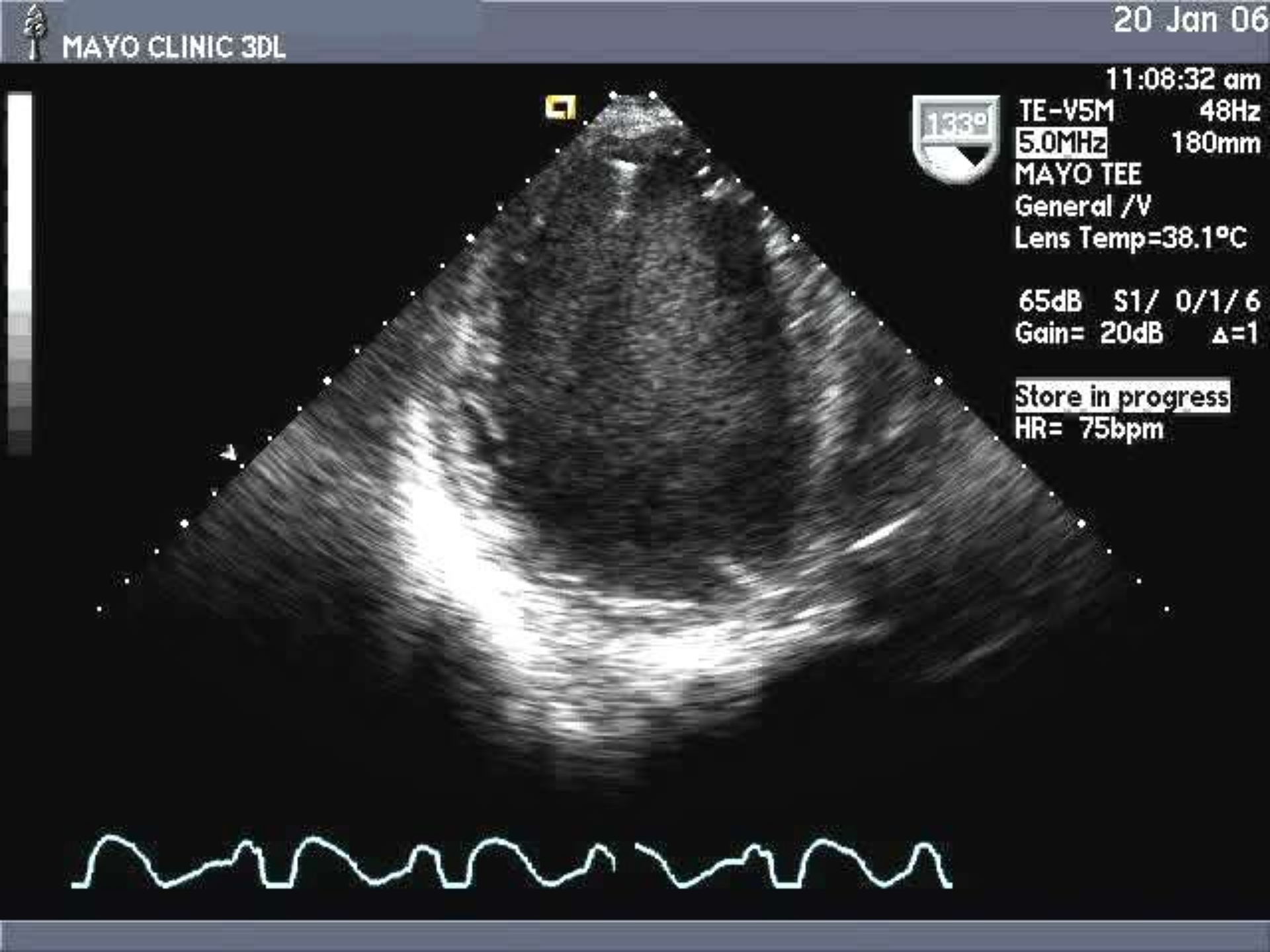
Hemolysis, CHF

Difficult to treat

<u>Underestimated</u>

60 yo Man

- AVR 1981 – endocarditis
- Starr-Edwards AVR + MVR 1989 due to endocarditis.
- CHF class IV. AF. ICD.
- Severe LV dysfunction EF 10%
- Severe periprosthetic leak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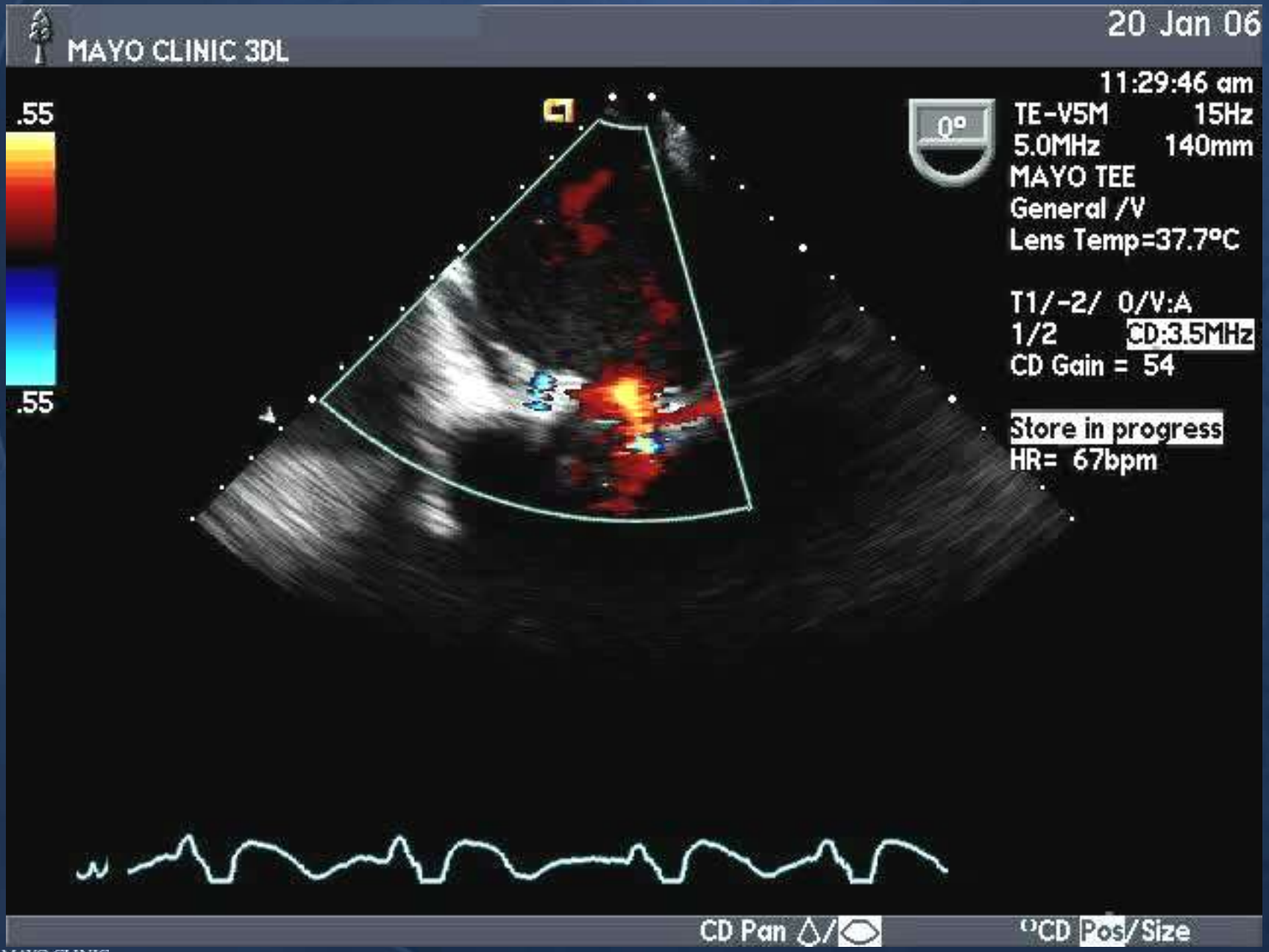
20 Jan 06
11:08:32 am
133°
TE-V5M
48Hz
5.0MHz
180mm
MAYO TEE
General /V
Lens Temp=38.1°C
65dB S1/ 0/1/6
Gain= 20dB Δ=1
Store in progress
HR= 75bpm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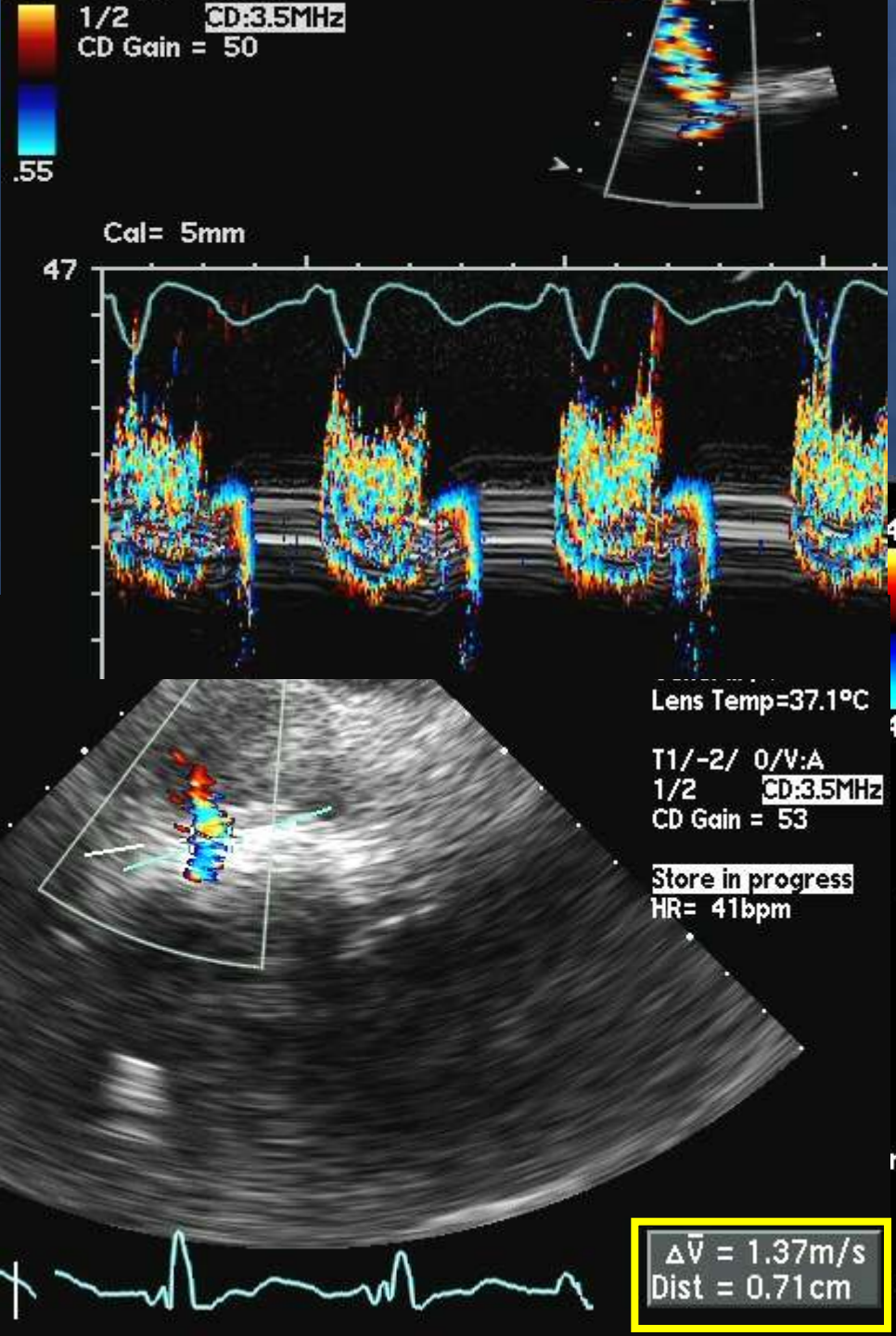
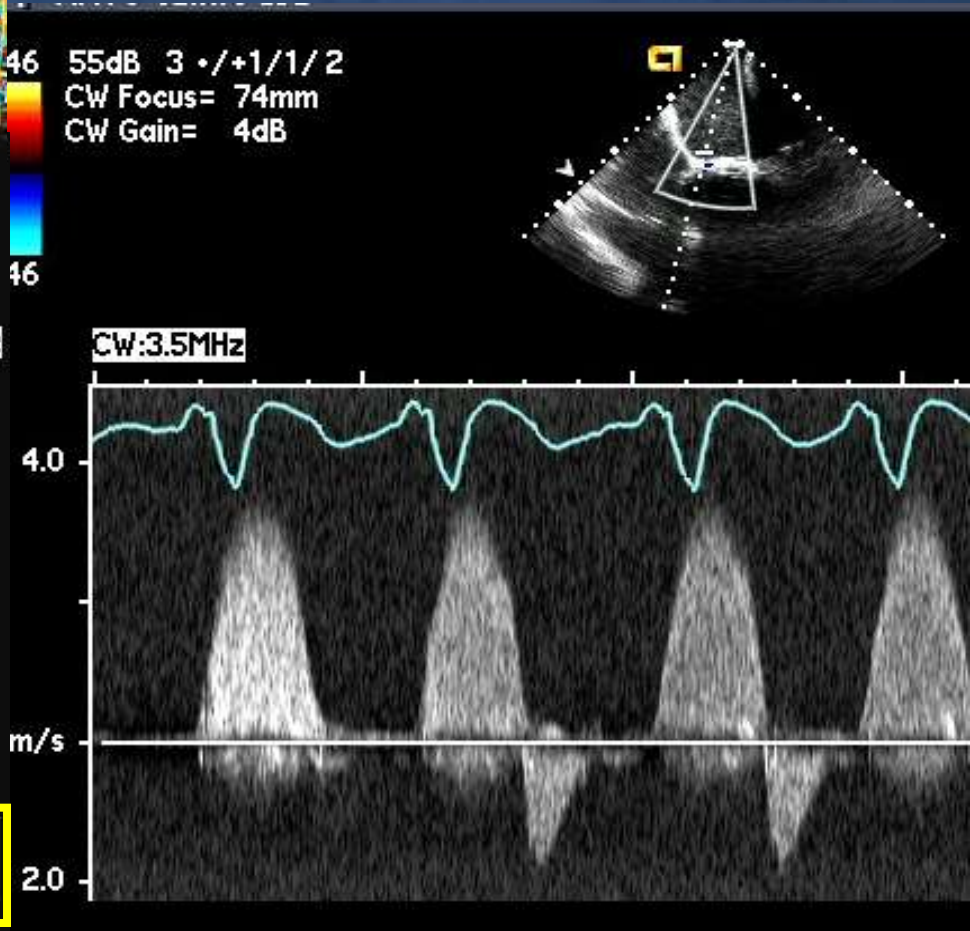
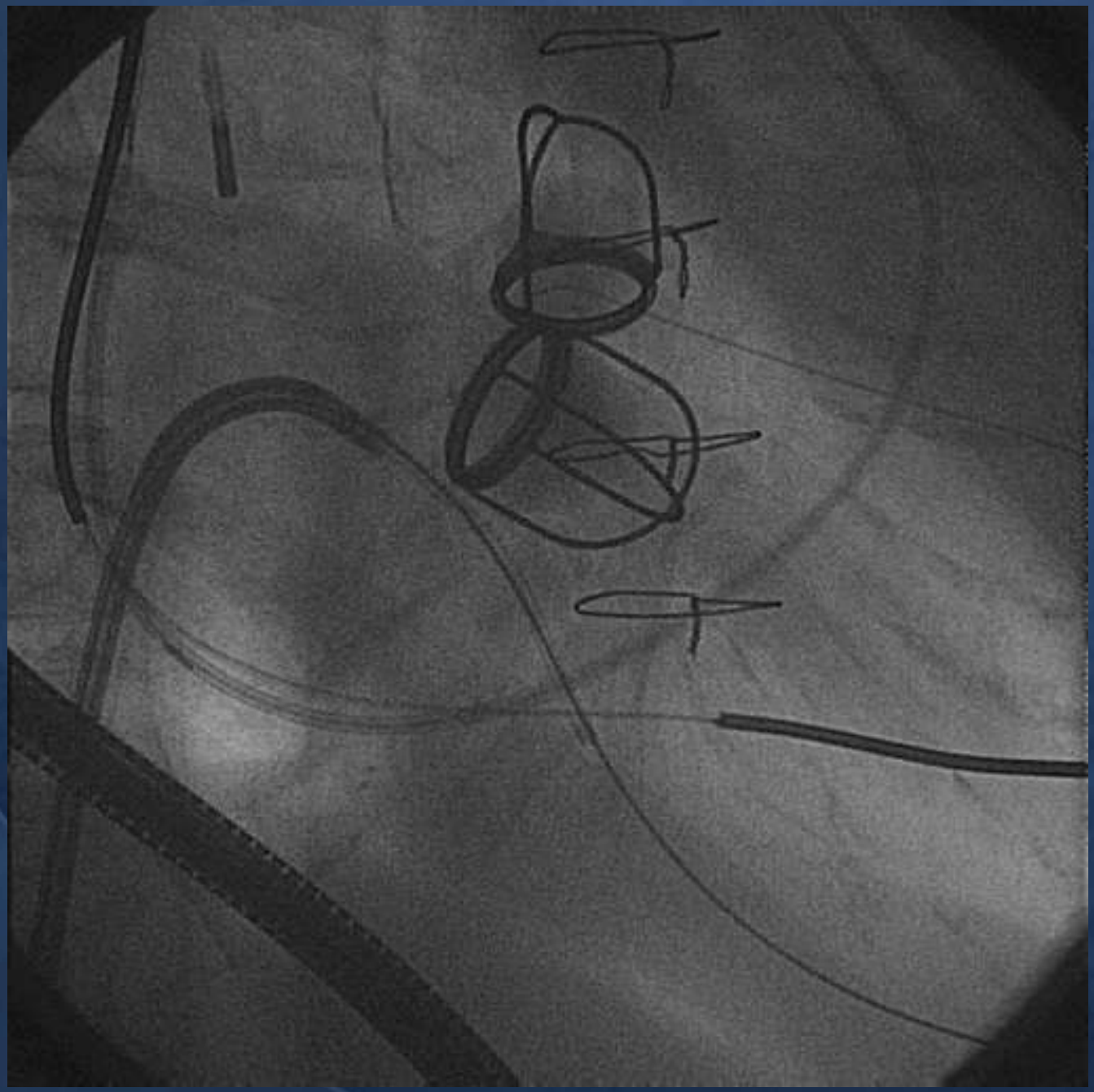
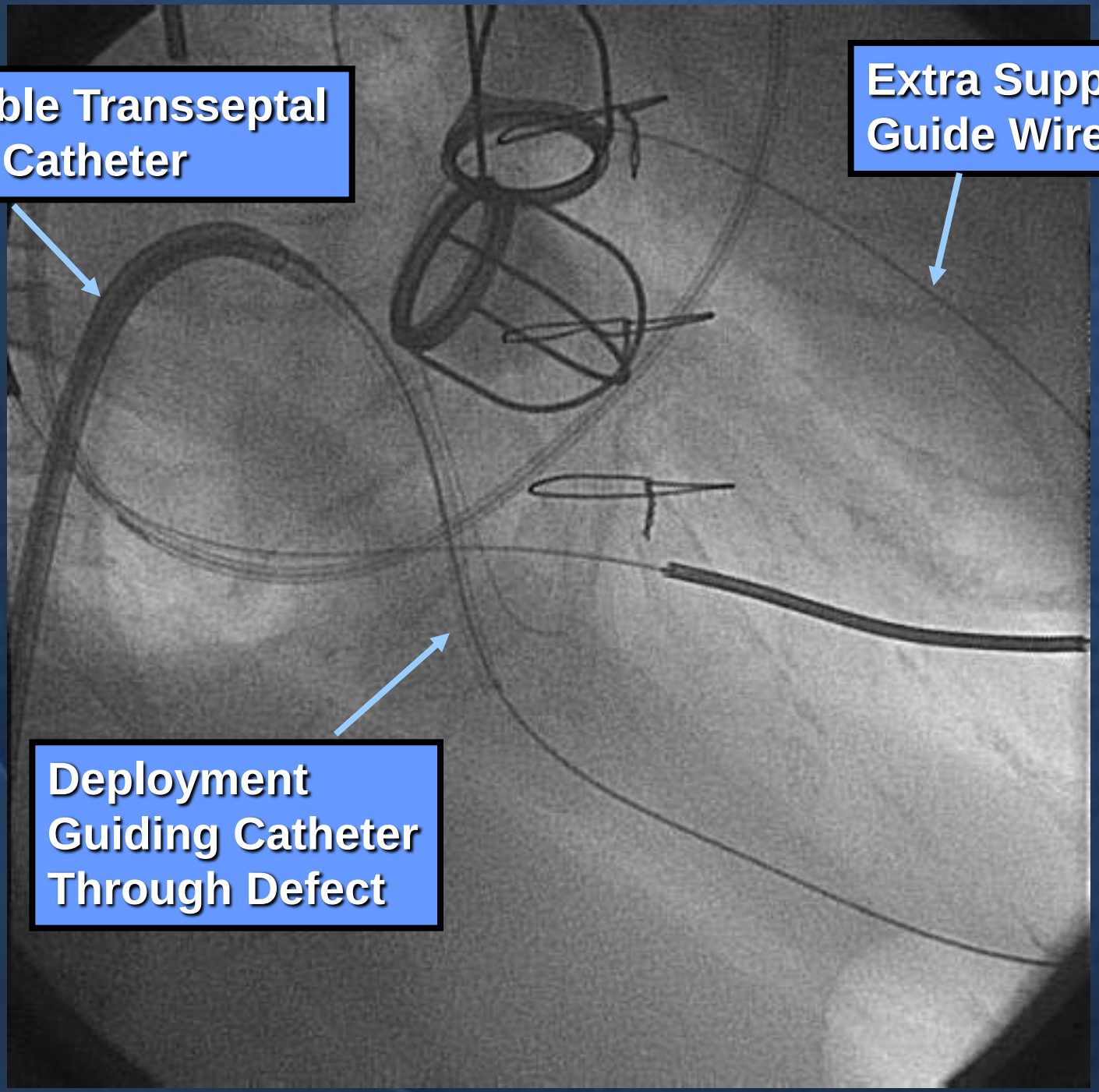
.55
.55
0°
TE-V5M 15Hz
5.0MHz 140mm
MAYO TEE
General /V
Lens Temp=37.7°C
T1/-2/ 0/V:A
1/2 CD:3.5MHz
CD Gain = 54
Store in progress
HR= 67bpm
CD Pan
CD Pos/Size

Severe Periprosthetic Mitral Regurgitation with 7mm Orifice

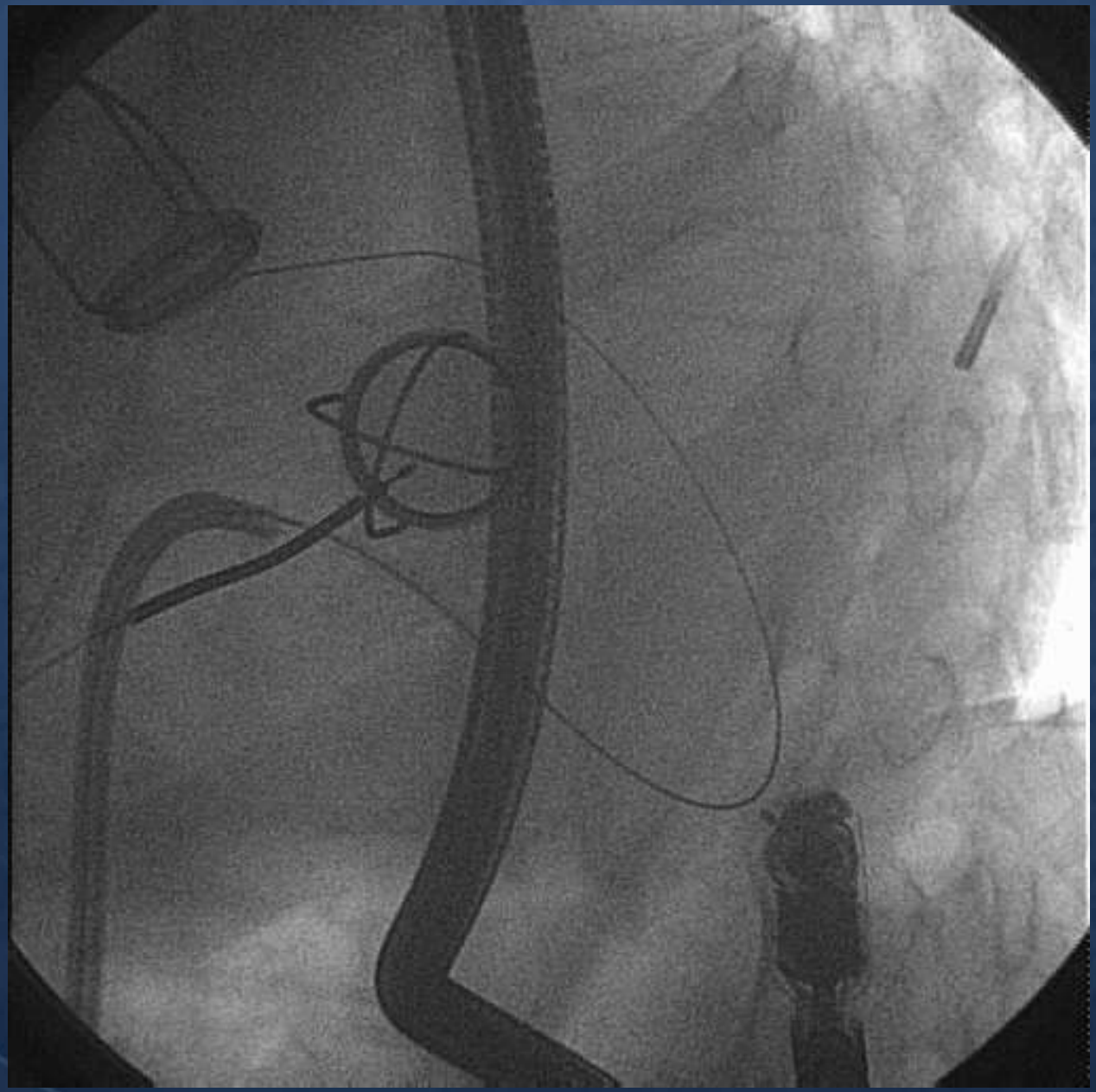


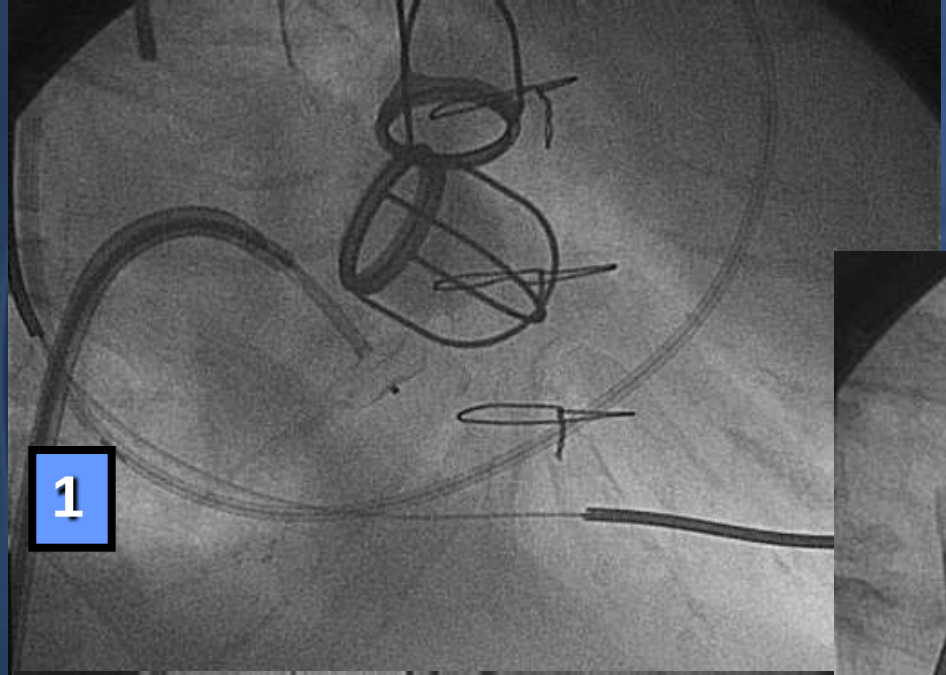





Deflectable Transseptal Guiding Catheter
Extra Support Guide Wire
Deployment Guiding Catheter Through Defect

Deployment Guiding Catheter Through Defect Medial Aspect

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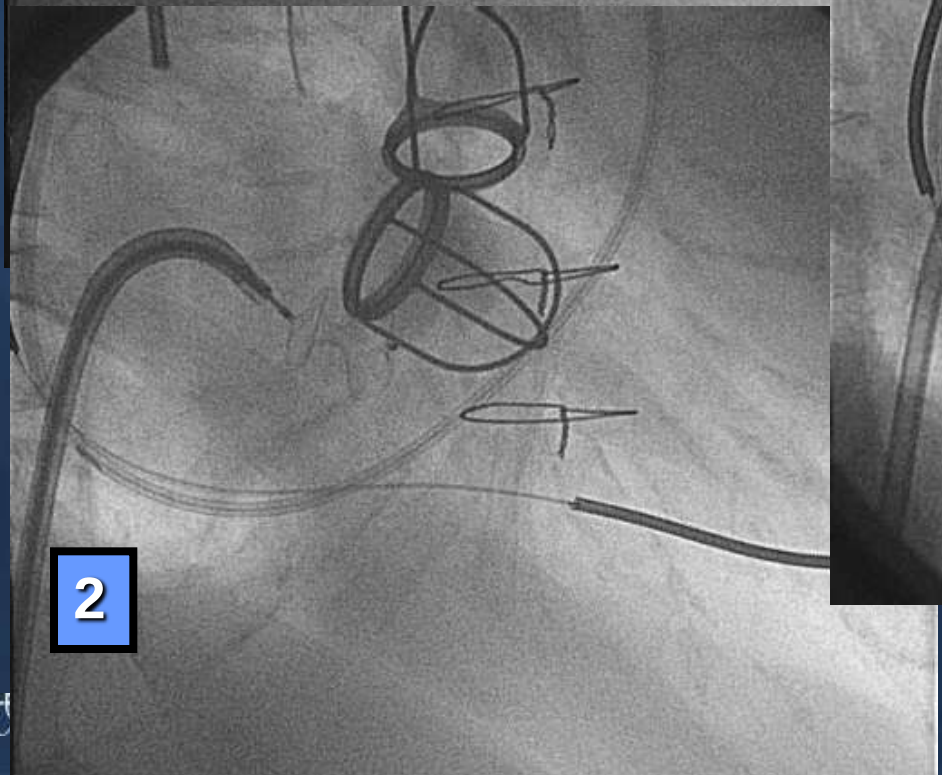
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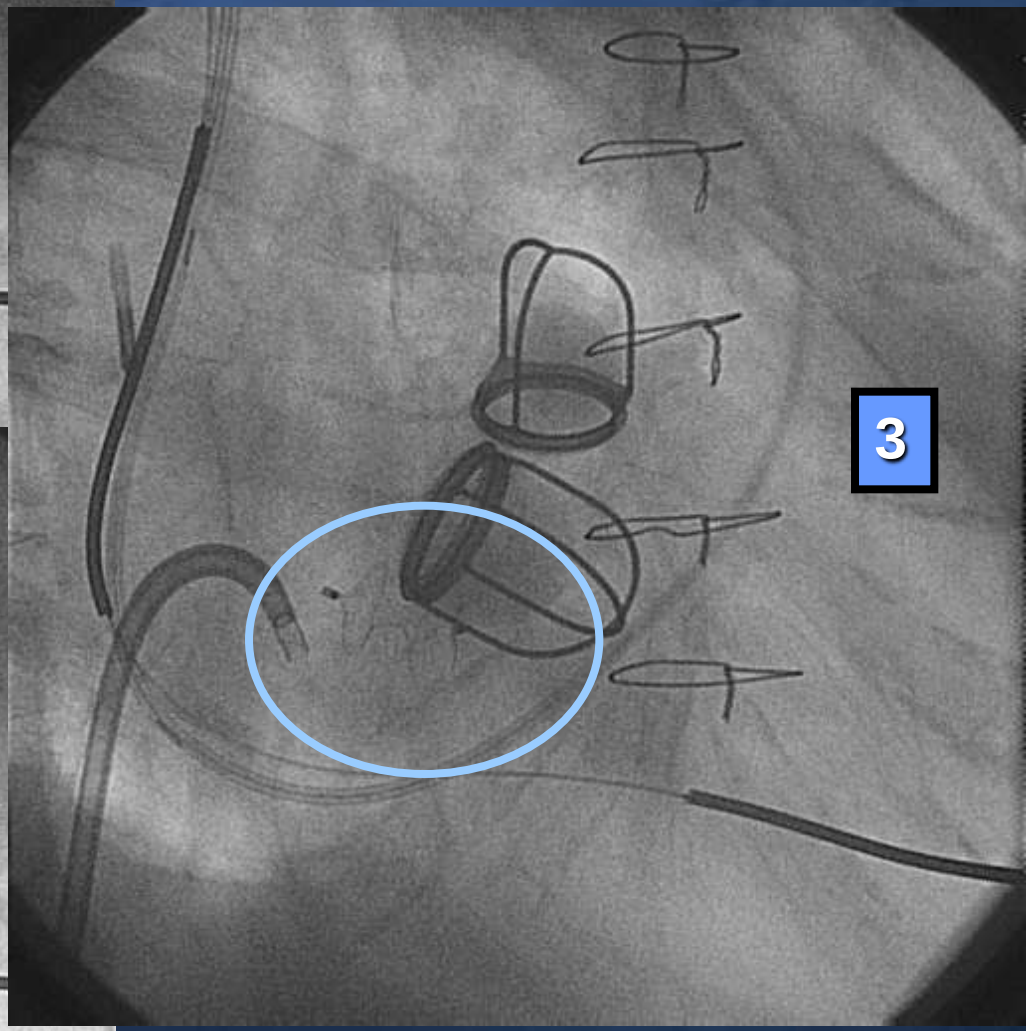
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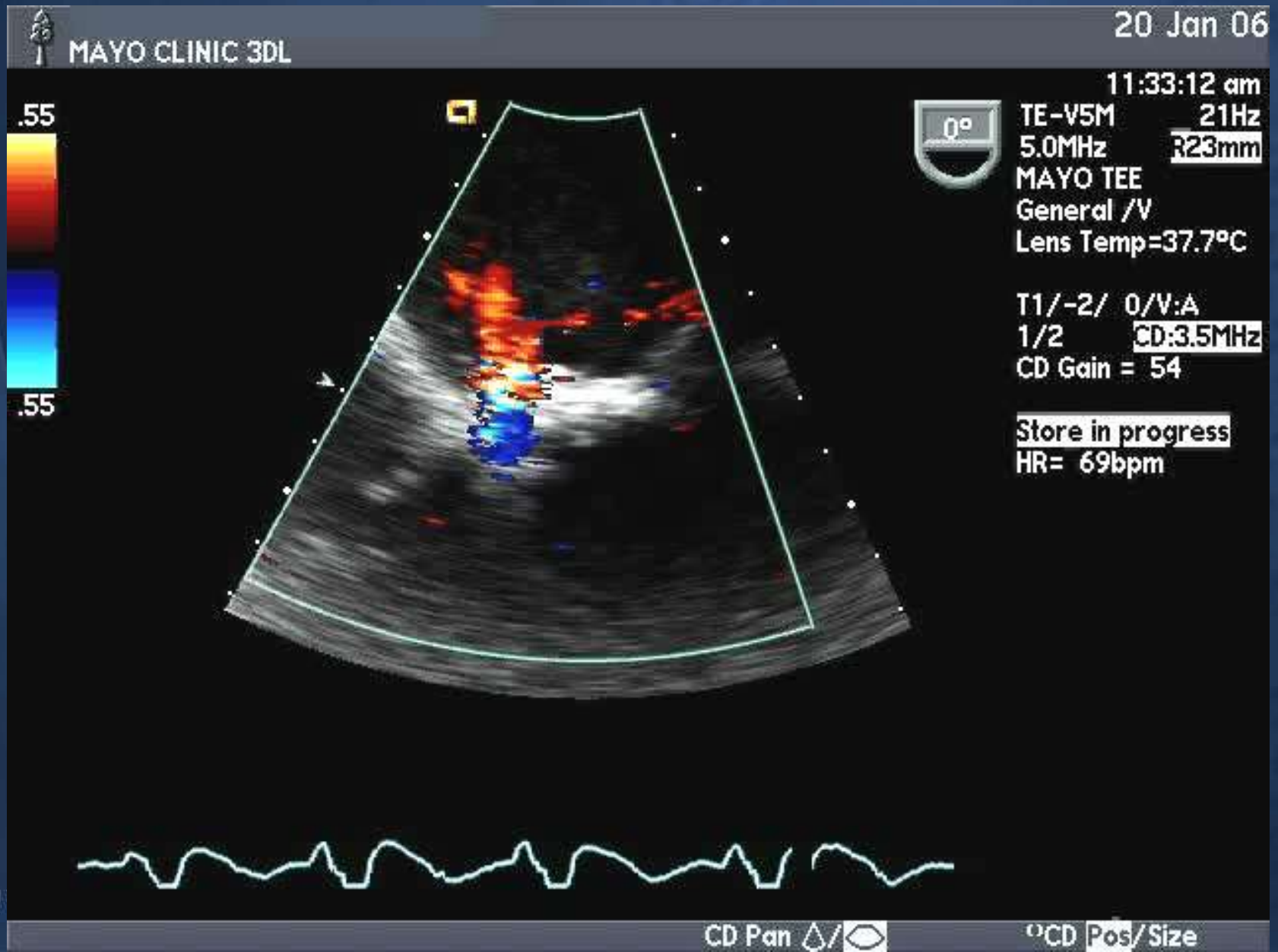
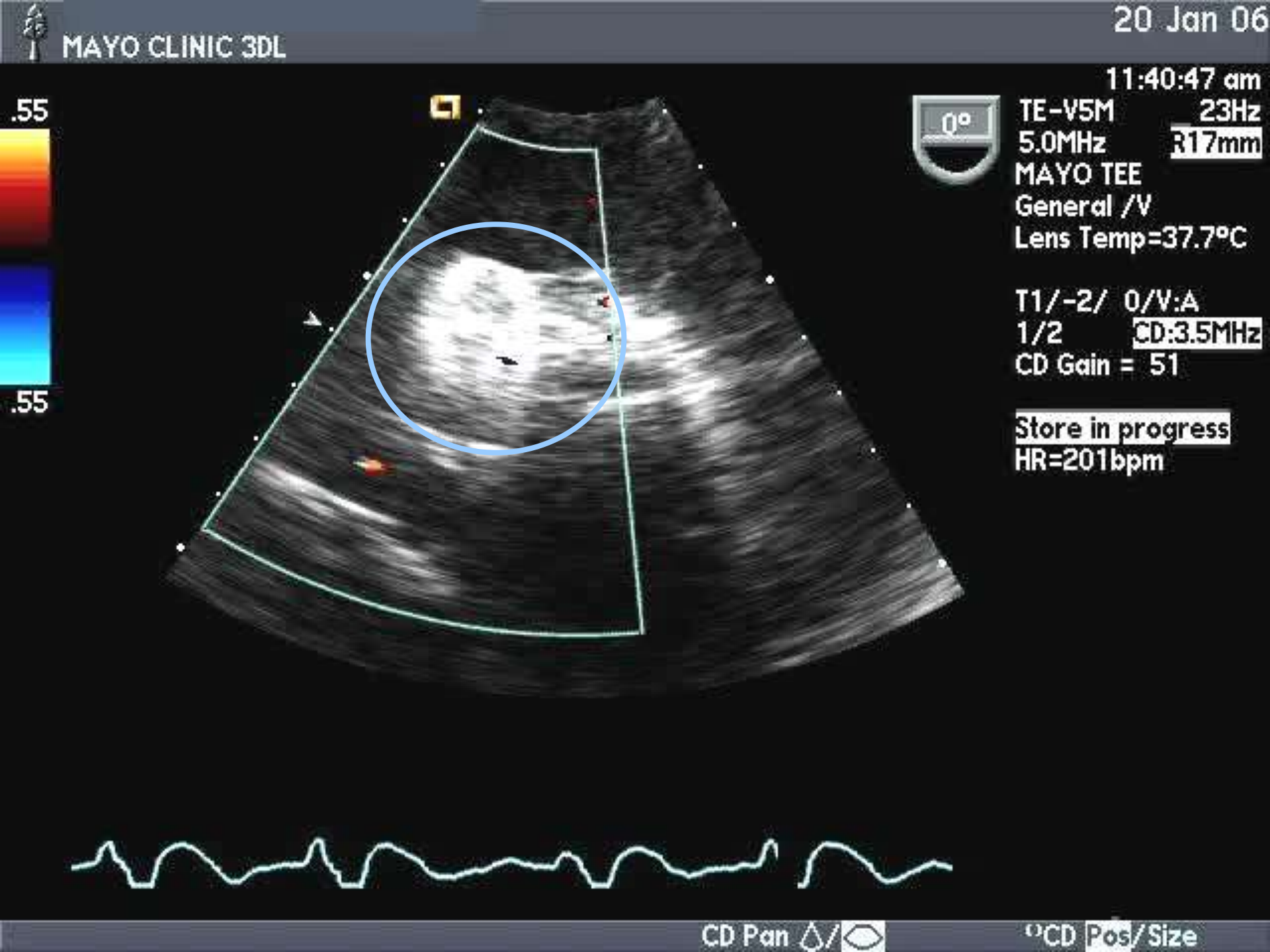
Post Deployment

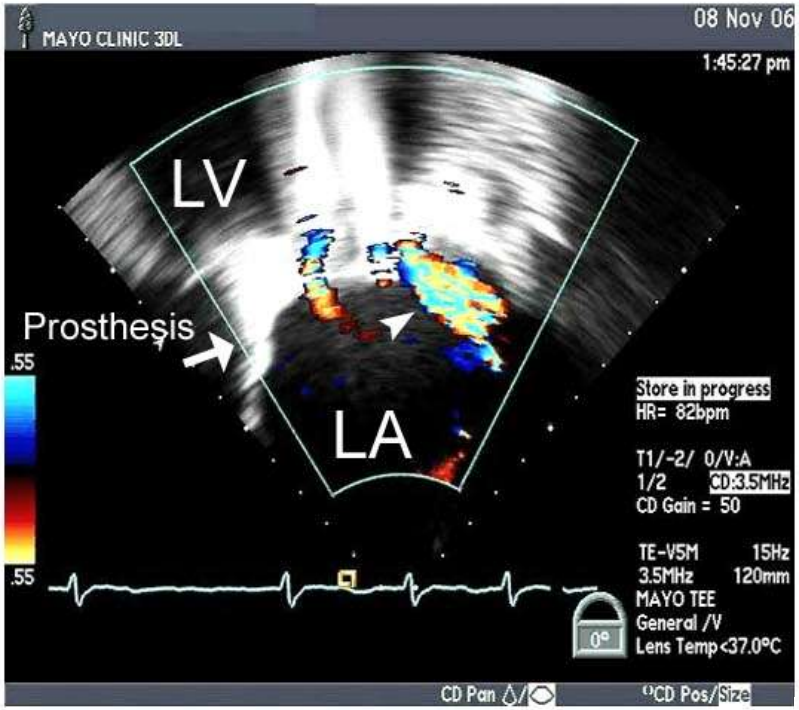


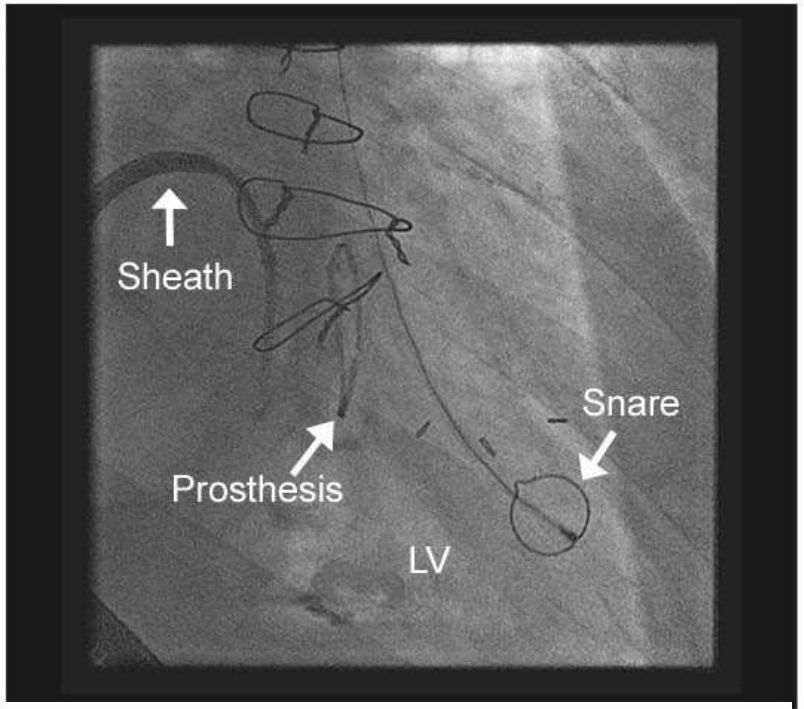

MAYO CLINIC 3DL
20 Jan 06
11:40:47 am
.55
.55
0°
TE-V5M
23Hz
5.0MHz
R17mm
MAYO TEE
General /V
Lens Temp=37.7°C
T1/-2/ 0/V:A
1/2
CD:3.5MHz
CD Gain = 51
Store in progress
HR=201bpm
CD Pan
CD Pos/Size

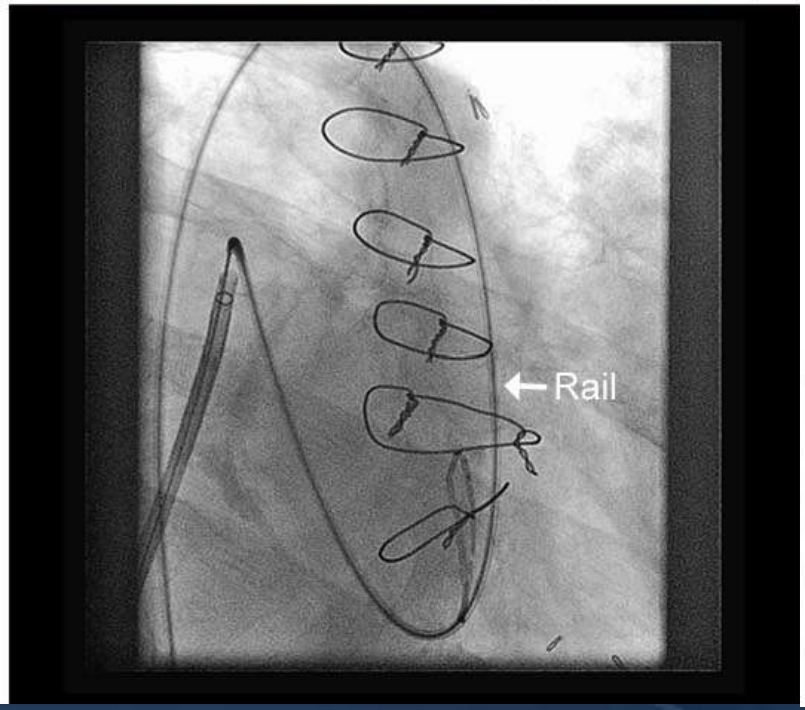
60 yo Man

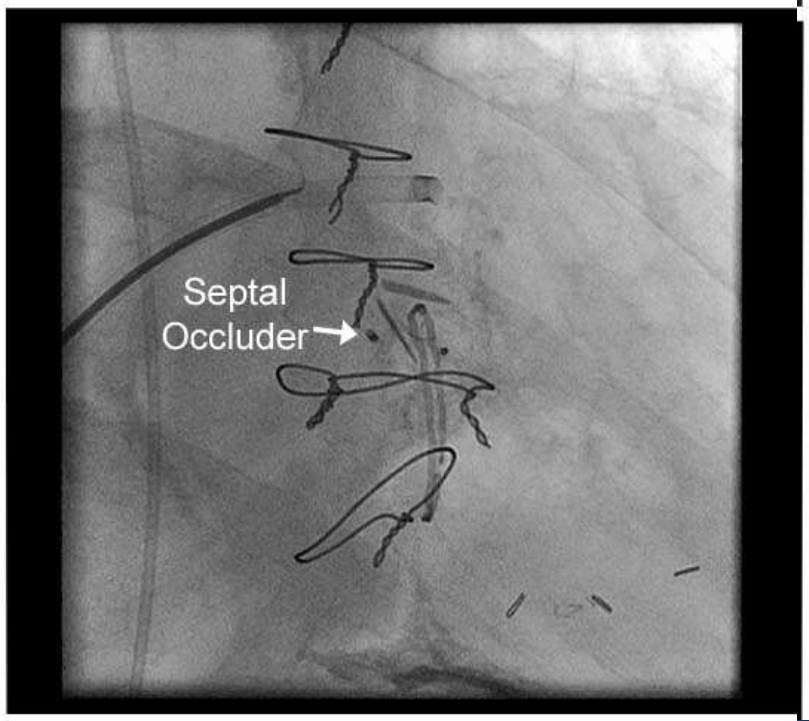
- Immediate improvement
- Murmur gone
- Significant functional improvement
- Still alive

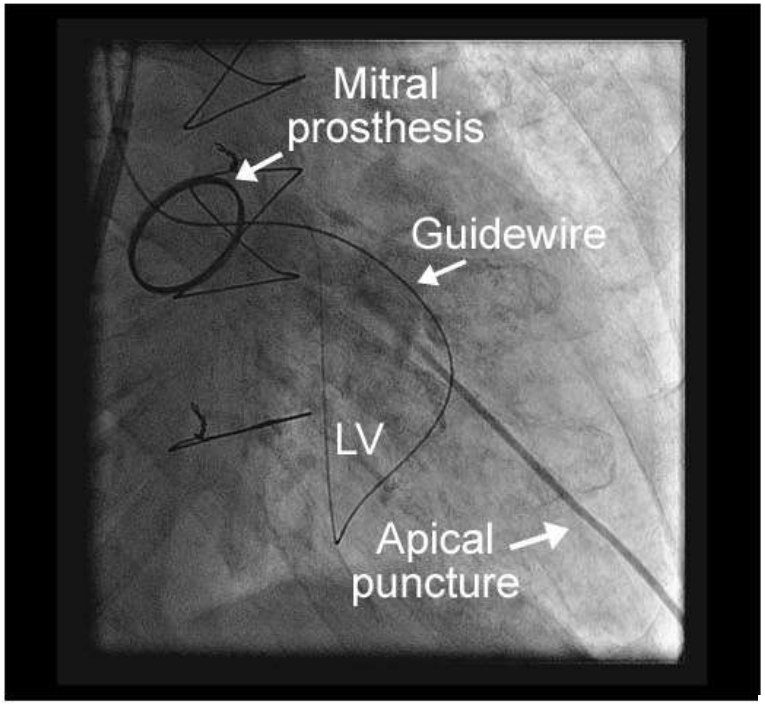
Techniques, Devices, Examples

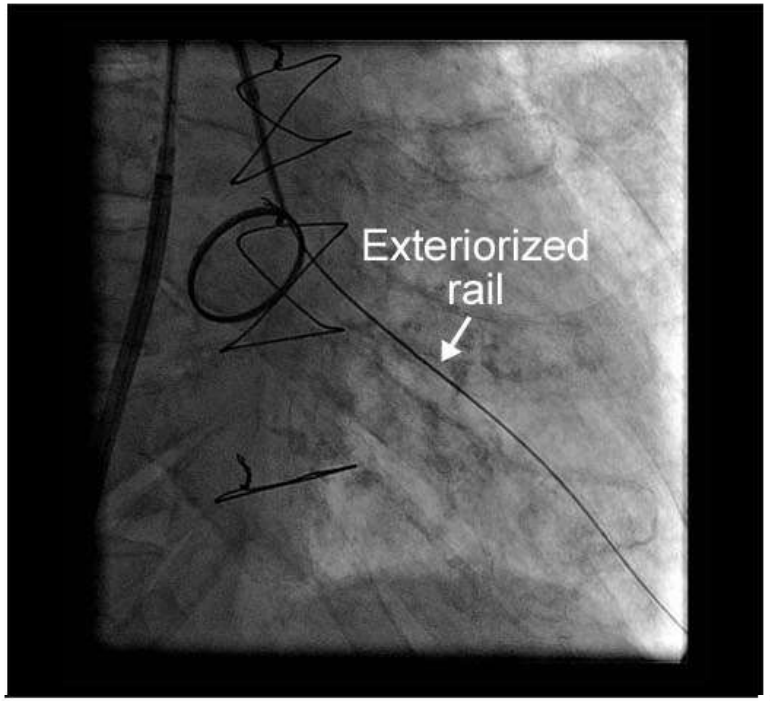

MAYO CLINIC 3DL
08 Nov 06
1:45:27 pm
LV
Prosthesis
LA
.55
.55
Store in progress
HR= 82bpm
T1/-2/ 0/V:A
1/2
CD:3.5MHz
CD Gain = 50
TE-V5M
15Hz
3.5MHz
120mm
MAYO TEE
General /V
Lens Temp<37.0°C
0°
CD Pan
CD Pos/Size

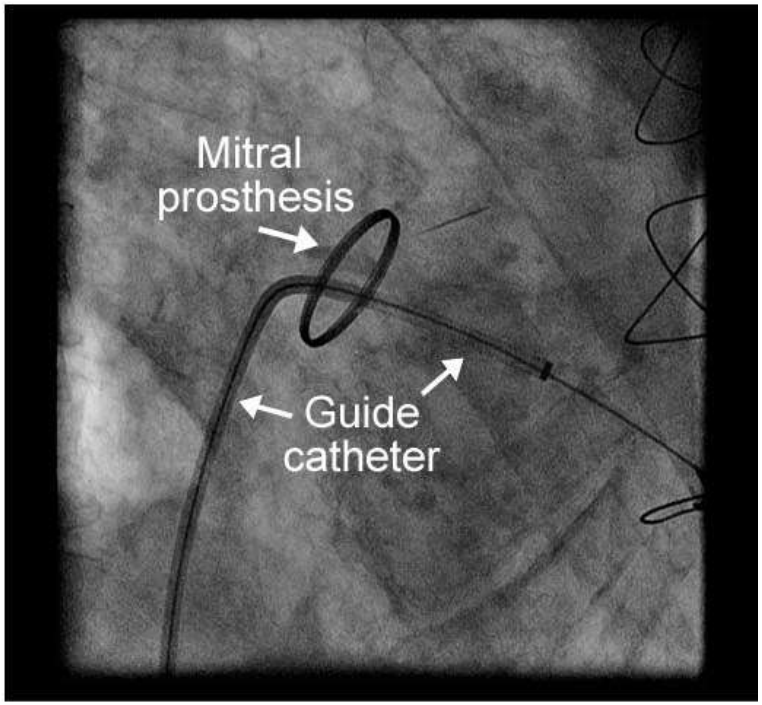

Sheath
Snare
Prosthesis
LV

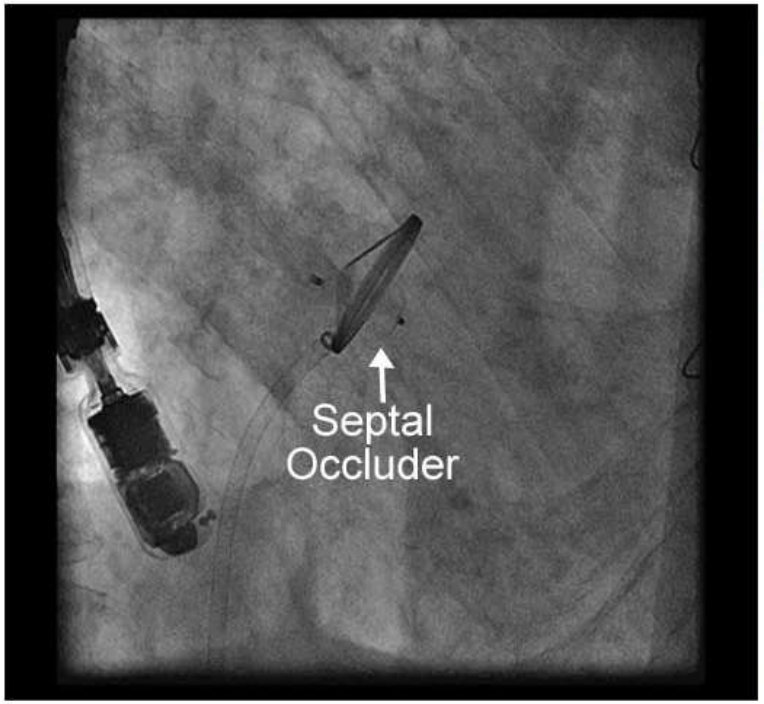

Rail


Septal
Occluder

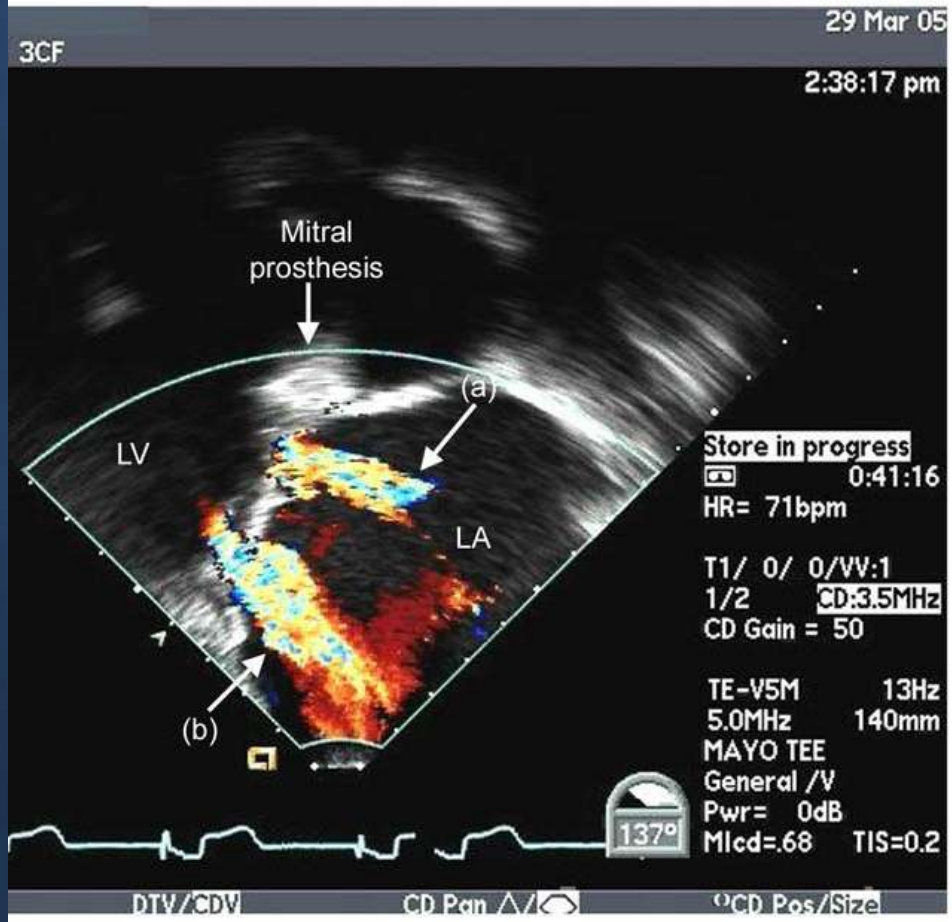

Mitral prosthesis
Guidewire
LV
Apical puncture

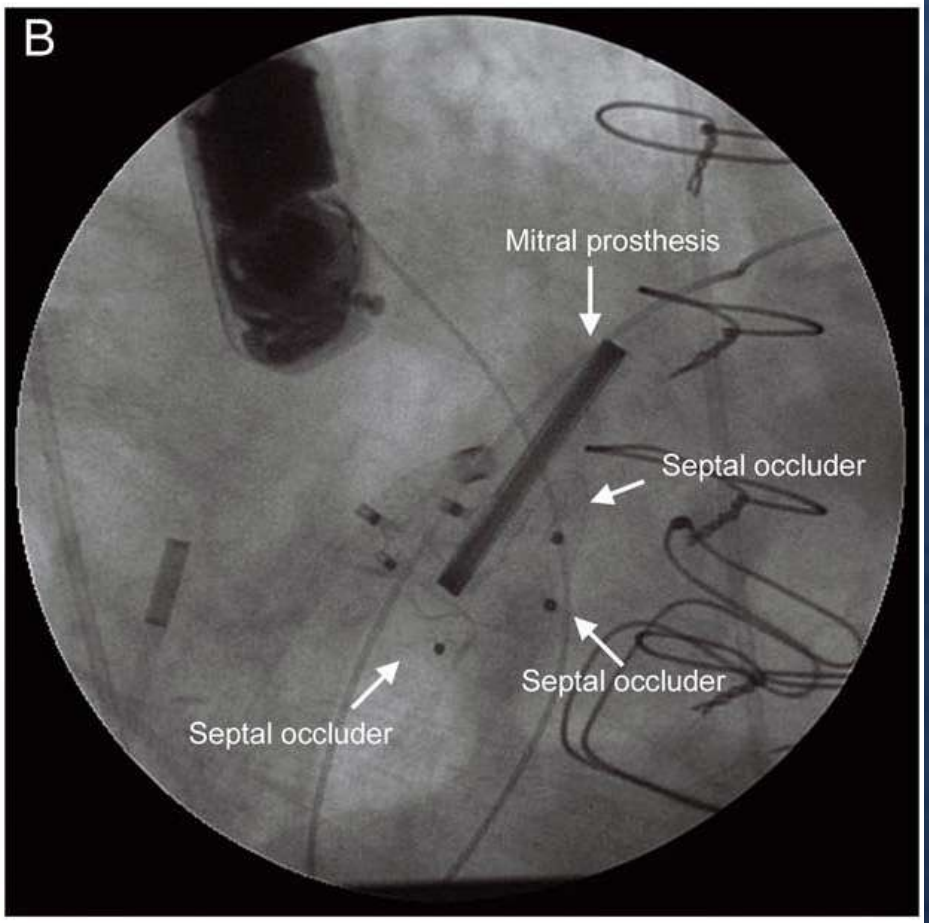

Exteriorized rail


Mitral prosthesis
Guide catheter

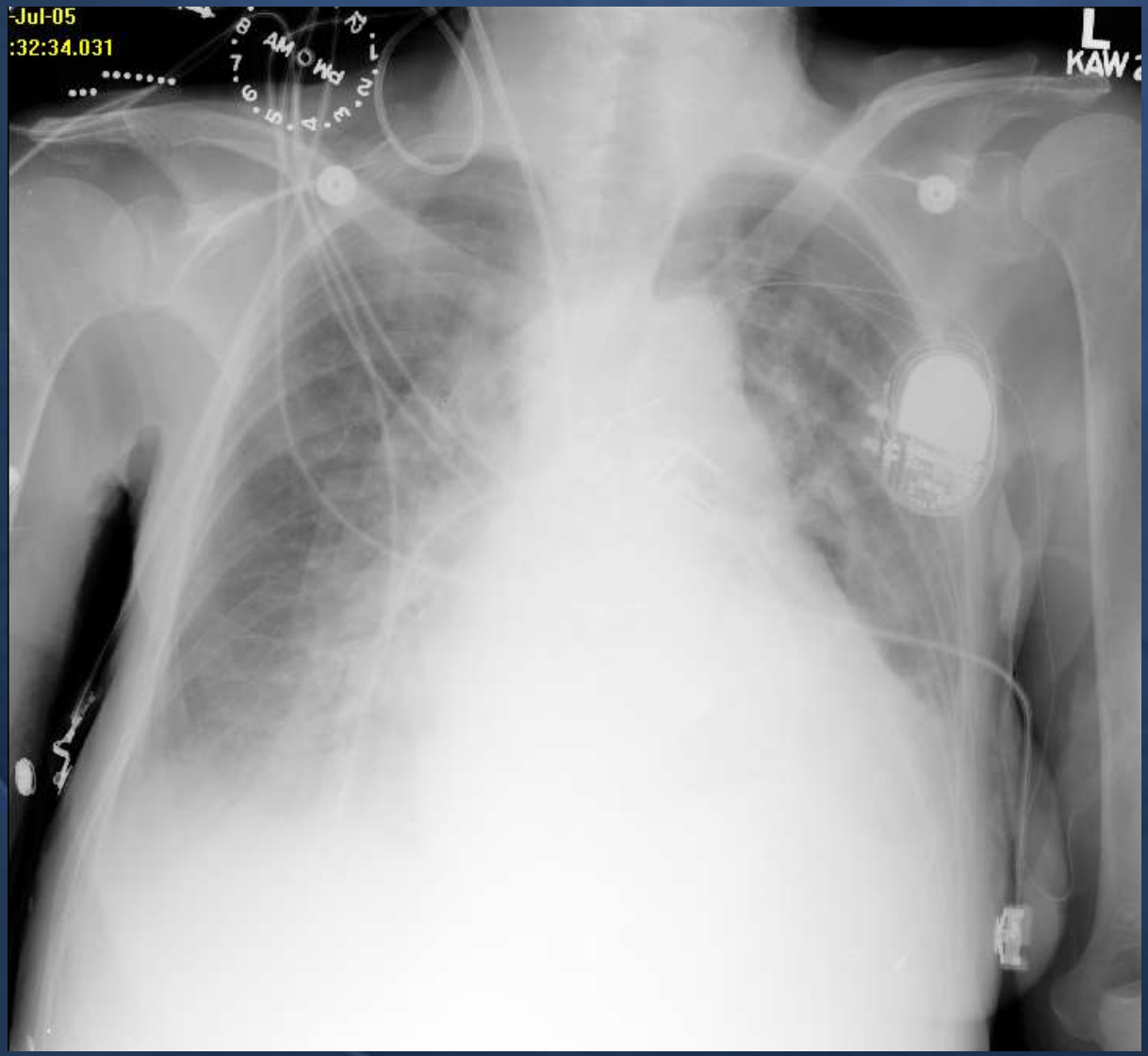

Septal Occluder

Multiple Defects

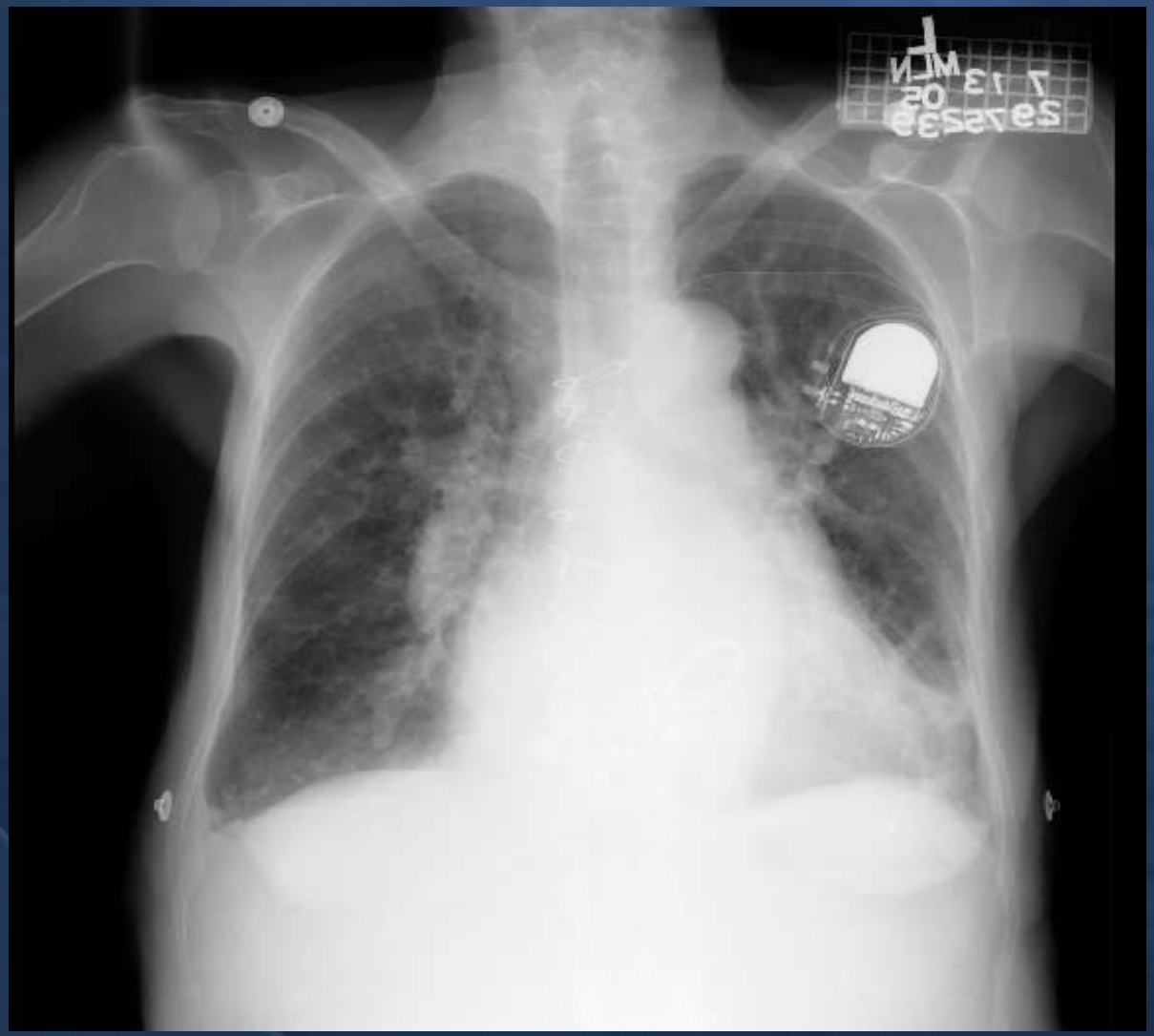




Multiple defects

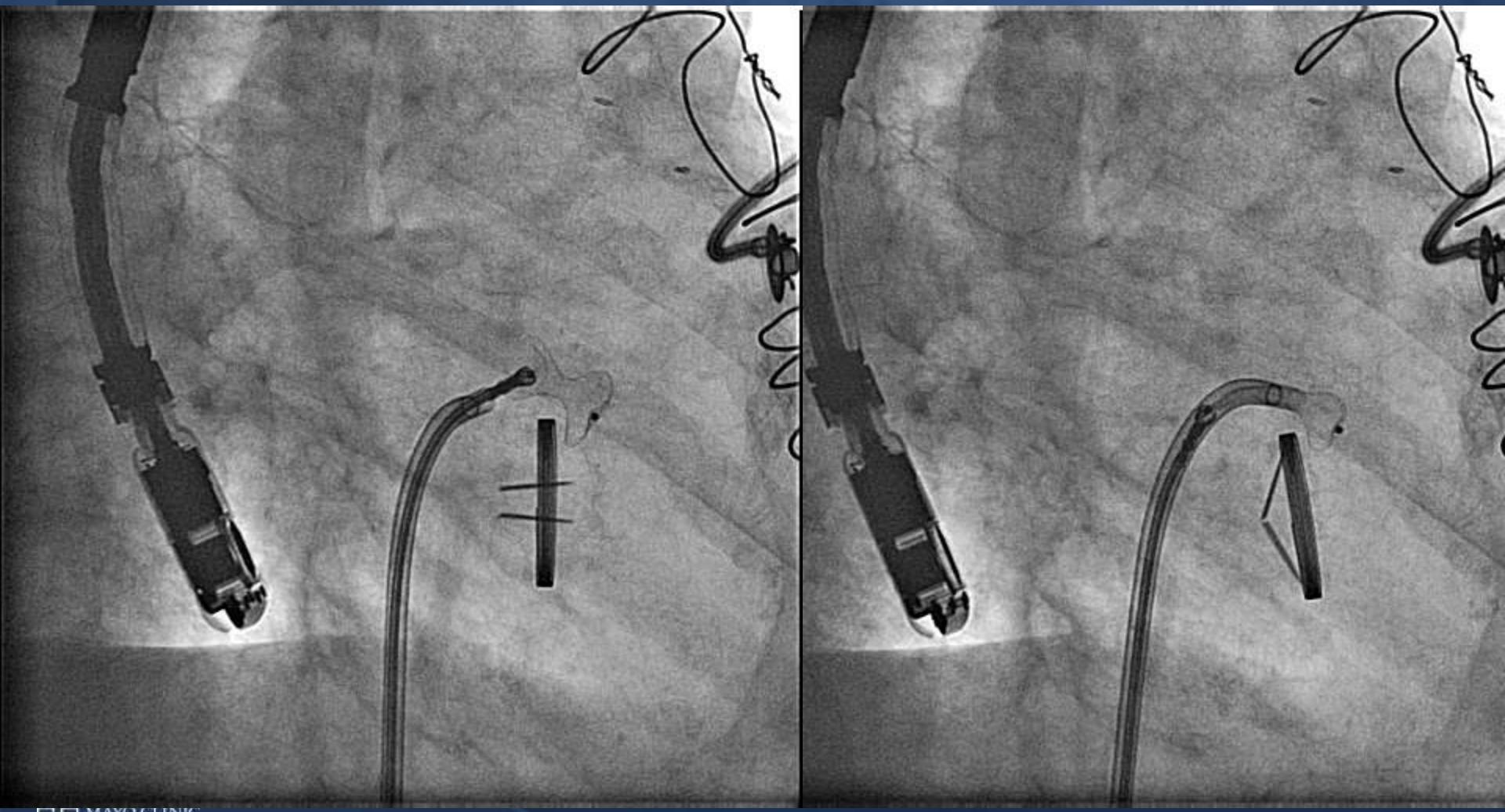


Post closure

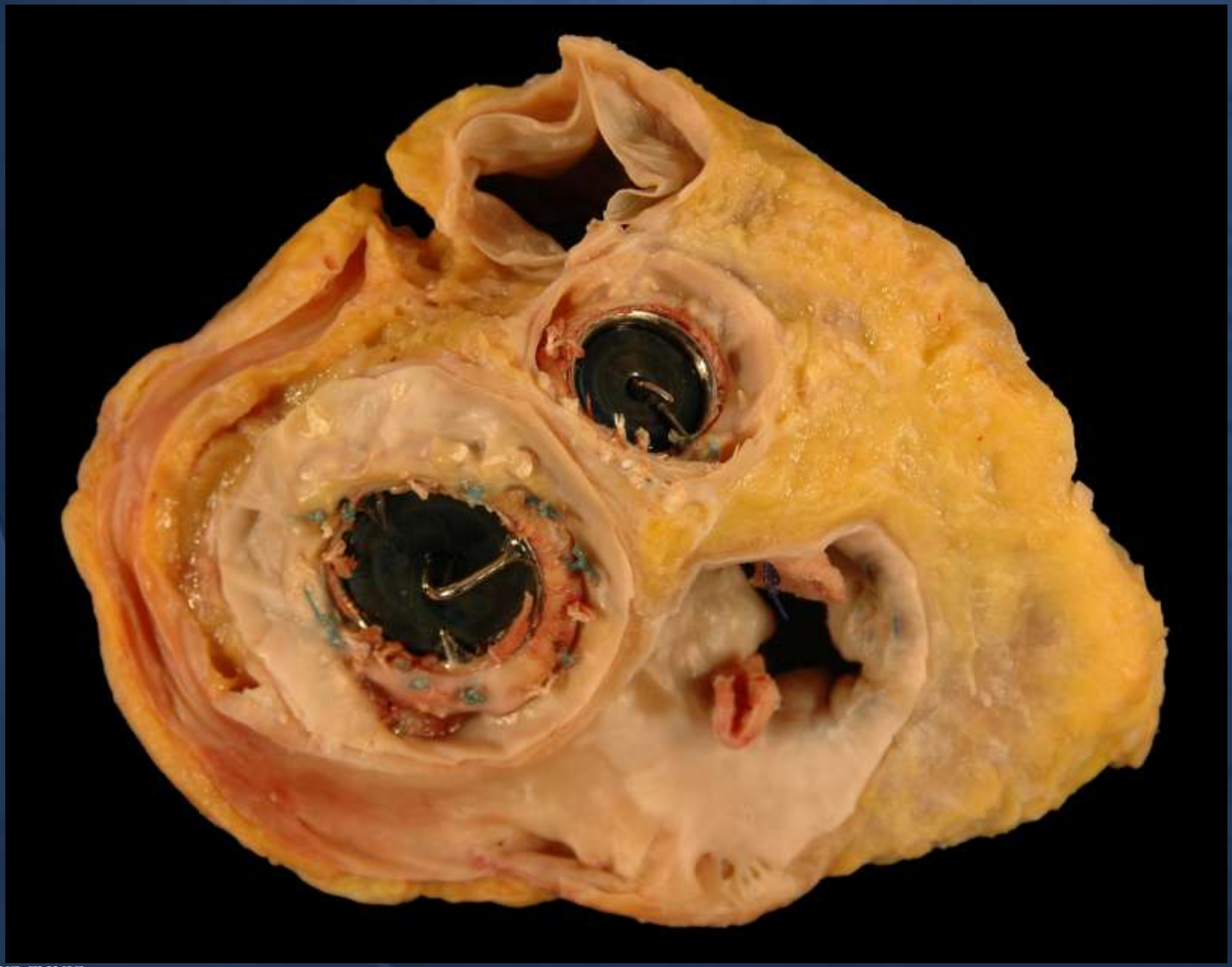


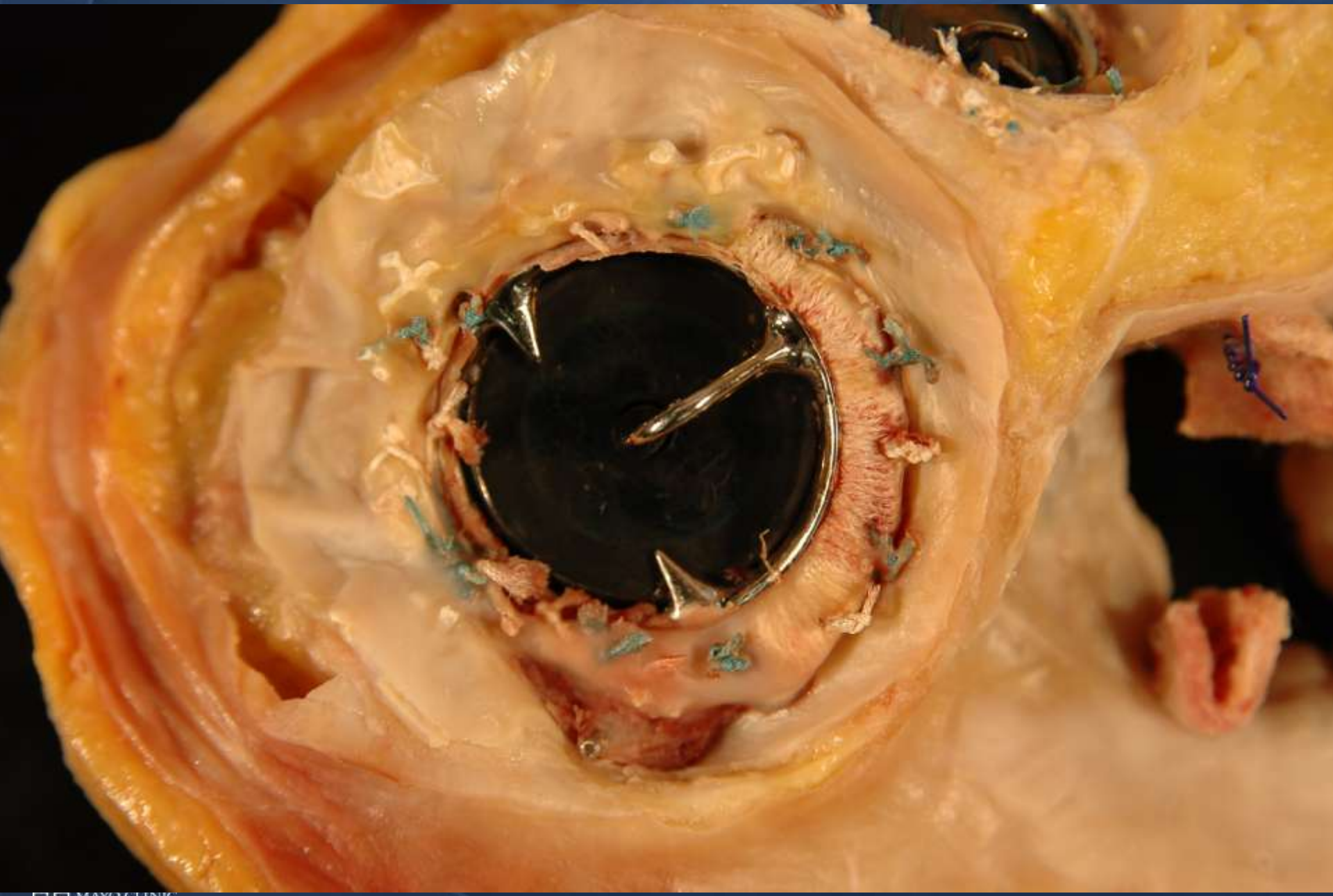
Necessity is the Mother of Invention

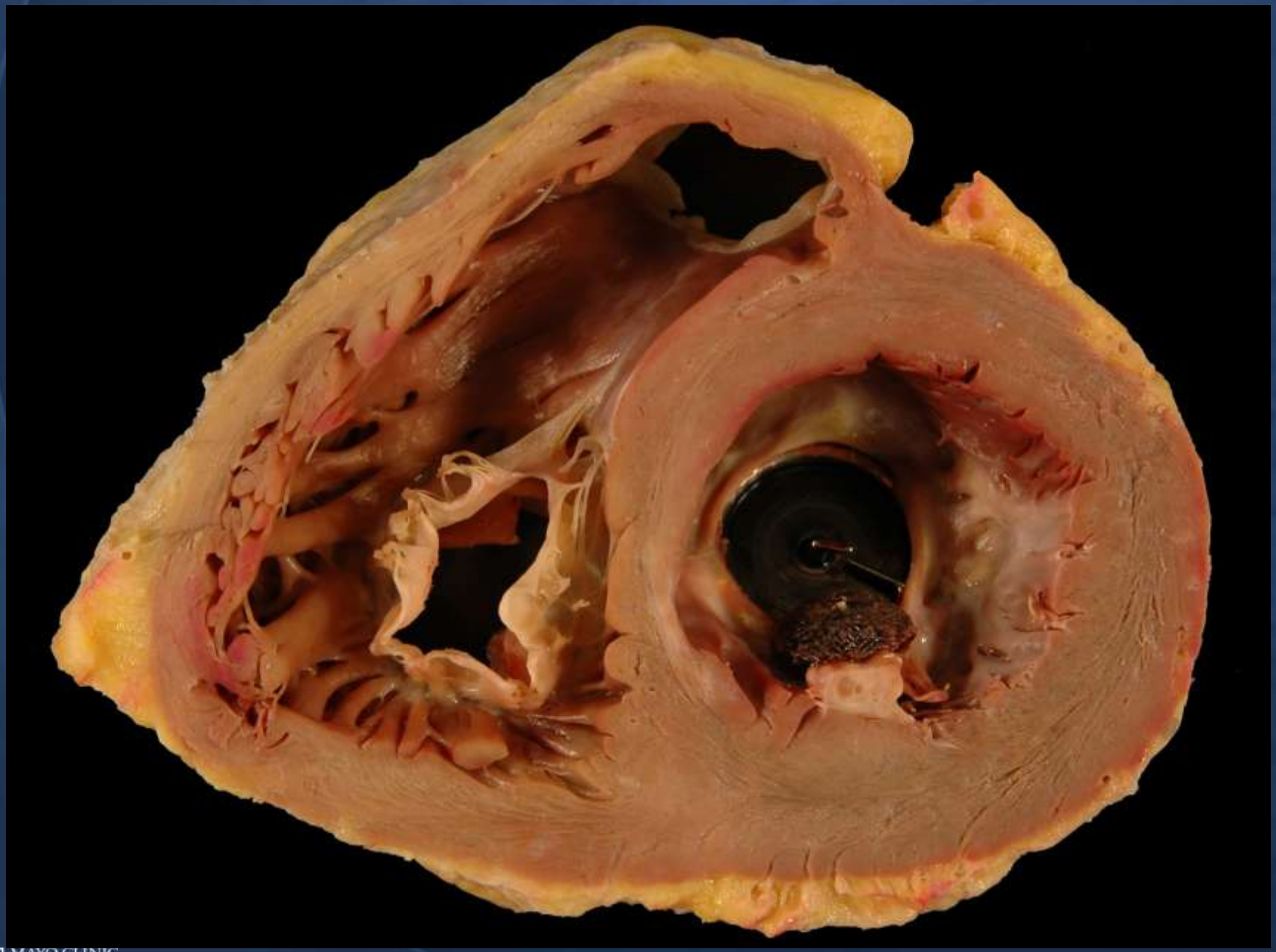
- Plato, The Republic



Anatomic Considerations







Periprosthetic Leaks

- Most common cause of nonstructural prosthetic valve failure
- Clinically significant leaks can present any time after surgery with
    1. decompensated heart failure,
    2. hemolytic anemia or
    3. endocarditis

Tan. Cath and CV Interventions 9/2006

Etiology of Periprosthetic Regurgitation

1. Tissue friability
2. Extensive annular calcification
3. Dehiscence of prosthesis
4. Type of prosthesis (mechanical more likely?)
5. Posteromedial and anteromedial annulus

Tan. Cath and CV Interventions 9/2006

Original Studies

Successful Percutaneous Repair of Perivalvular Prosthetic Regurgitation

Paul Sorajja,[1] MD, Allison K. Cabalka,[2] MD, Donald J. Hagler,[2] MD, Guy S. Reeder,[1] MD, Krishnawamy Chandrasekaran,[1] MD, Frank Cetta,[2] MD, and Charanjit S. Rihal,[1]* MD

Objective: To examine the feasibility and outcome of percutaneous transcatheter repair of perivalvular regurgitation. Background: Perivalvular prosthetic regurgitation causes significant morbidity, and is associated with high perioperative mortality if open surgical repair is required. Methods: Percutaneous repair of perivalvular regurgitation was attempted in 16 patients with heart failure or hemolytic anemia. All patients were either not candidates or were high-risk for open surgical repair (Parsonnet score, 39 ± 7). Regurgitant lesions were perimitral in 14 patients (2 had multiple defects) and peri-aortic in 2 patients. Under echocardiographic and fluoroscopic guidance, patients underwent implantation of either the Amplatzer Septal Occluder or Duct Occluder. Results: Successful percutaneous closure with mild or no residual regurgitation was achieved in 17 of 21 attempts (81%). In one patient, an occluder could not be deployed. There were no procedural deaths, strokes, or myocardial infarctions, and no prosthetic obstruction from device deployment. NYHA functional class improved from 3.1 ± 0.6 to 2.0 ± 1.0 at follow-up (mean, 3.1 mos; $P = 0.0001$ vs. baseline). One patient with heart failure had symptom resolution but died suddenly 4 weeks after the procedure. One subsequent noncardiac death and two late deaths from progressive heart failure also occurred. Conclusions: Percutaneous repair of perivalvular prosthetic regurgitation is a feasible alternative to open surgical correction, and may be preferred in patients at significant perioperative risk. Further experience with careful attention to patient selection, late morbidity, and mortality is required in this high risk patient subset.

Catheterization and Cardiovascular Interventions 2007

Percutaneous Periprosthetic Regurgitation Repair

- 37 procedures in 34 patients.
- Symptoms: HF 20, hemolysis 1, both 13
- 22 males, median age 66
- perimitral 27, periaortic 7

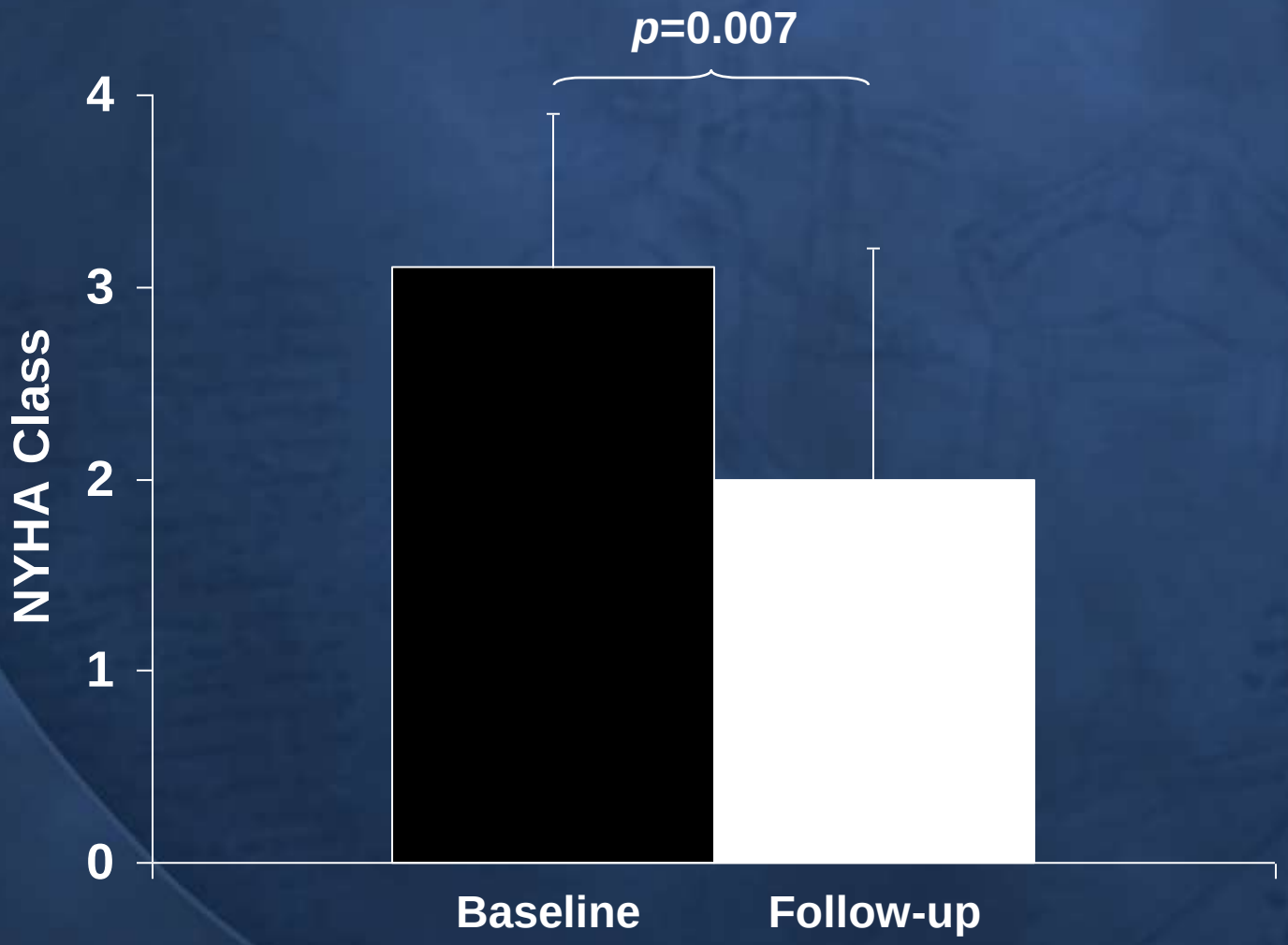
Percutaneous Periprosthetic Regurgitation Repair

- Successful closure 32 of 37 procedures
- No death, MI, stroke, or device embolization
- Failure to deploy n=2
- Valve interference n=2
- Defect too large 1

Percutaneous Periprosthetic Regurgitation Repair

- 2 ongoing hemolysis referred to surgery
- 1 sudden death
- 3 deaths from HF
- 1 noncardiac death

Functional Improvement



PRINCIPLES

- Comprehensive imaging
- Risk of alternatives
- Exclude infection
- Multidisciplinary approach
- Comfort with wide variety of techniques

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