Bioprosthetic Mitral Valve Dysfunction: Innovation and Evolution of a New Therapeutic Technique

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DISCLOSURES

Relevant Financial Relationships

None

Off Label Use

Melody Valve, Medtronic

Sapien Valve, Edwards Lifesciences

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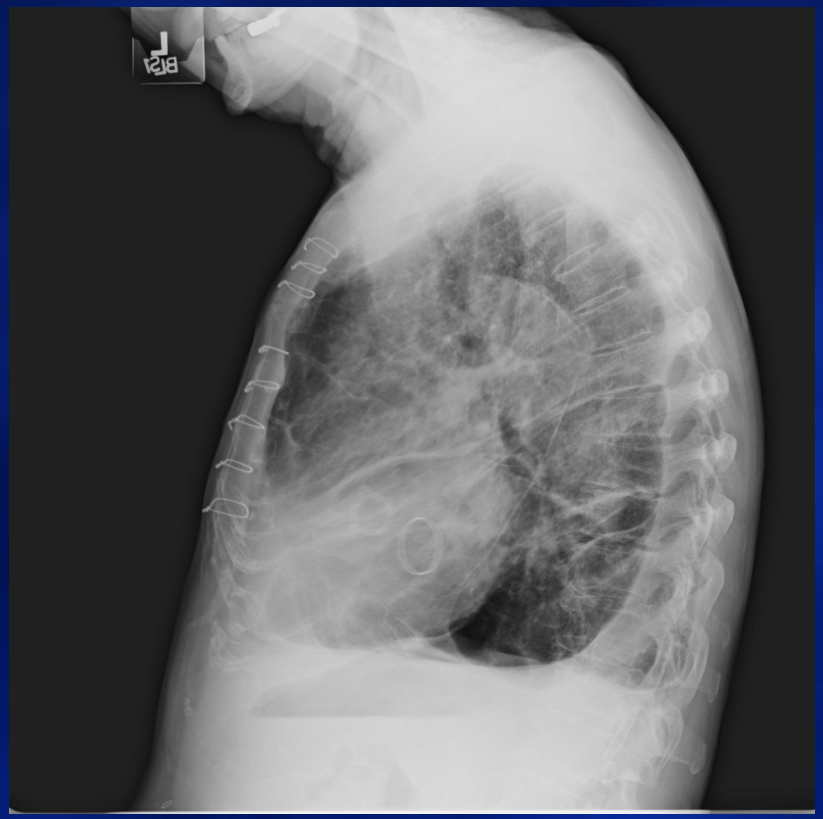
83M AVR, MVR. Heart failure, hemolytic anemia and severe COPD.



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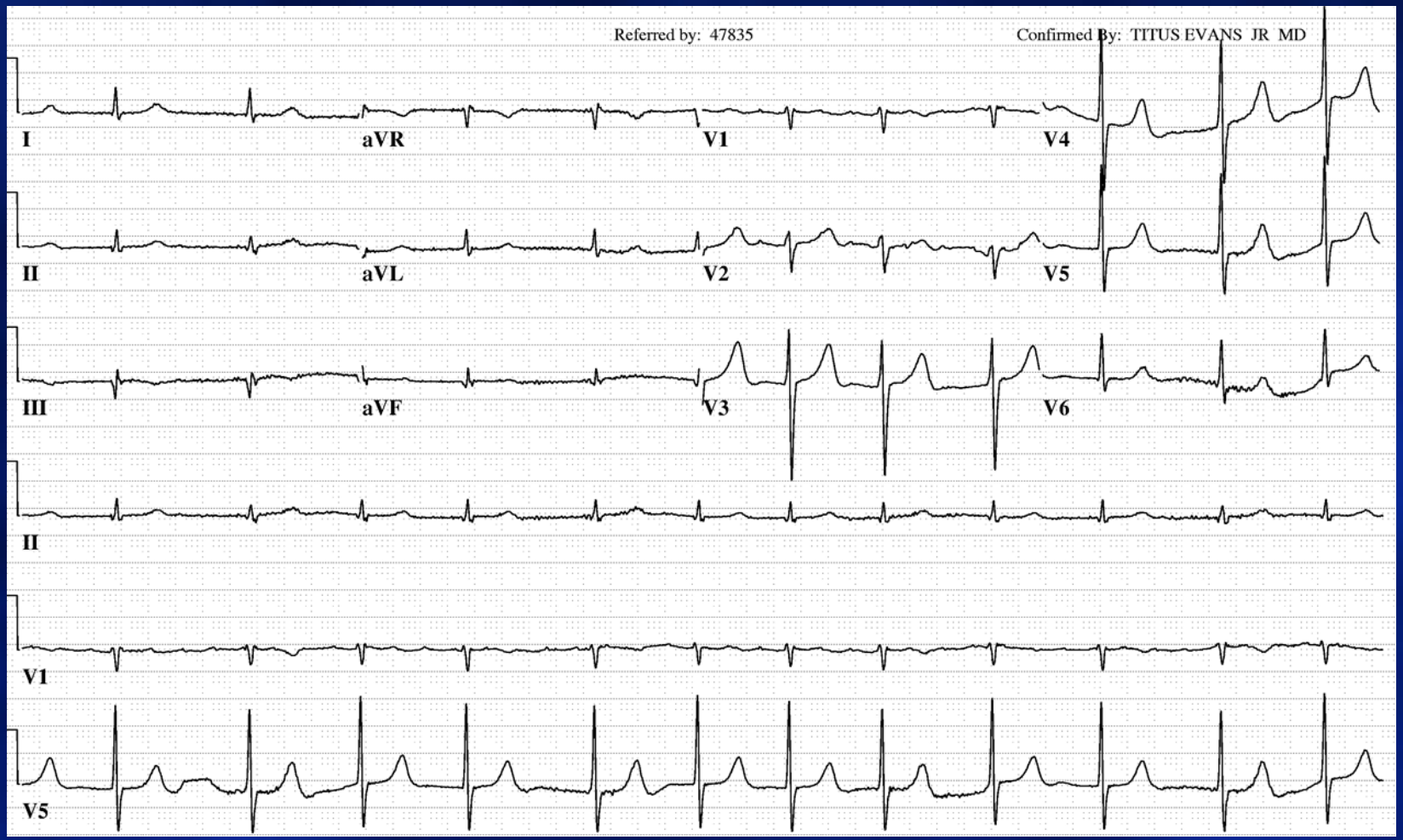
EKG



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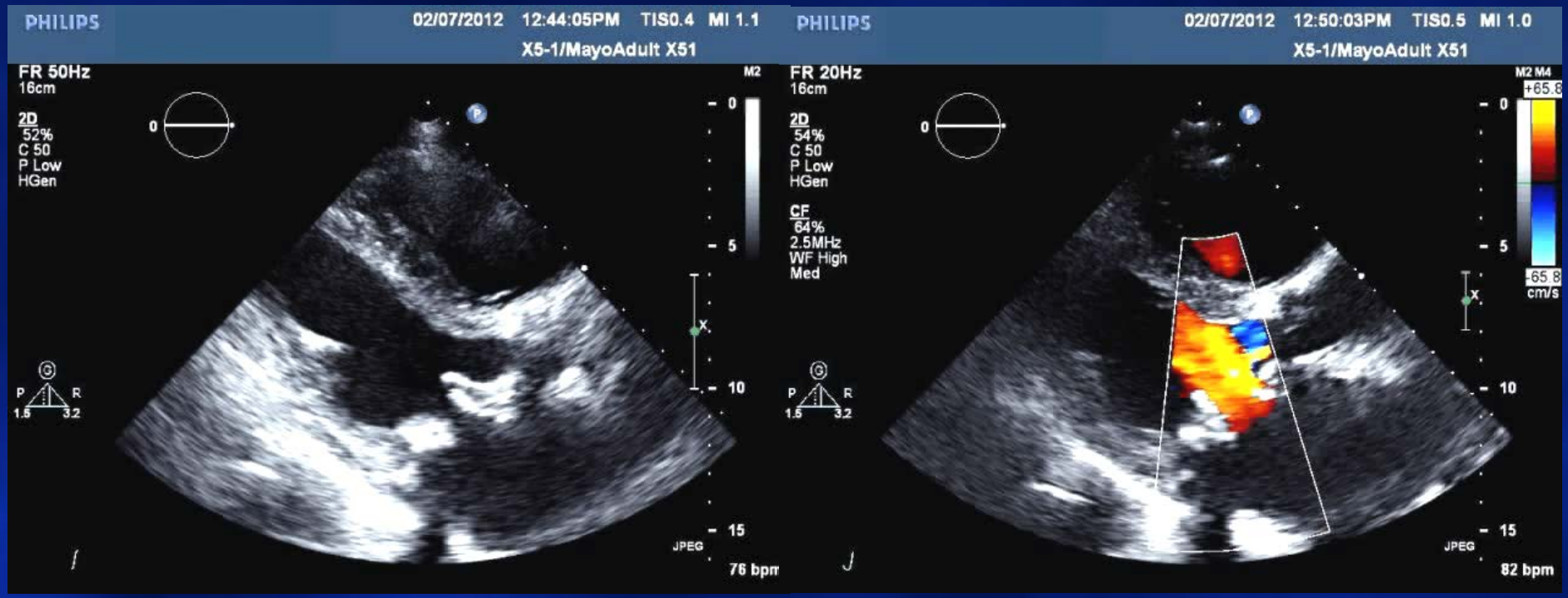
Transthoracic Echocardiogram



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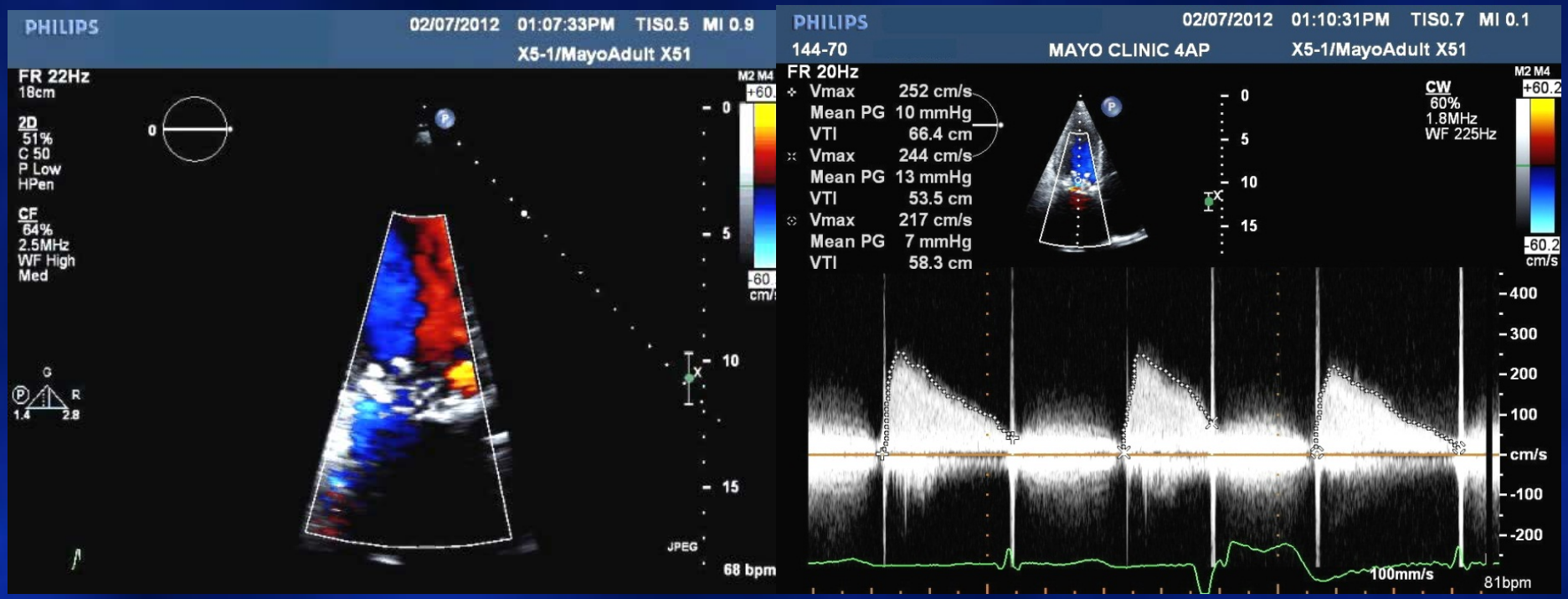

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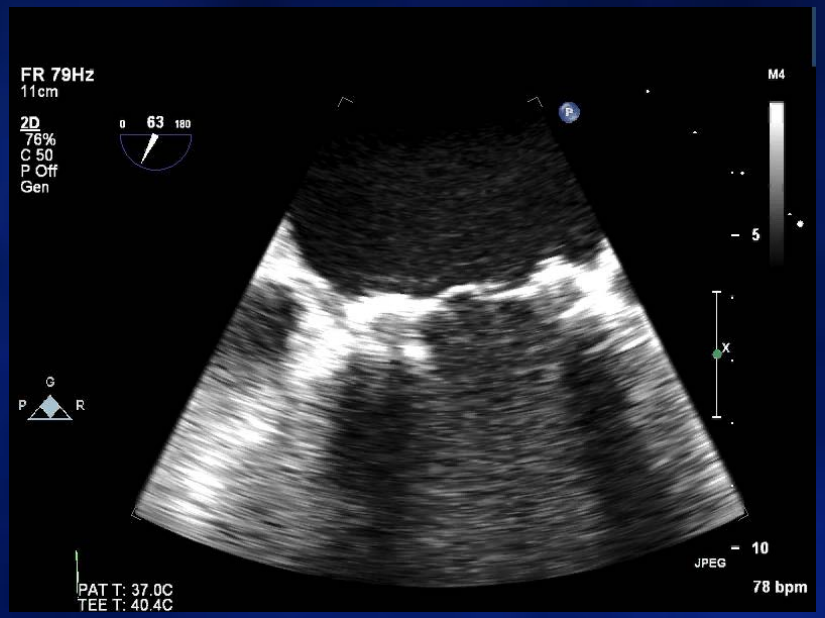
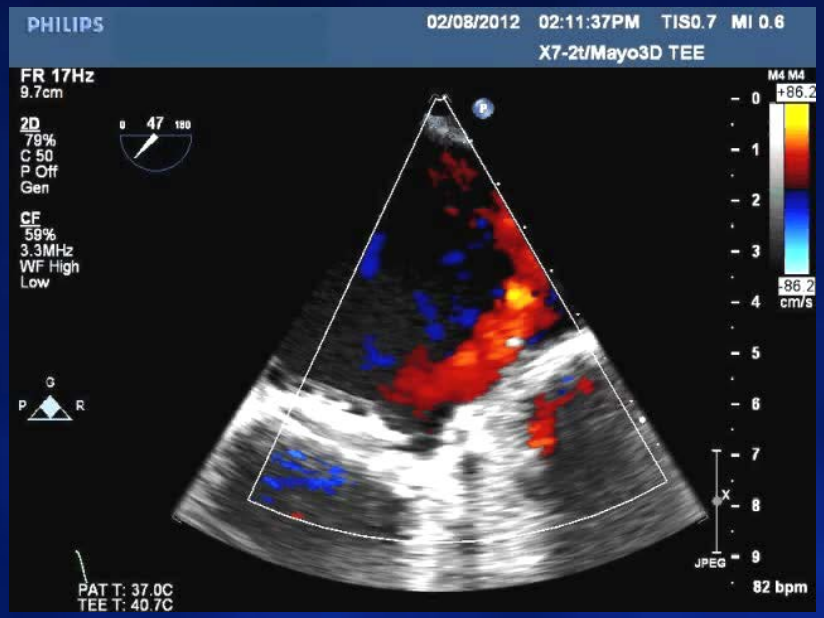
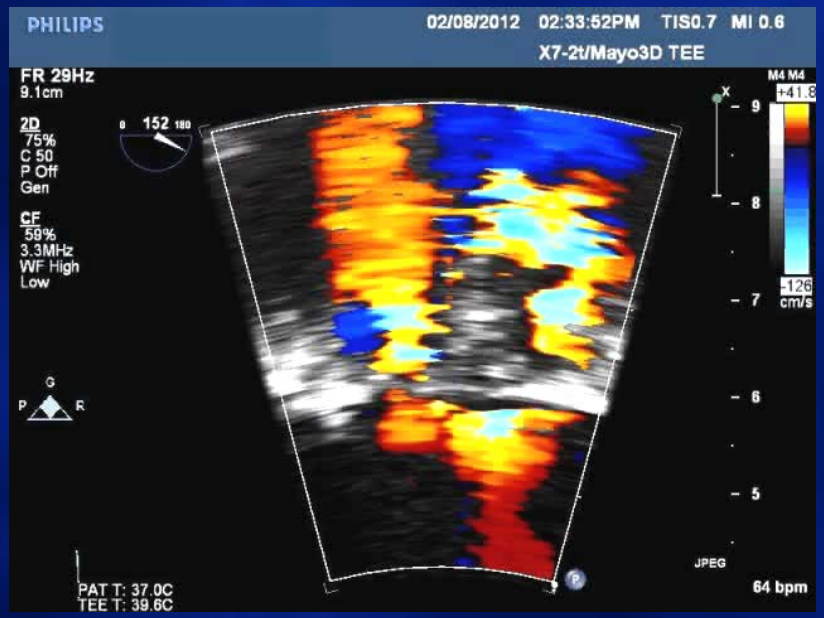
Transesophageal Echocardiogram







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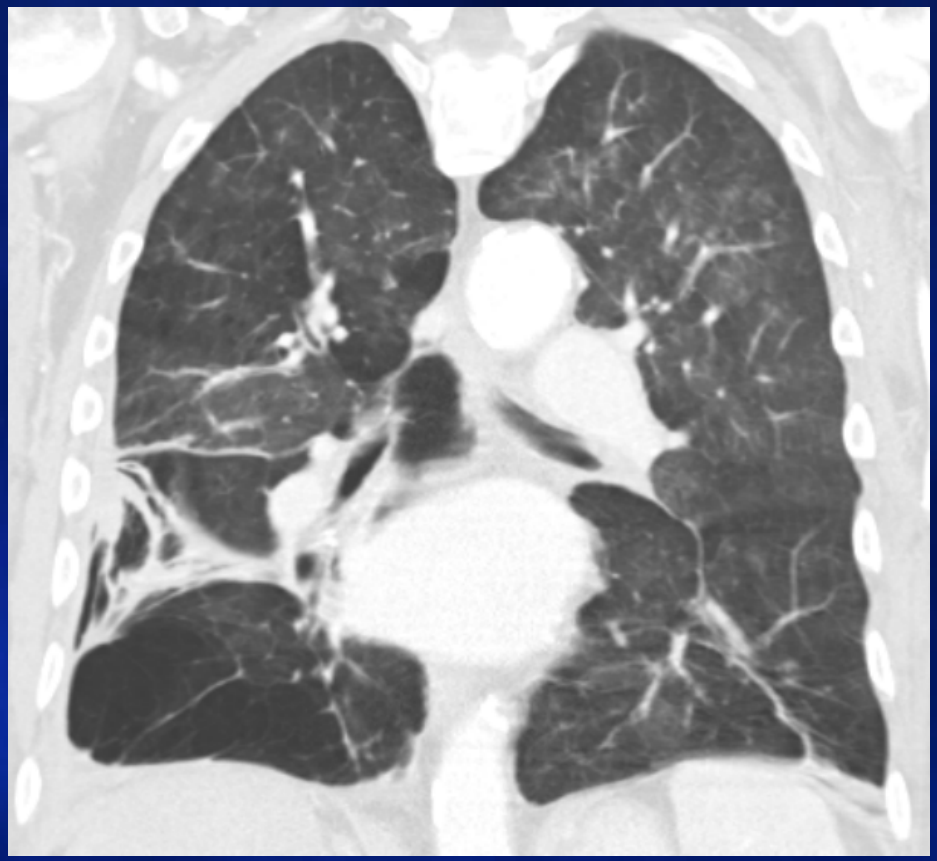
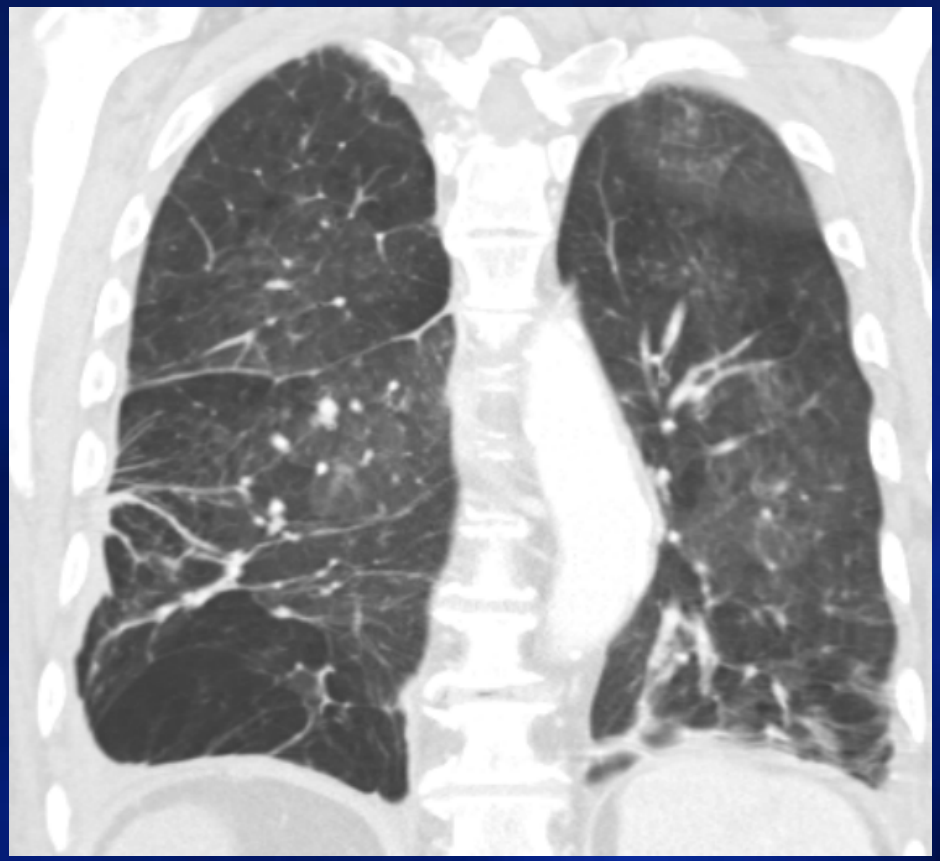
CT Chest, Abdomen, Pelvis





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What is your next step?

1. Continue medical therapy
2. Refer for peri-valvular leak closure
3. Refer for percutaneous prosthetic balloon mitral valvuloplasty
4. Refer for percutaneous mitral valve-in-valve implantation
5. Refer to surgery for mitral valve re-replacement

What is this patient's risk of postoperative 30-day or in-hospital mortality?

1. <5%
2. 5-10%
3. 10-15%
4. 15-20%
5. >20%

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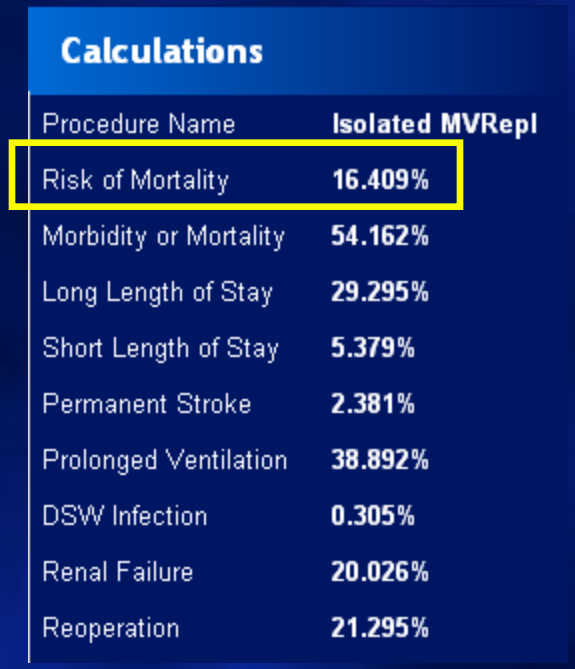
Case Presentation

- Patient referred to surgery
  - Mitral valve re-replacement
  - Tricuspid valve annuloplasty
- STS Score



Calculations	
Procedure Name	**Isolated MVRepl**
Risk of Mortality	**16.409%**
Morbidity or Mortality	**54.162%**
Long Length of Stay	**29.295%**
Short Length of Stay	**5.379%**
Permanent Stroke	**2.381%**
Prolonged Ventilation	**38.892%**
DSW Infection	**0.305%**
Renal Failure	**20.026%**
Reoperation	**21.295%**

16.4% Mortality Risk

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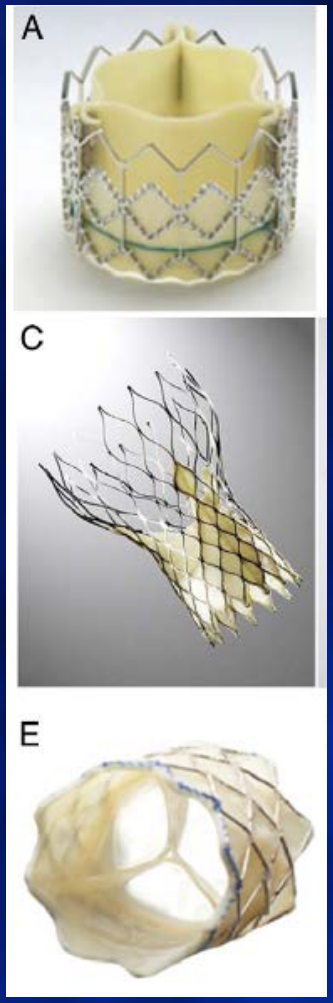
http://riskcalc.sts.org/STSWebRiskCalc273/

Transcatheter Heart Valves



Edwards SAPIEN valve

Medtronic CoreValve

Medtronic Melody valve

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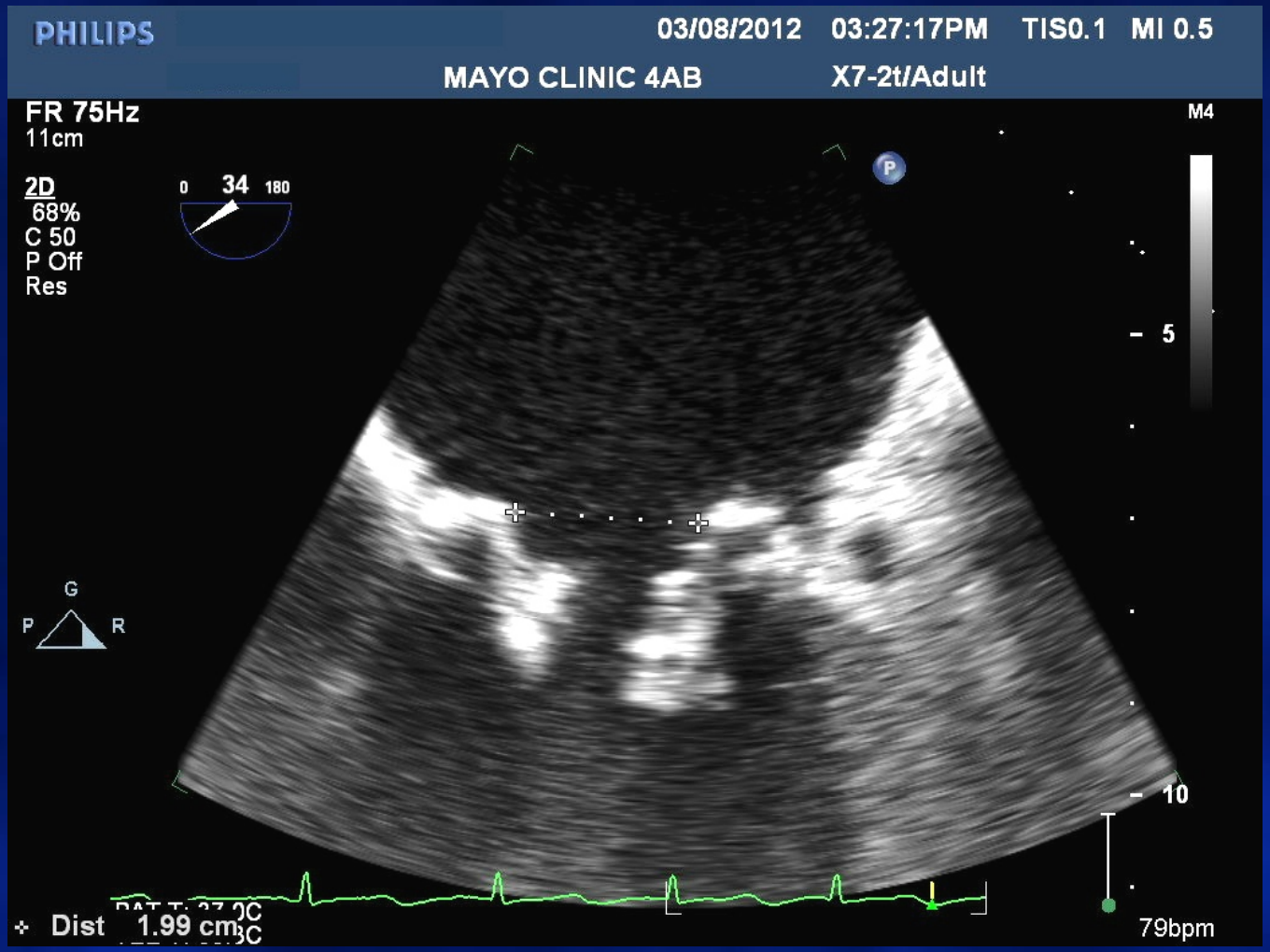
Gurvitch R, et al. *JACC* 2011; 58(21): 2196-209.

Internal Diameter Measurement



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Intra-procedure Imaging

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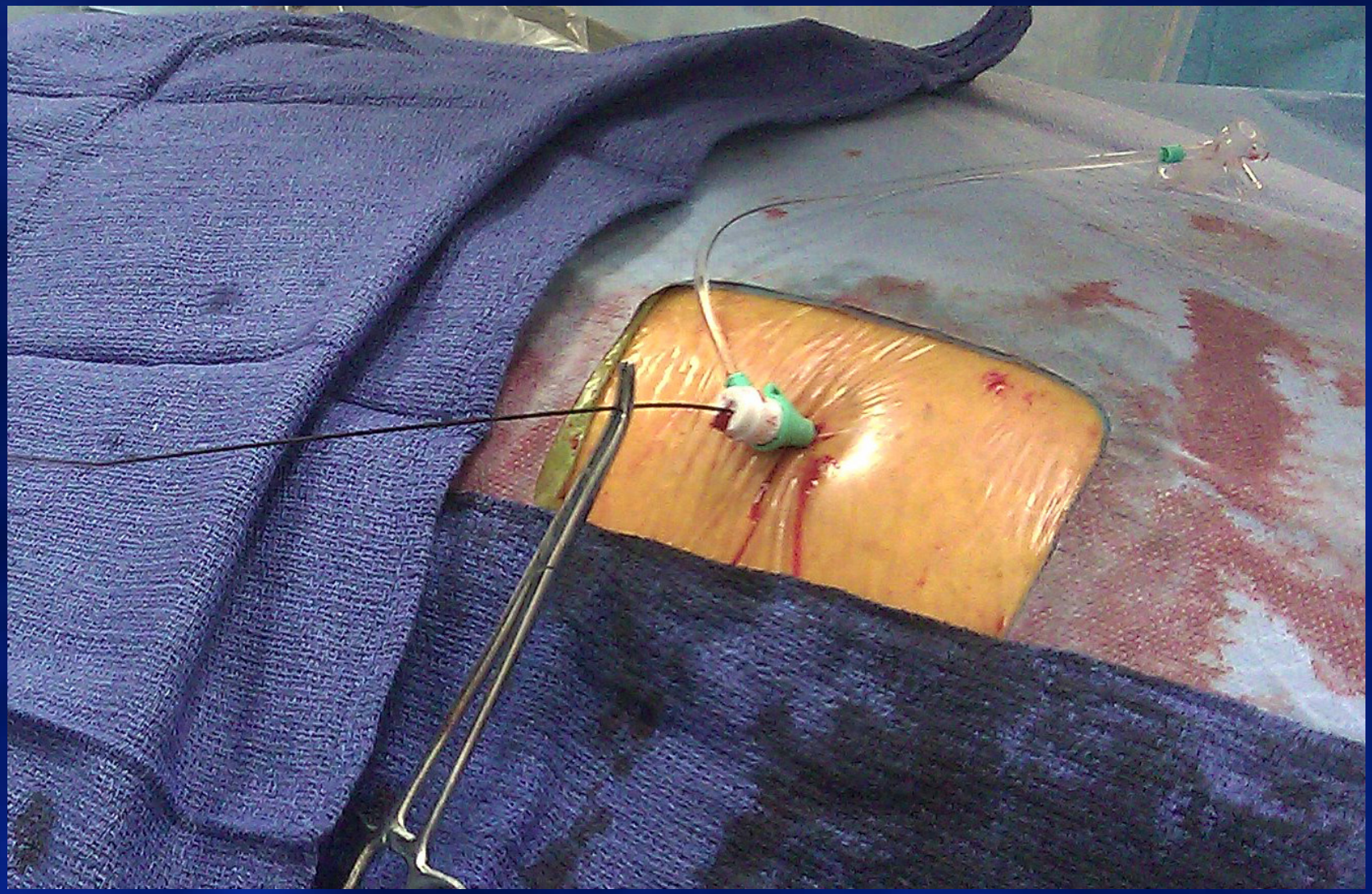
Apical Rail Exteriorization



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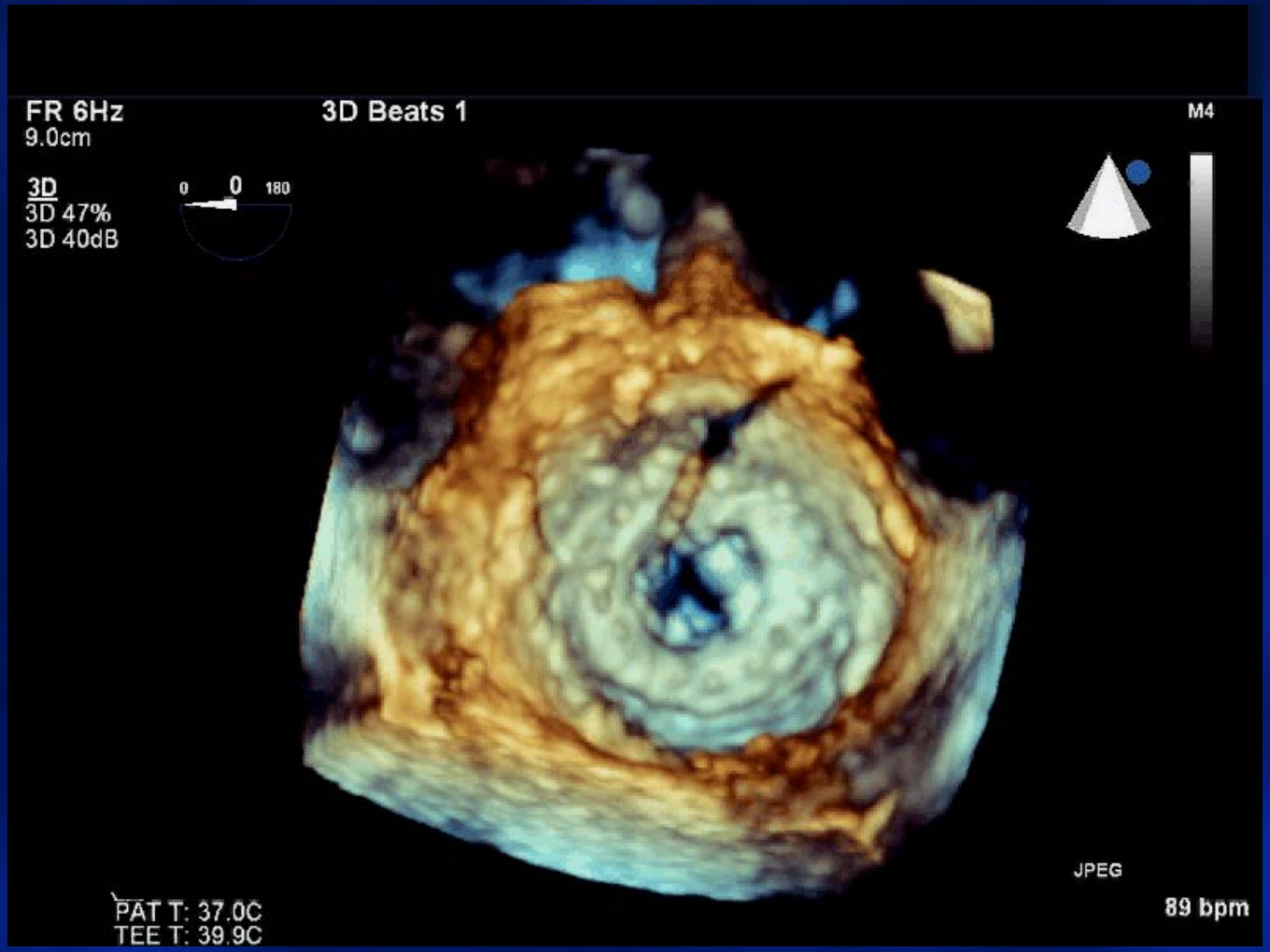

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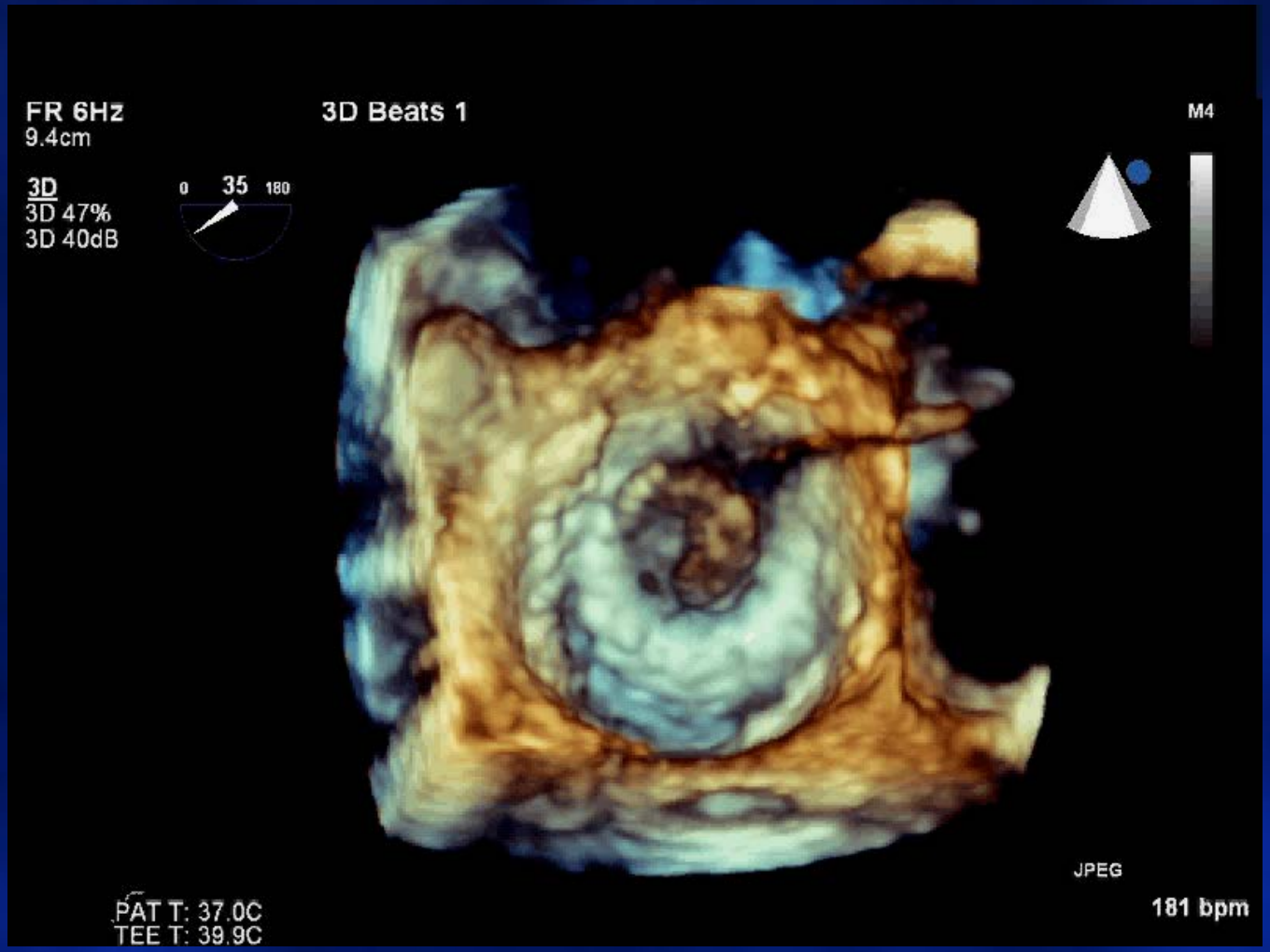

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Intra-procedure Imaging

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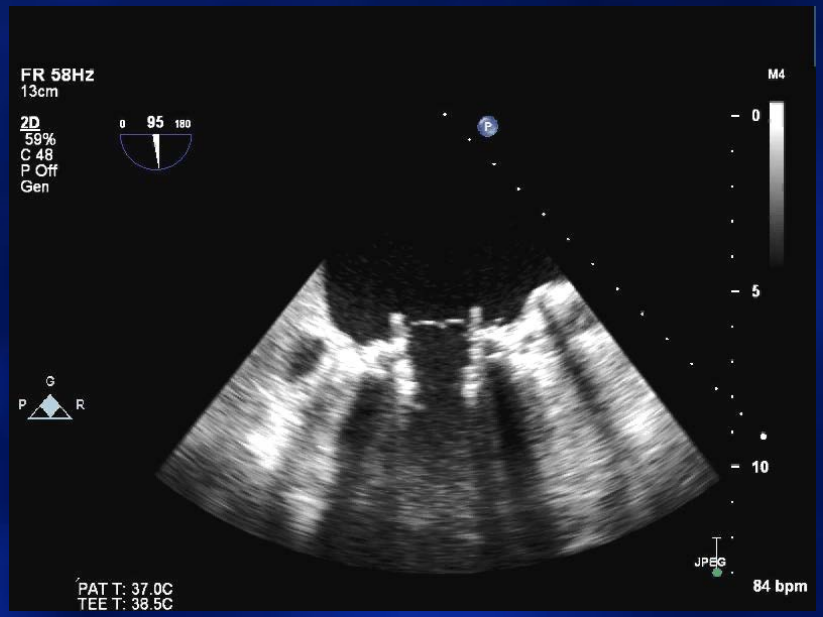

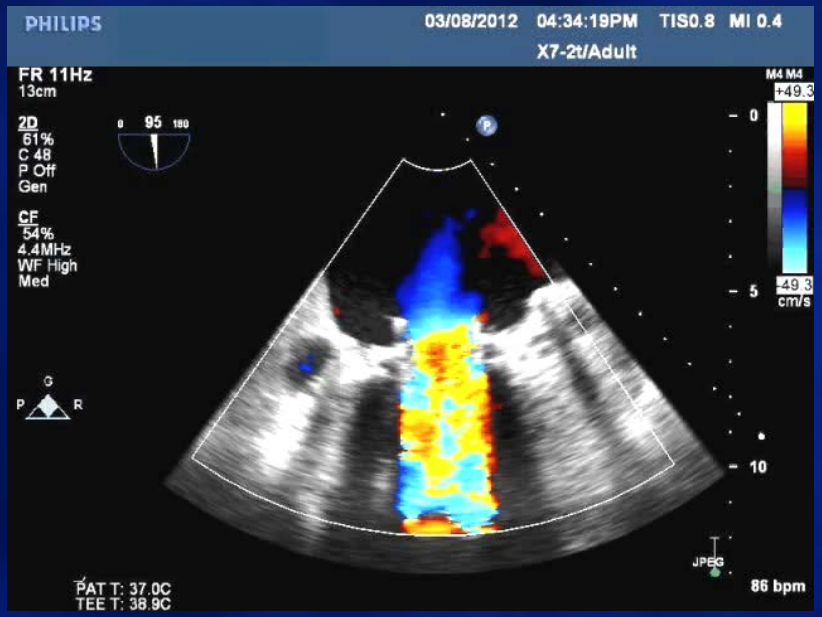

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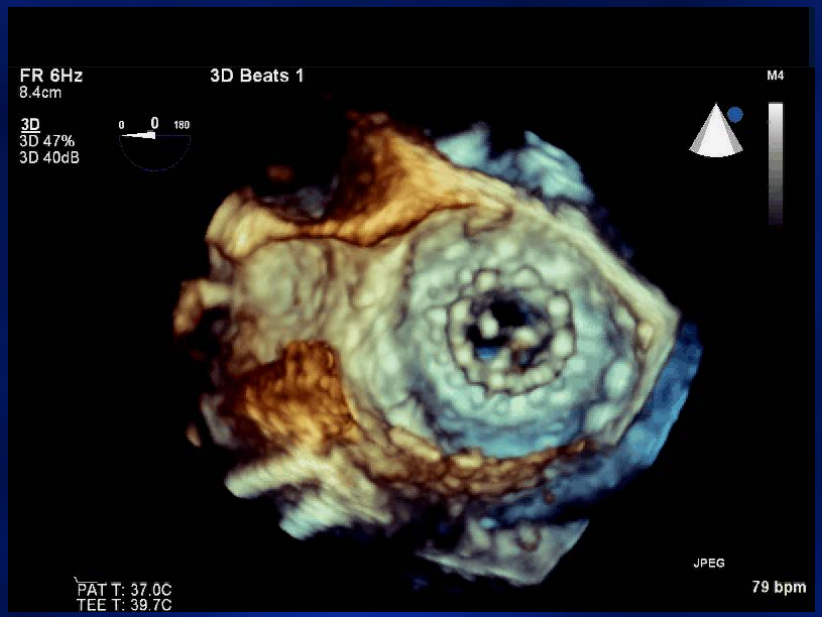

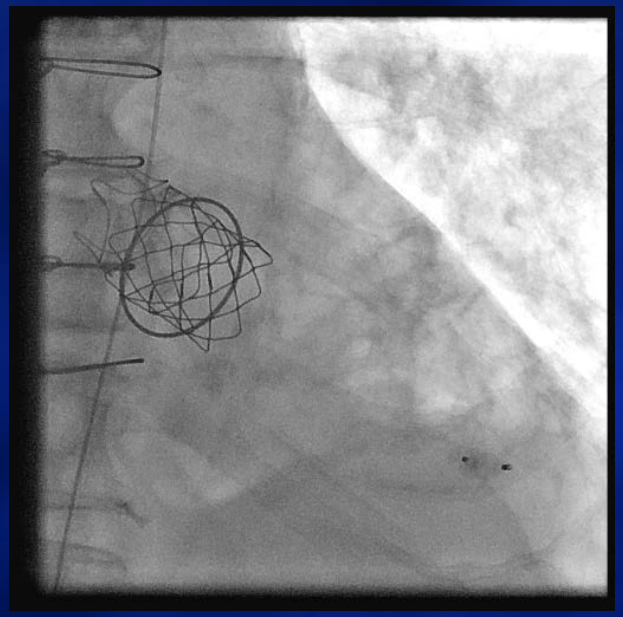

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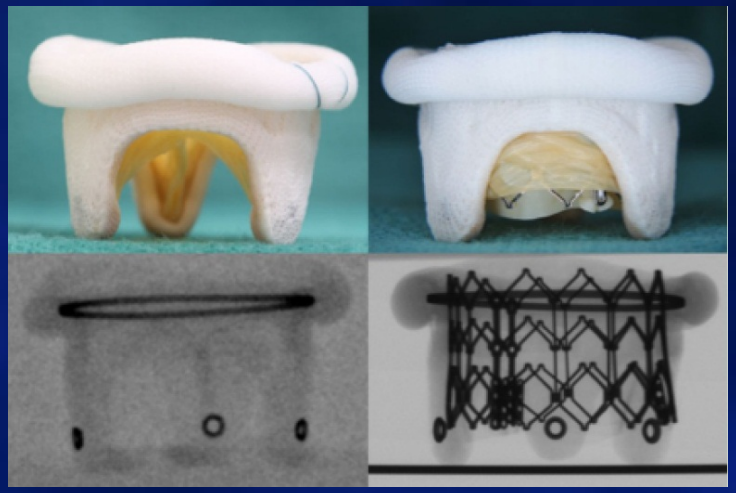
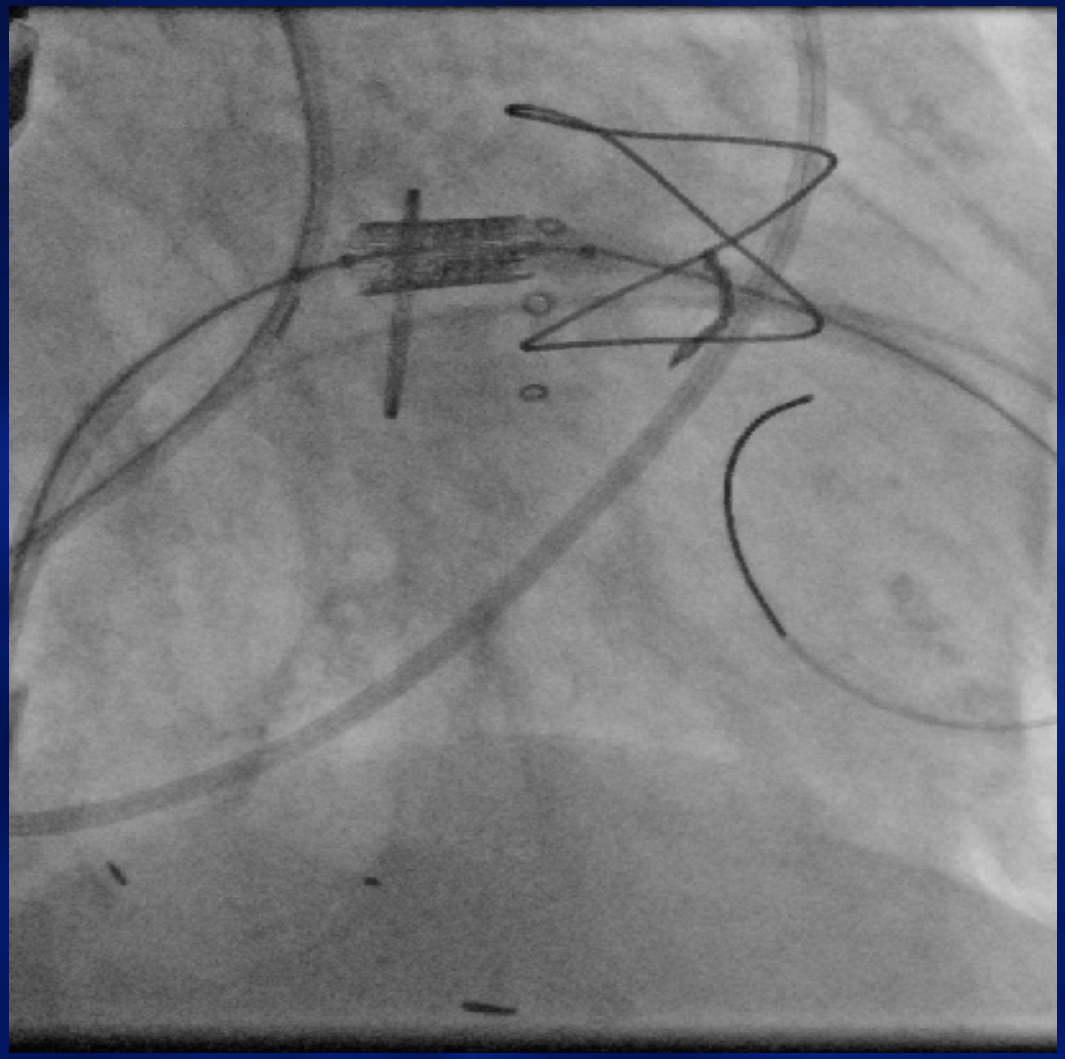
Follow up

- Hemoglobin stabilized
- Bilirubin 3.9 → 1.5 mg/dL
- Patient symptomatically improved
- Dismissed home 7 days after procedure

Technique Evolution





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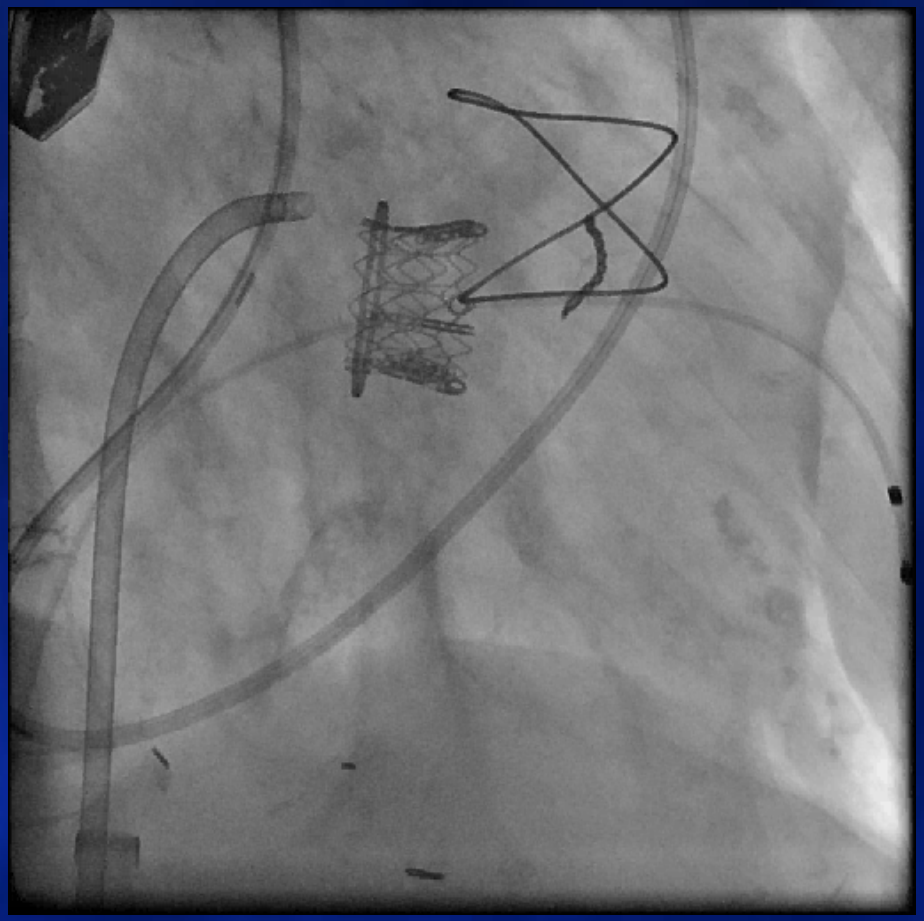
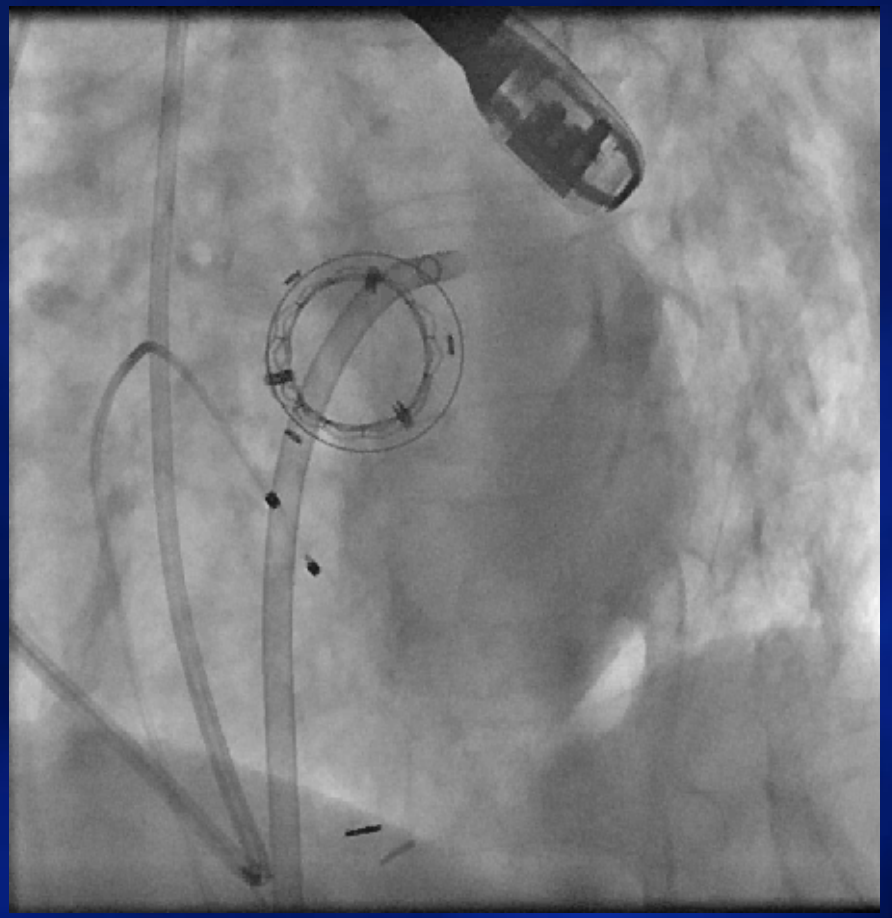
Final Result





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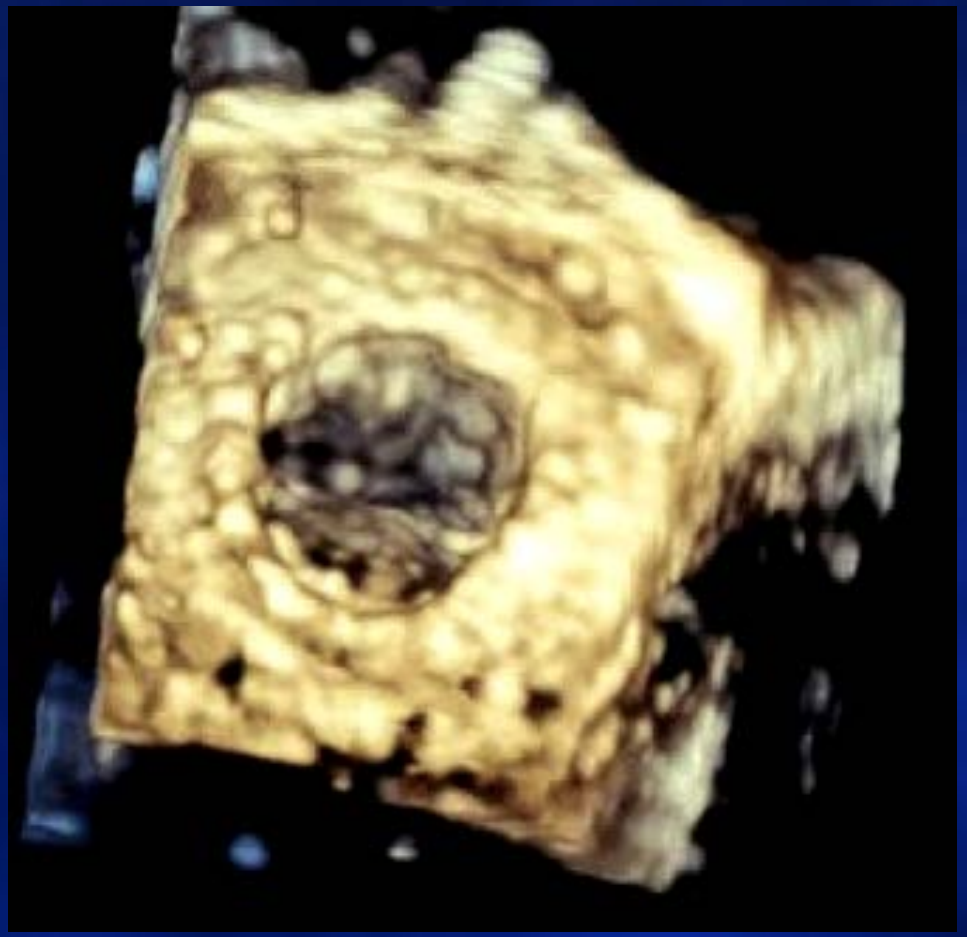
Gradient reduced from 19 → 7 mmHg



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Transvenous, Antegrade Melody Valve-in-Valve Implantation for Bioprosthetic Mitral and Tricuspid Valve Dysfunction

A Case Series in Children and Adults

Michael W. Cullen, MD,* Allison K. Cabalka, MD,† Oluseun O. Alli, MBBS,‡ Sorin V. Pislaru, MD, PHD,* Paul Sorajja, MD,* Vuyisile T. Nkomo, MD, MPH,* Joseph F. Malouf, MD,* Frank Cetta, MD,*† Donald J. Hagler, MD,*† Charanjit S. Rihal, MD, MBA*

Rochester, Minnesota; and Birmingham, Alabama

Mitral N = 9
Tricuspid N = 10

Age 65 (10 – 88)
STS 13.3 ± 5.6 %
No procedural death, MI, stroke or valve embolization.

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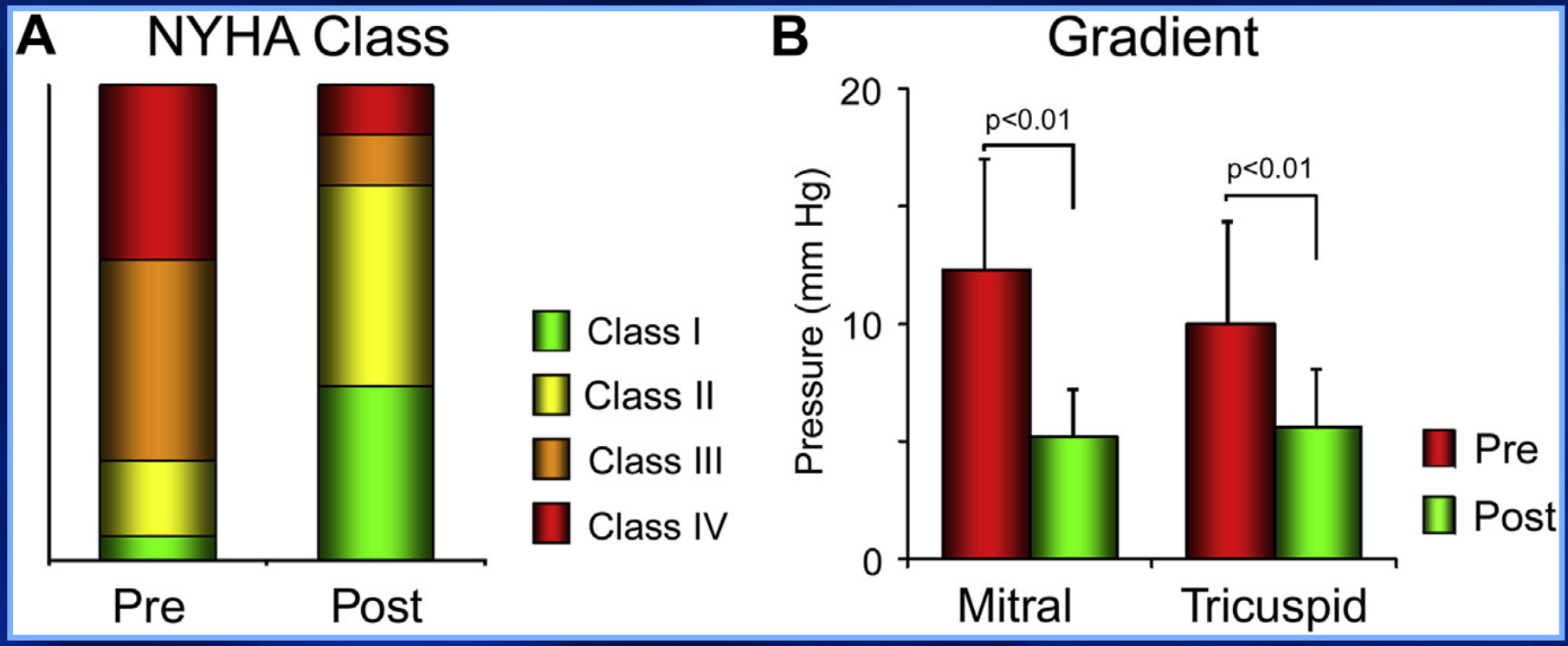
Clinical Results



A viable therapeutic option in carefully selected paients

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Summary of Published Case Series

- Elderly, symptomatic, high-risk patients
- Improved regurgitation
- Reduced mitral valve inflow gradient
- Main differences from Mayo Clinic cases
  - Edwards SAPIEN vs. Melody valve
  - Transapical vs. transvenous access

Take Home Points

- Mitral valve-in-valve implantation can be a therapeutic option for high surgical risk patients with dysfunctional bioprosthetic mitral valves.
- The STS score incorporates the number of previous sternotomies and can risk stratify patients prior to valve operations.

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Mayo Clinic
Locations

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Introduction

- Previous trans-catheter mitral valve-in-valve procedural technique used venous-LV-apical rail
  - Some centers use mini-thoracotomy or apical delivery
  - Percutaneous rail prone to complications
- Venous-arterial rail also possible
  - Geometry may not be ideal
  - Requires arterial access
  - Wire tension across aortic arch
- Goal: to place THV in mitral position using exclusively venous access

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Case Presentation

- 77yo female with NYHA III symptoms
  - 25mm Hancock II prosthetic mitral valve replacement in 2003 for degenerative mitral regurgitation.
  - Recurrent bouts of “pneumonia” with activity over previous four months
  - Found to have severe prosthetic valve stenosis with mean gradient 19 mmHg
  - Severe COPD, 45kg
- Evaluated by heart team
  - Felt to be high risk for re-operation

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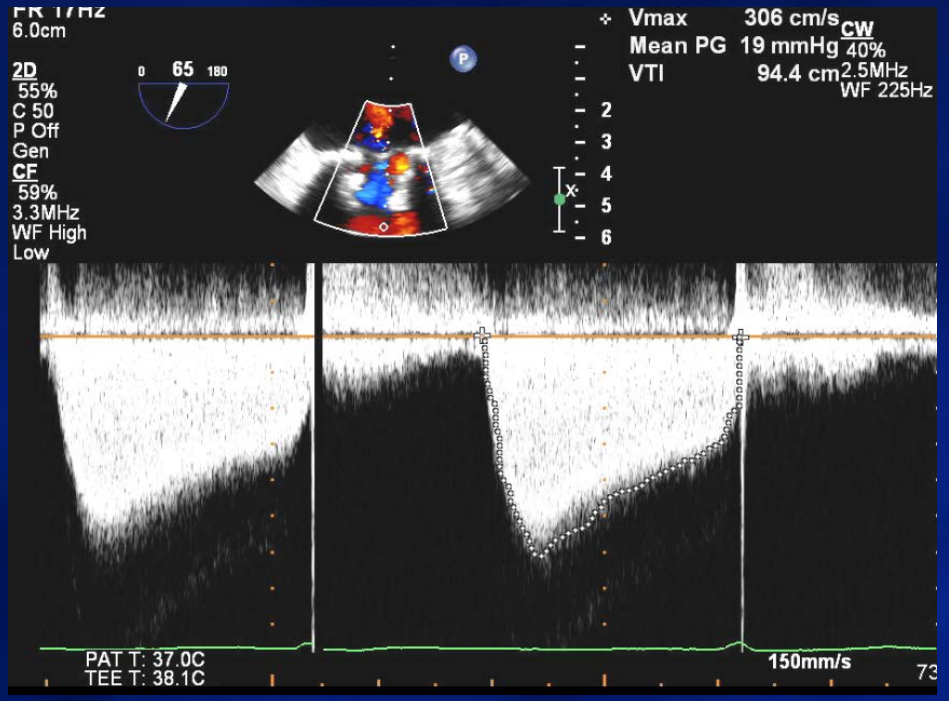
Baseline trans-mitral gradient 19 mmHg



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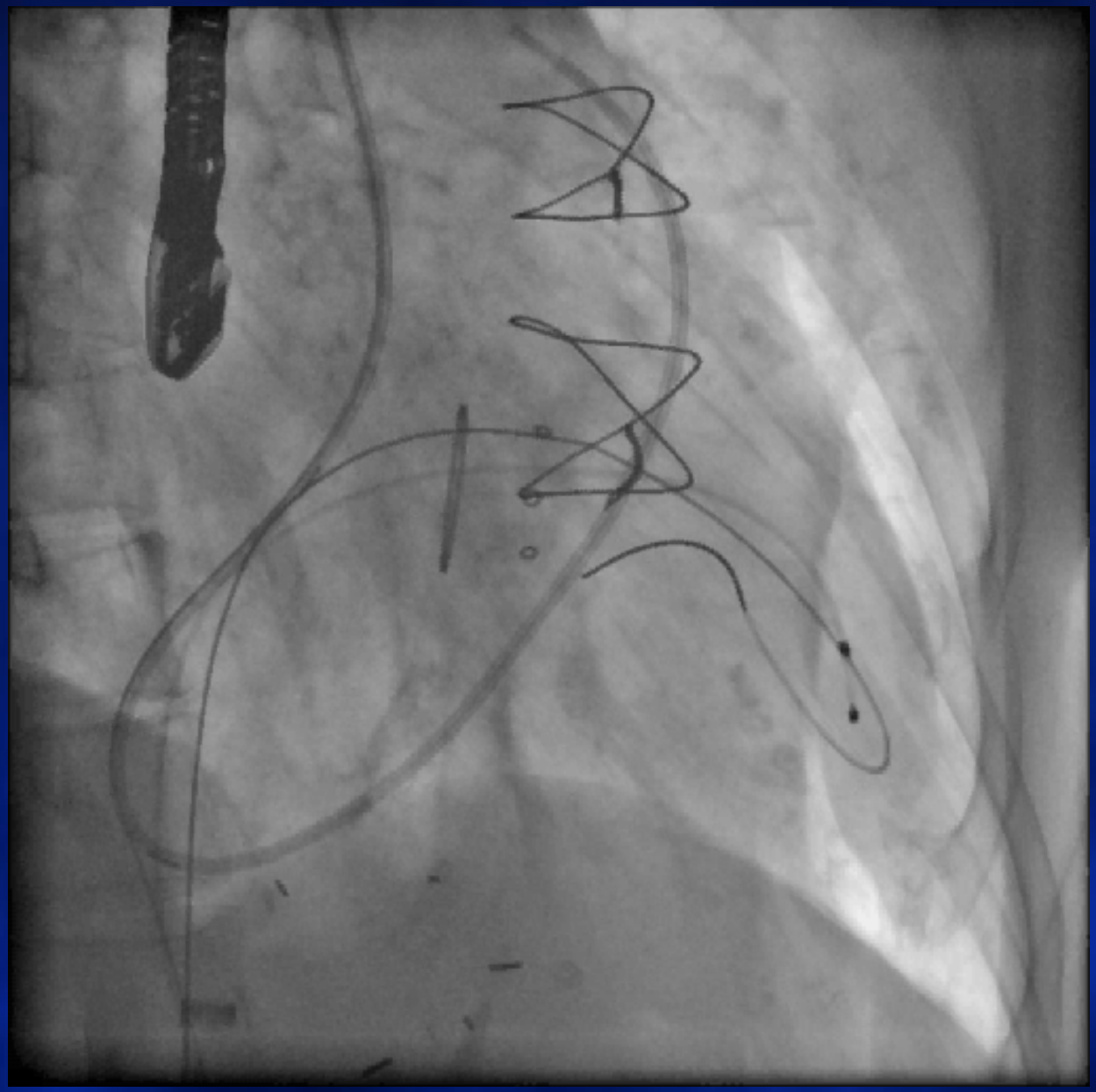
Procedural Setup



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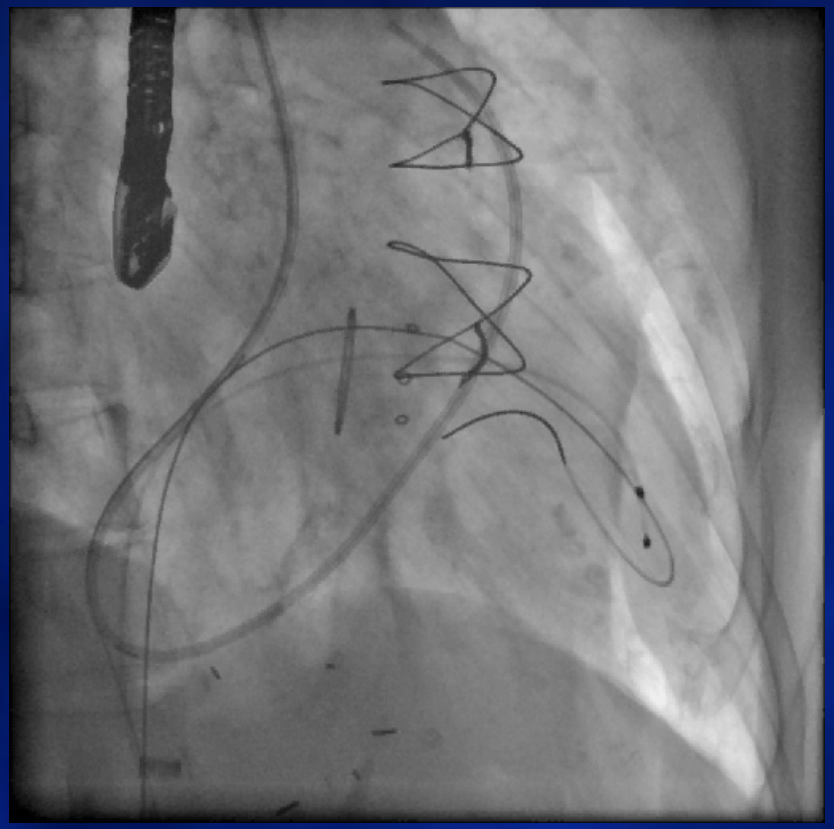
Procedural Setup

- General anesthesia
  - RIJ Pacing Swan
  - TEE
- Posterior transeptal puncture
  - Dilated with 21F dilator
- 24F Edwards Sapien sheath
  - Advanced over Inue wire
- 8.5F Agilis to cross mitral valve
  - Support delivery of Lunderquist wire with LV loop



Post-Procedure Course

- Extubated in cath lab
  - Monitored on floor service
- Discharged post-procedure day 1
- No access site complications
  - Manual compression for hemostasis
- Doing well at one month follow-up
  - Significantly improved exercise tolerance

Conclusion & Lessons Learned

- Transcatheter mitral valve-in-valve replacement is possible in high risk patients using exclusively venous access
- Support of Lunderquist wire with LV-loop adequate
  - Less supportive wire may be inadequate
  - Shaped curve through LA seems helpful
- Curve of Sapien delivery system supports turn through left atrium
- Optimal transeptal puncture location important
  - Posterior at level of mitral valve

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