

Management of Tricuspid Valve Disease

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Learning Objectives

- Recognize signs and symptoms of tricuspid valve disease
- Understand diagnostic evaluation of patients with TR
- Identify which patients to refer to specialized valve centers and optimal timing of referral

Why the Tricuspid Valve Matters

- Tricuspid regurgitation (TR) is common, underdiagnosed
- Severe TR independently associated with higher mortality
- Early recognition can improve outcomes
- New transcatheter therapies have changed prior paradigms of management

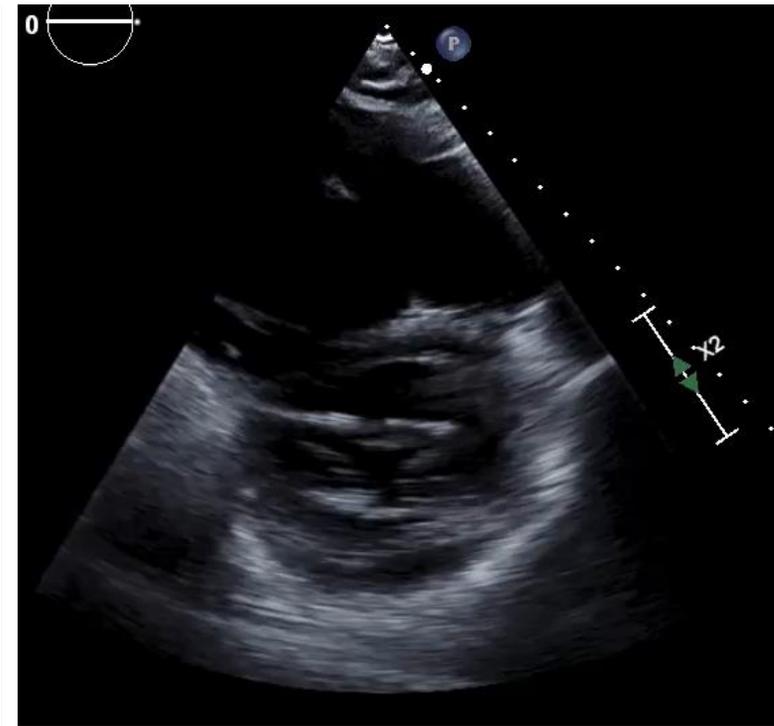
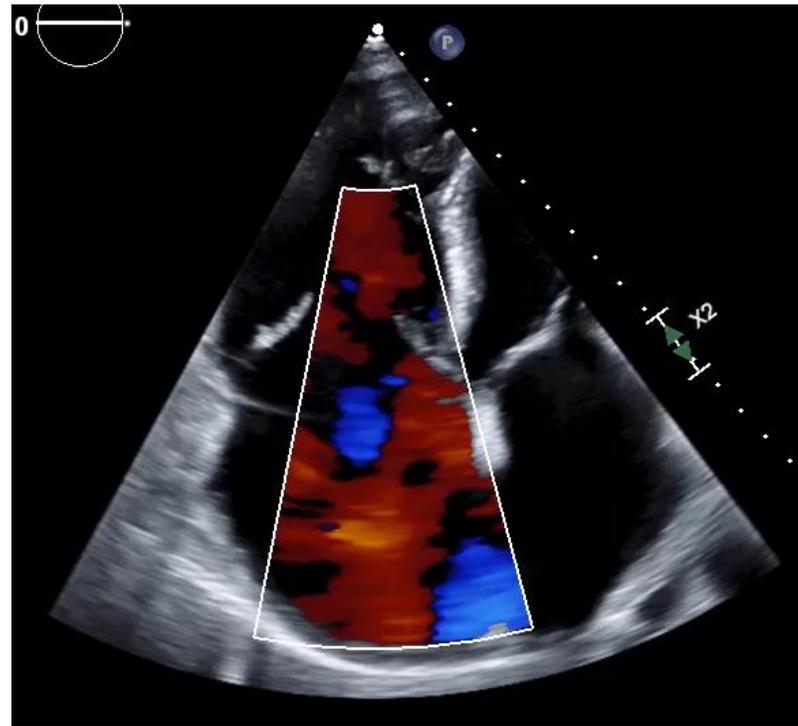
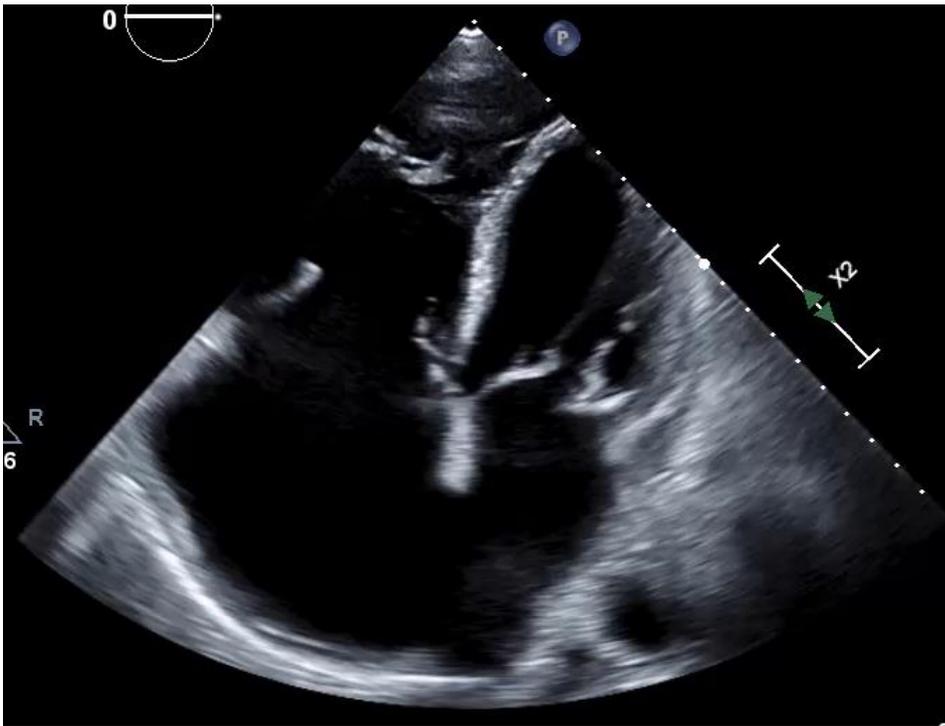
Case Presentation



**85-year-old
man**

- PMH: permanent atrial fibrillation on rivaroxaban, HTN, HFpEF, pulmonary HTN
- Presents with dyspnea on exertion (NYHA II-III), new leg swelling requiring diuretics
- Recent hospitalization for heart failure

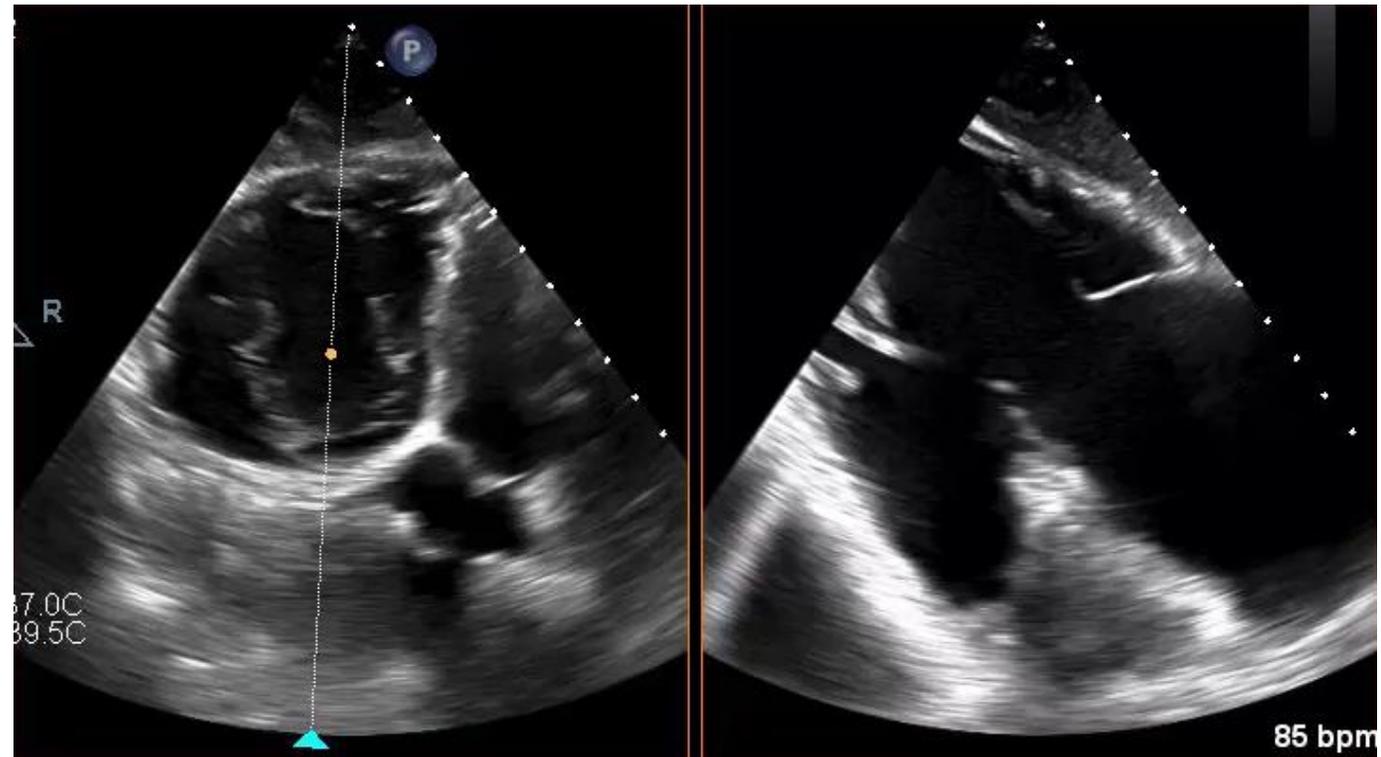
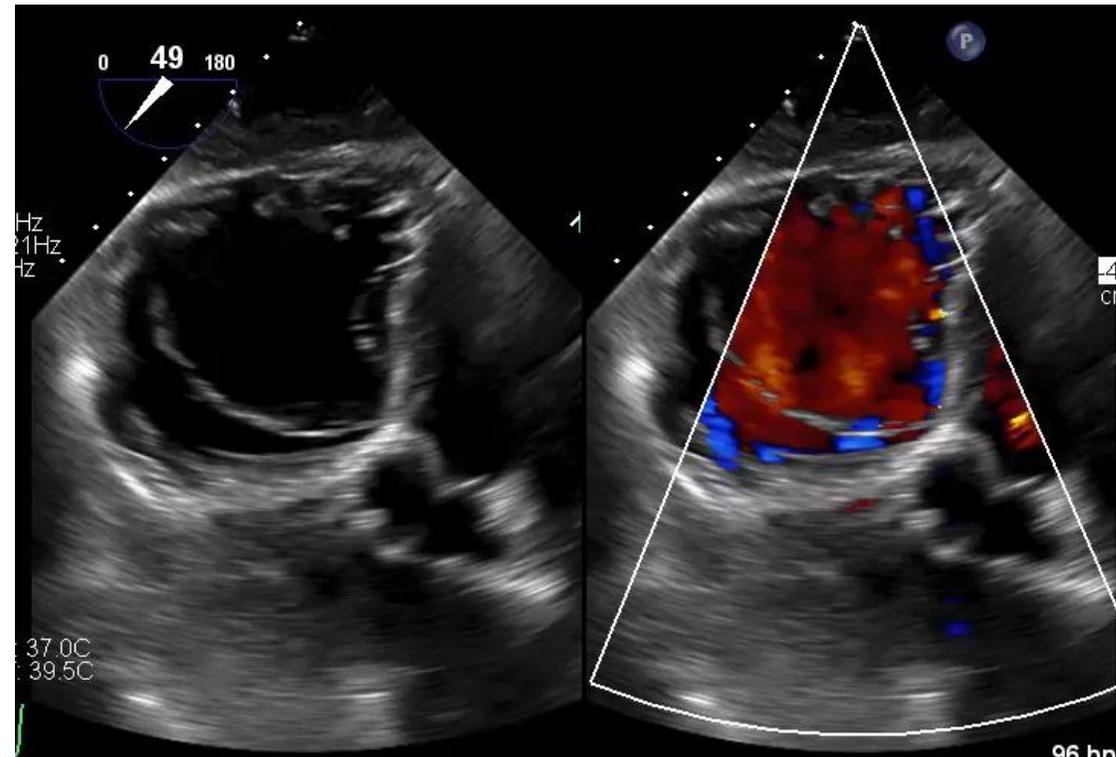
Transthoracic Echocardiogram



Right Heart Catheterization

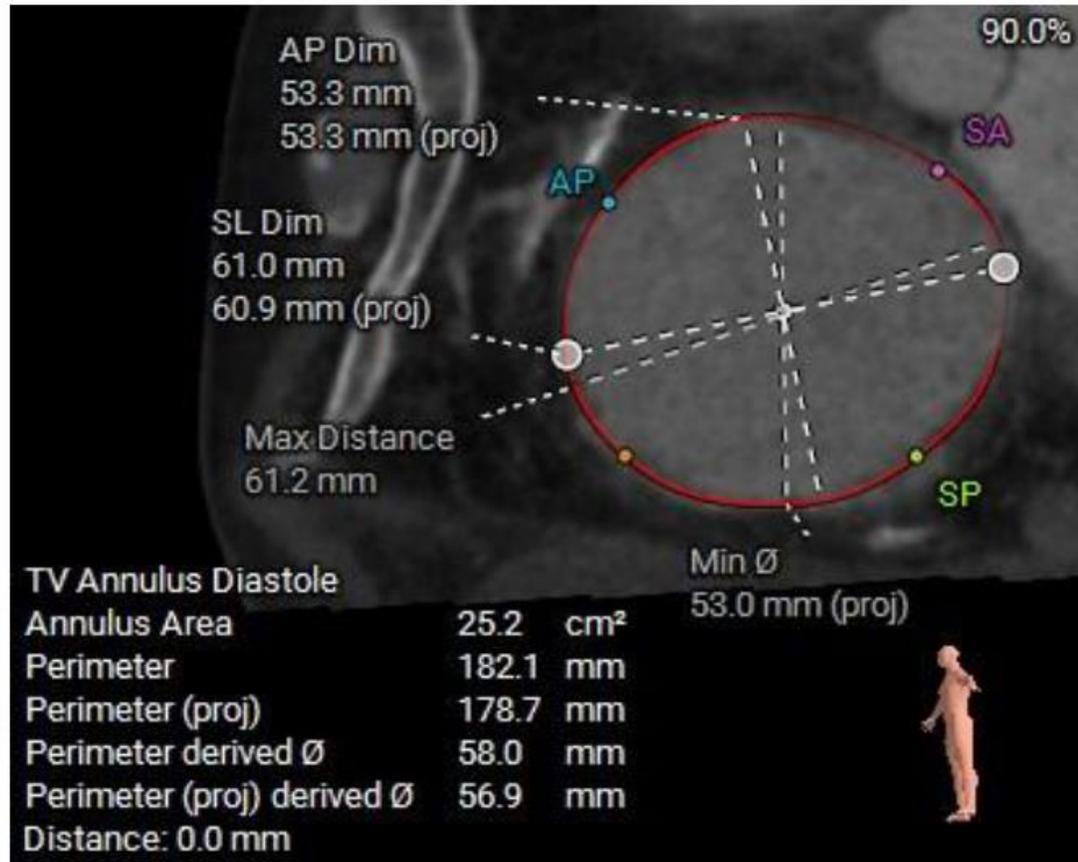
- RA 6 mmHg
- PA 46/14/25 mmHg
- PCWP 16 mmHg
- Normal Fick CI
- PVR 1.6 WU.

Transesophageal Echocardiogram

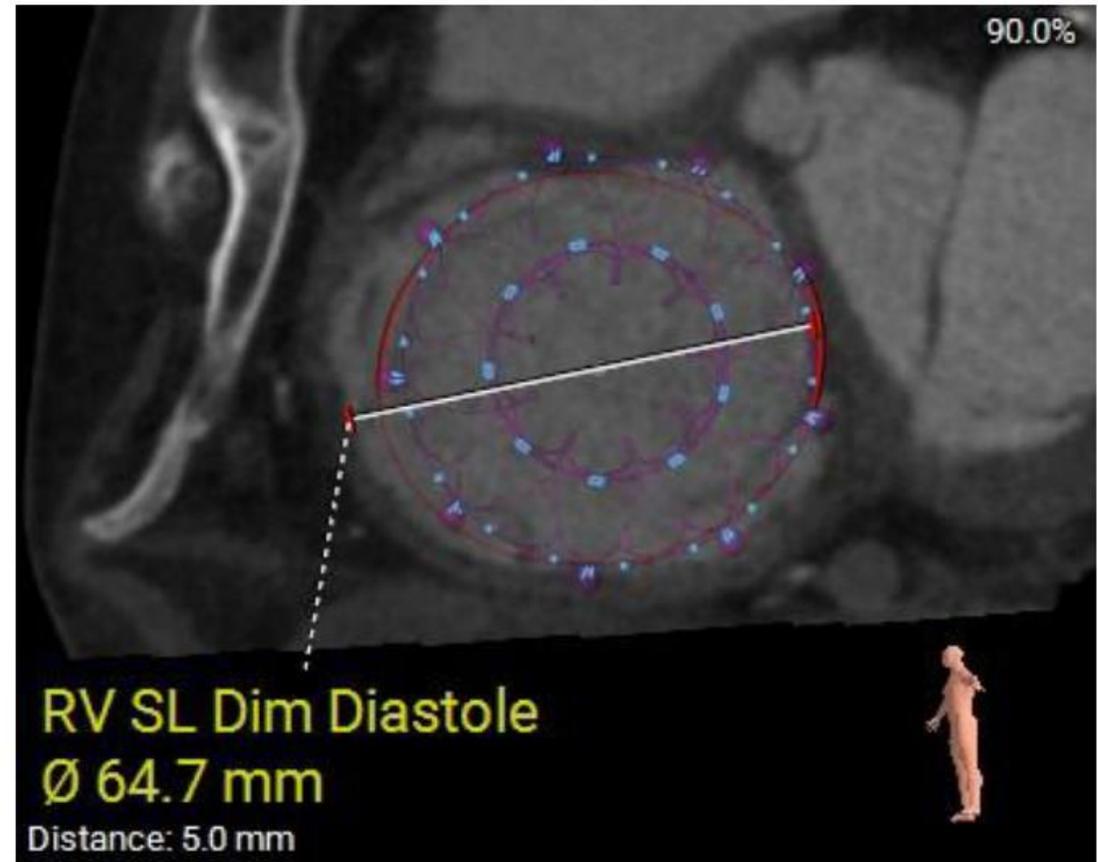


Cardiac CTA

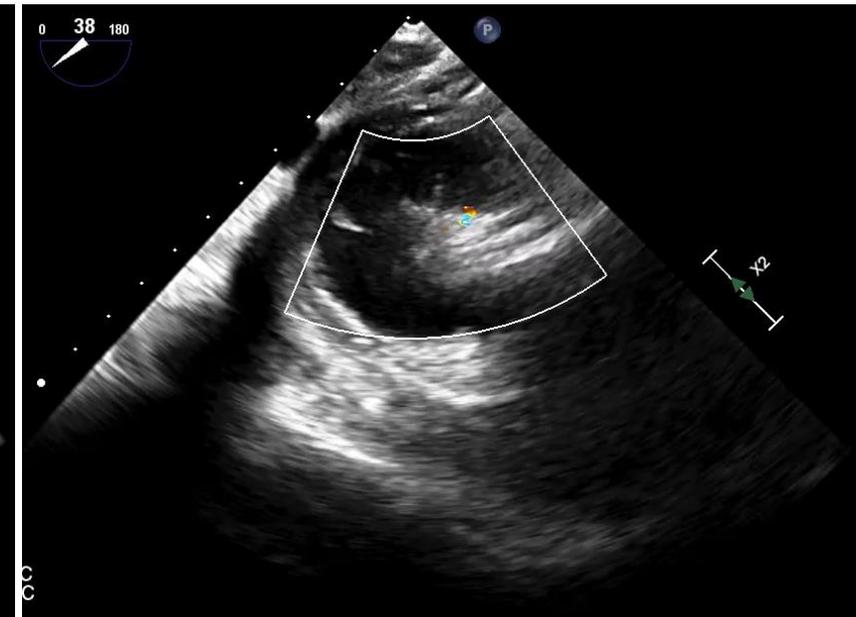
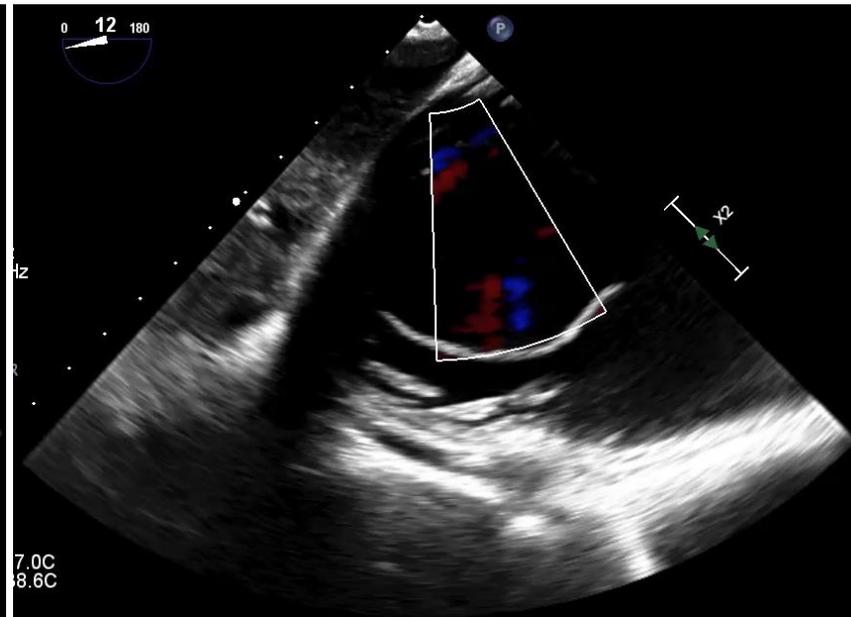
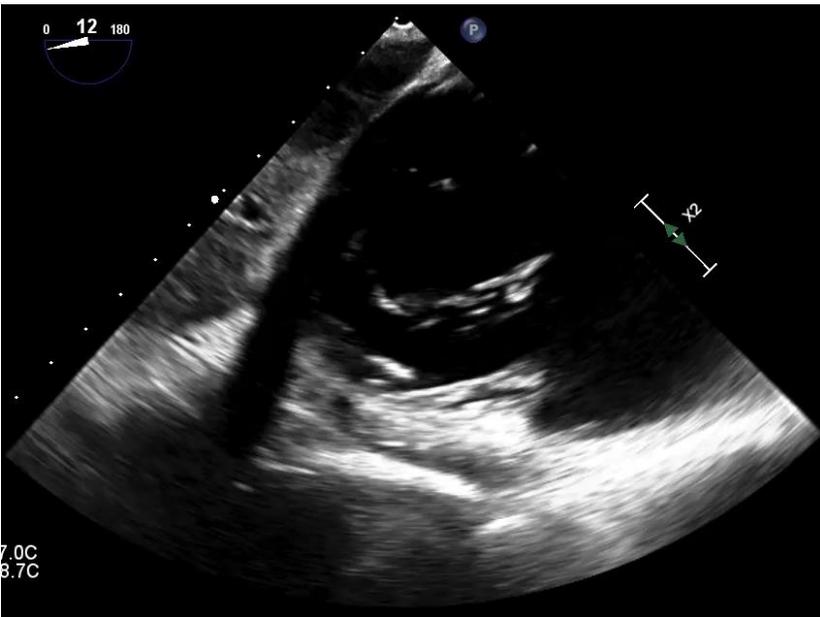
(1) TVA Diastole:



(2) Basal RV Diastole:



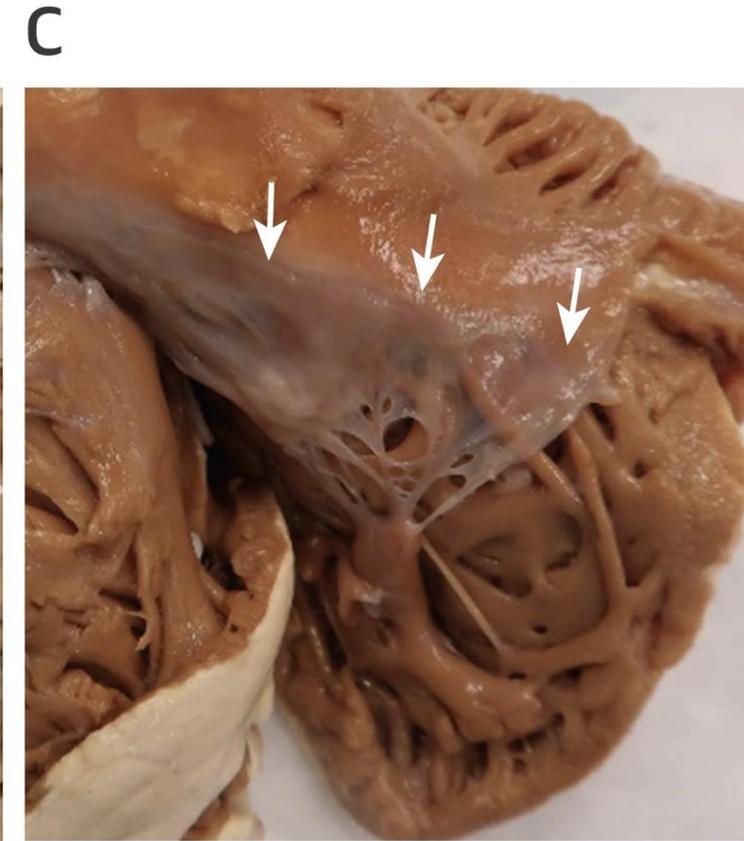
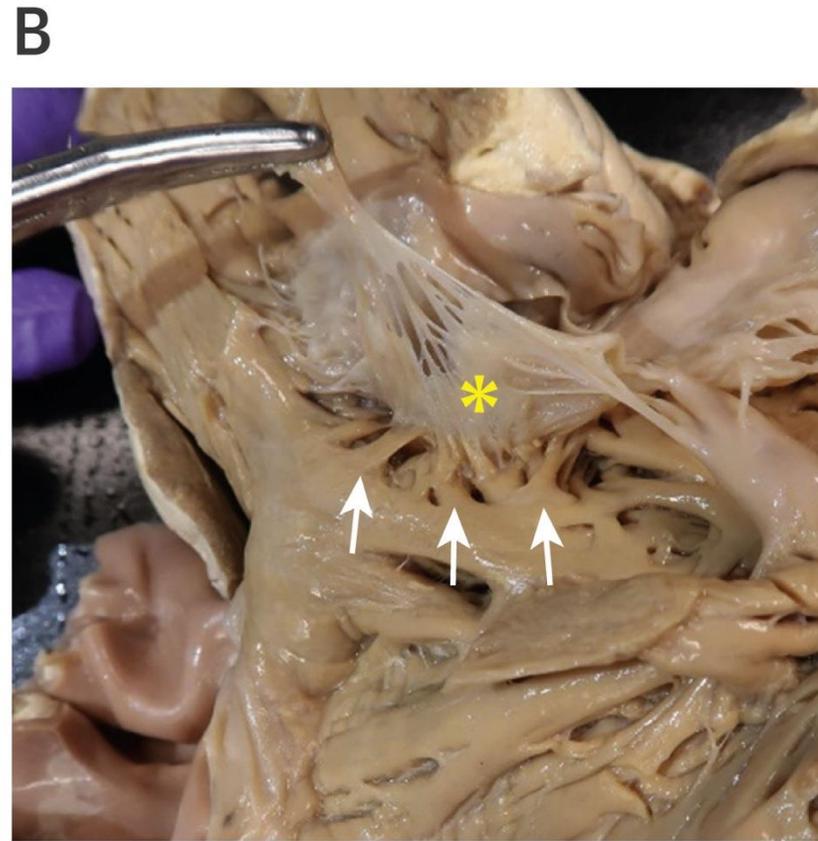
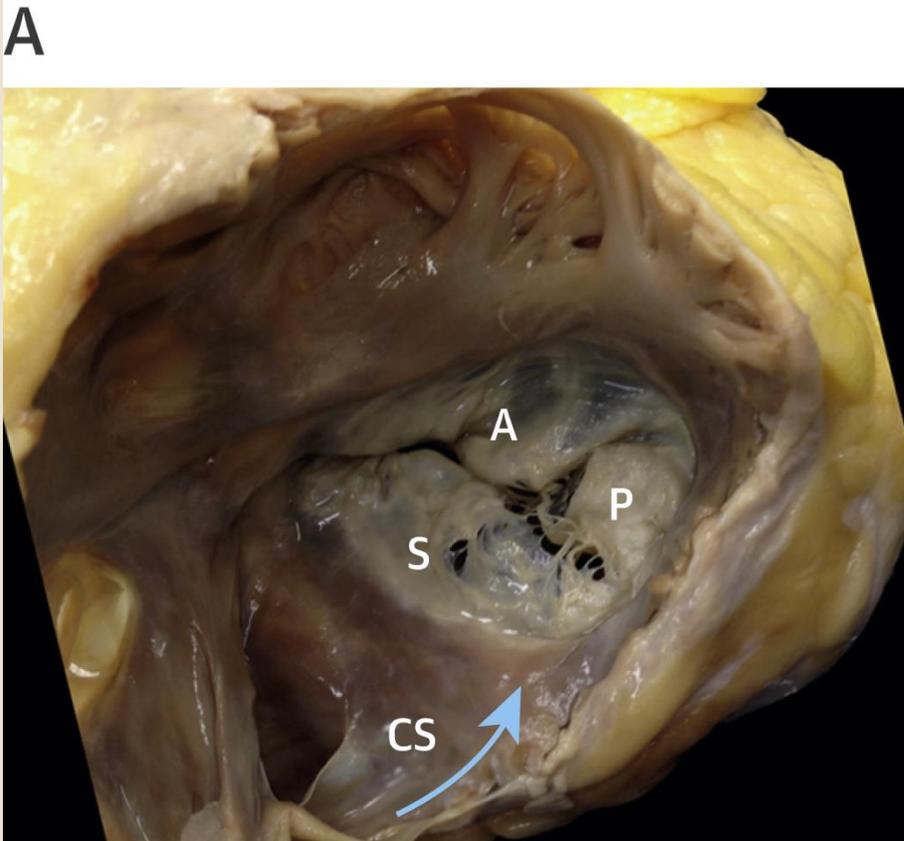
Tricuspid Edge to Edge Repair



Clinical Course

- Discharged home on POD #1
- Seen at one month by local cardiologist, reported feeling better, no leg edema
- TTE with mildly decreased RV size, mild to moderate residual TR

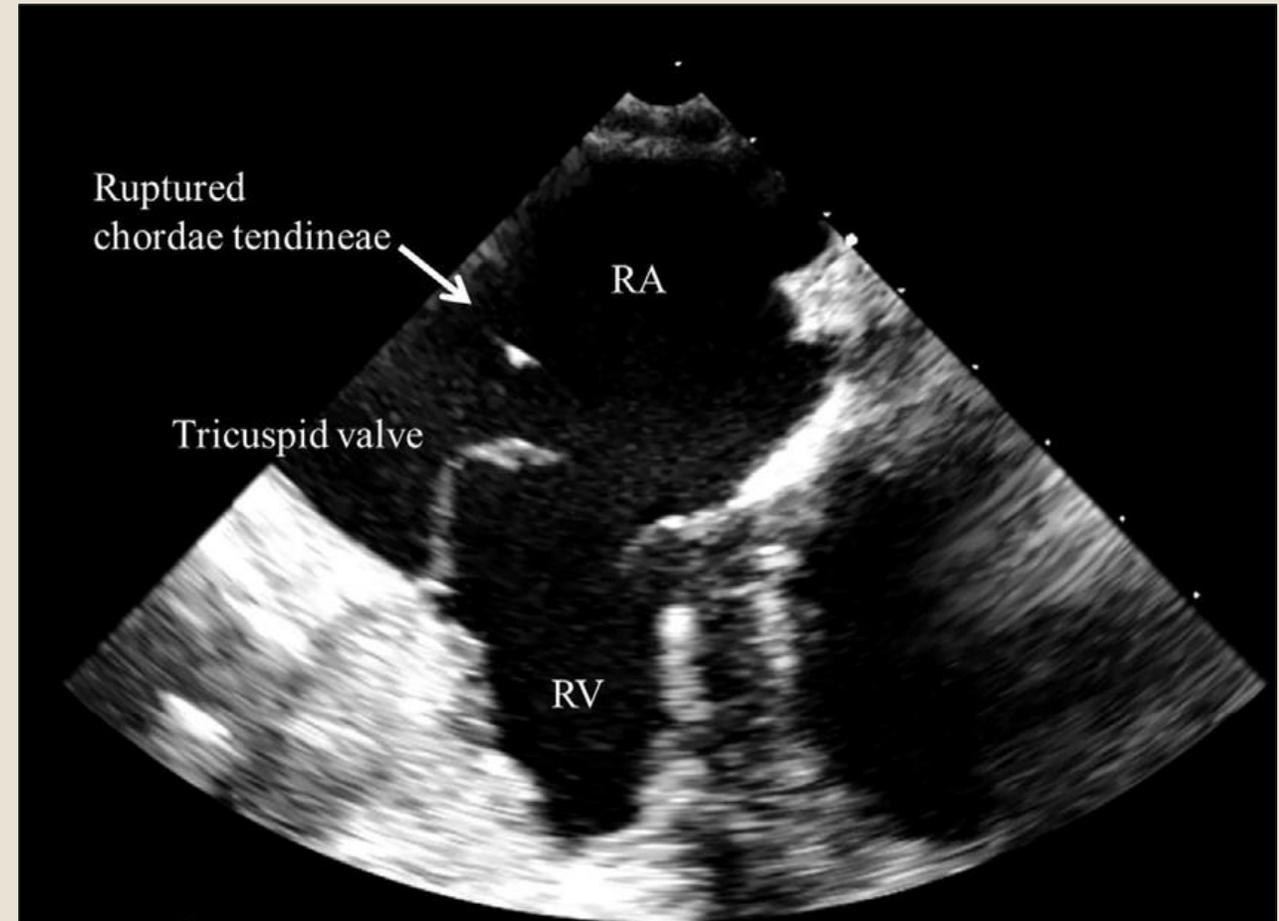
Anatomy and Physiology of the Tricuspid Valve



Source: A Dahou, et al. JACC: Cardiovasc Imaging. 2019.

Primary Tricuspid Regurgitation

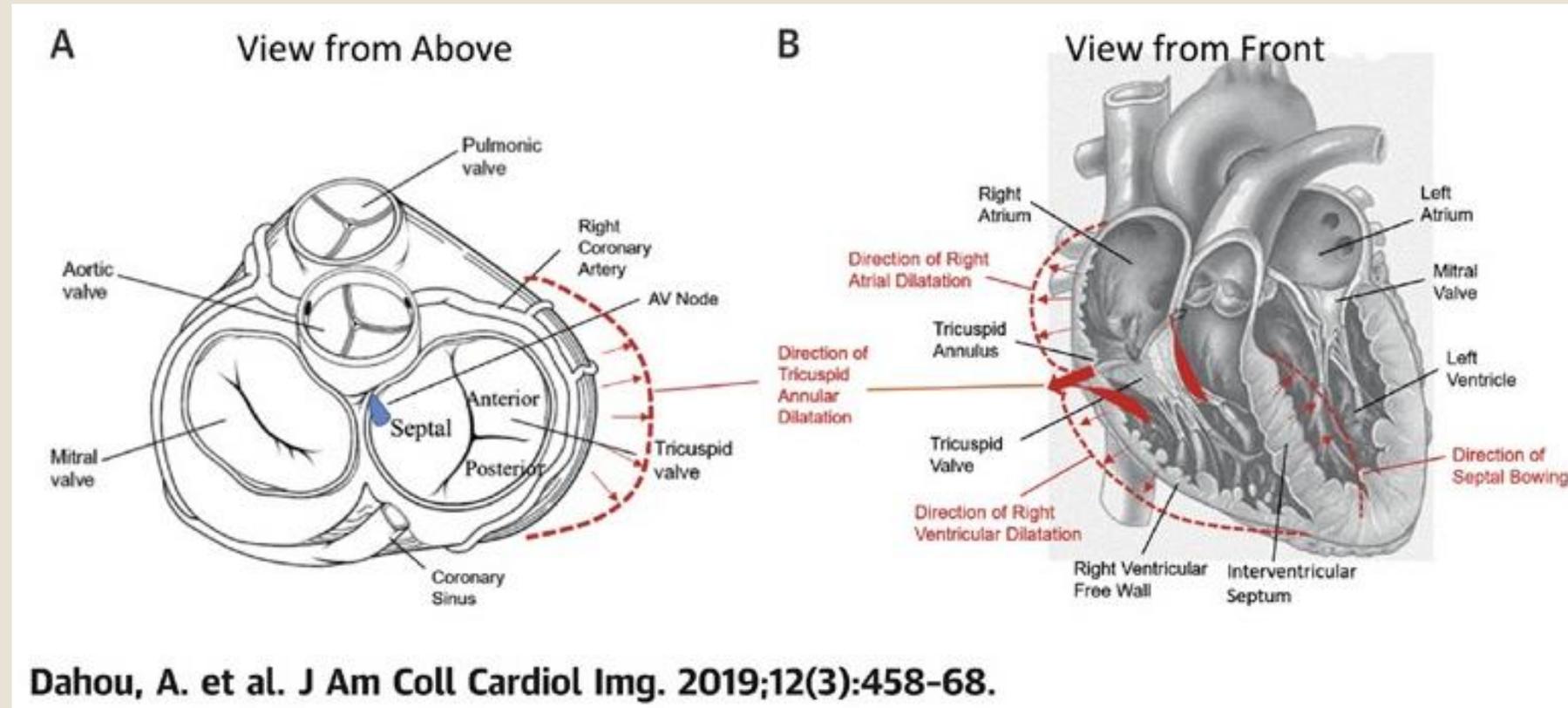
- Rare
- Congenital or acquired disease processes affecting leaflets or chordal structures, or both
- Myxomatous degeneration and prolapse, endocarditis, carcinoid syndrome, rheumatic disease, radiation



Source: M Uchihashi, et al. CASE. 2019.

Secondary Tricuspid Regurgitation

- Left-sided heart disease
- Pulmonary arterial hypertension
- RV dysfunction
- Idiopathic

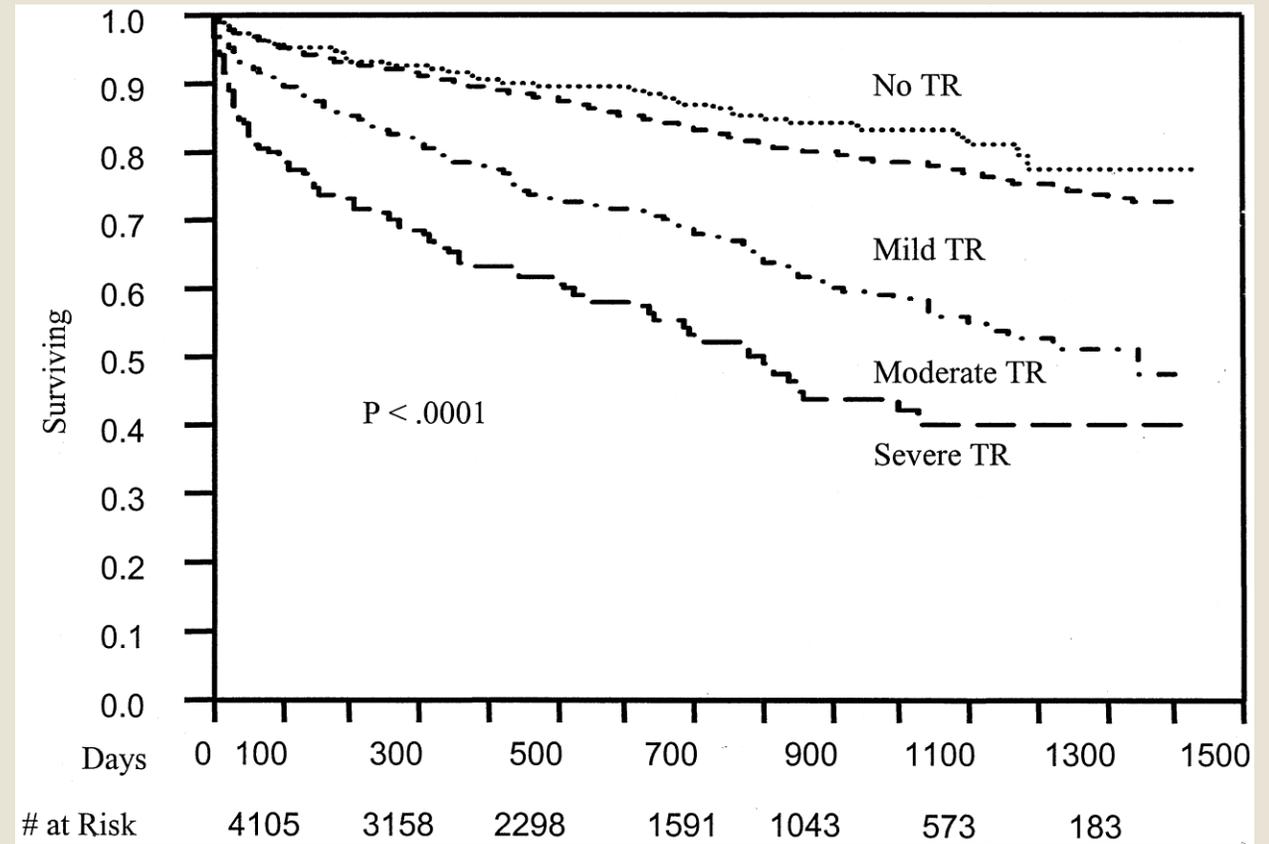


How Common is Tricuspid Regurgitation?

- Mild TR is very common on TTE
- Prevalence of significant TR estimated at 5% or higher in US adults older than 70 years
- More common in women
- Associated with older age
- Up to 25% of patients with HFrEF have moderate or worse TR

TR is Not Benign

- Independently associated with recurrent heart failure hospitalizations and increased mortality, regardless of LVEF or PASP
- Symptoms of venous congestion can negatively affect quality of life

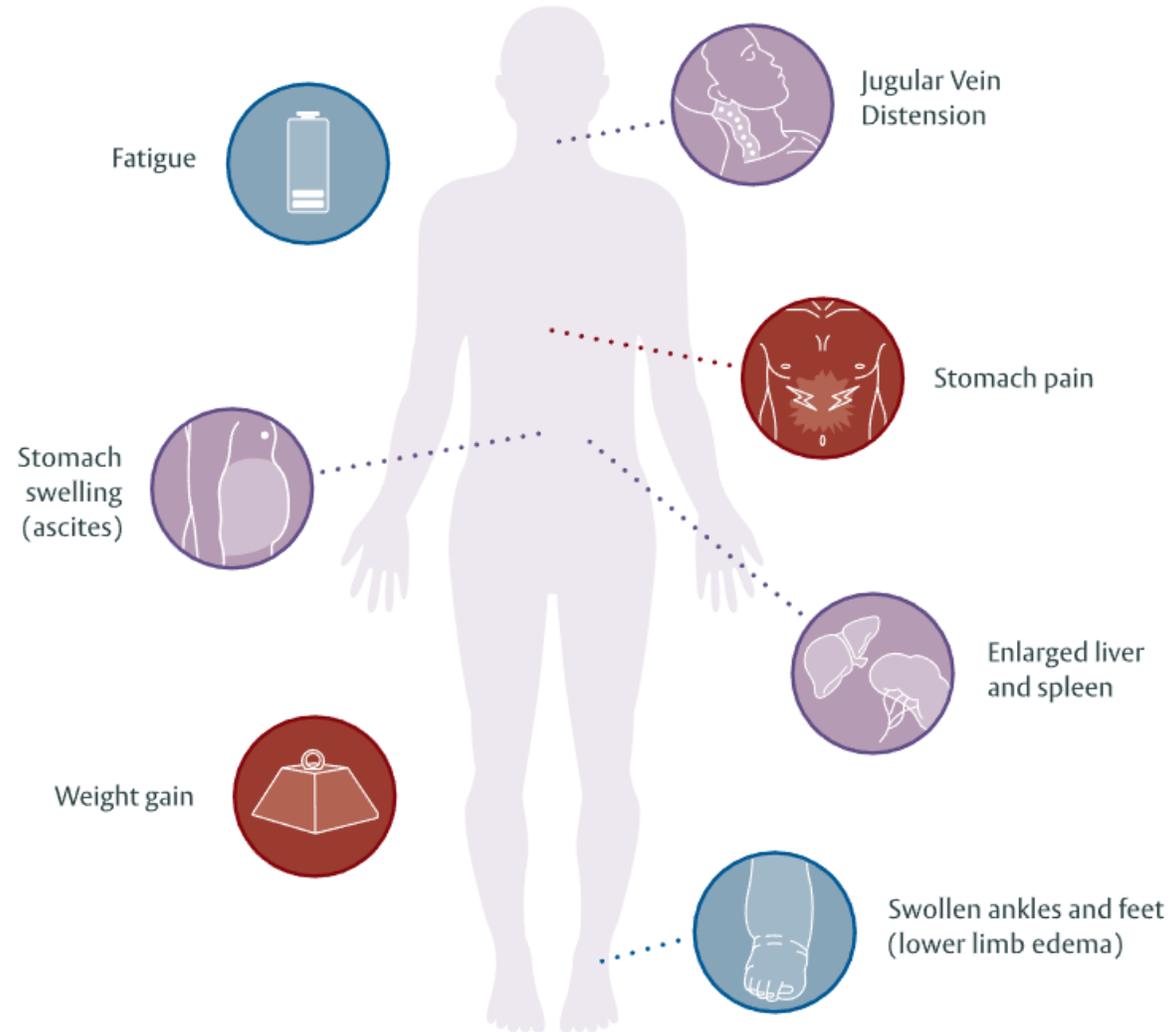


Source: J Nath, et al. JACC. 2004.

Progression of TR Over Time

- RV dilation → RV dysfunction → systemic congestion → reduced cardiac output/index

Symptoms and Signs of TR



Diagnostic Evaluation of TR

- History and physical exam
- Transthoracic echocardiography
- Right heart catheterization
- Advanced studies: Transesophageal echocardiography, cardiac MRI, cardiac CTA

Key Aspects of TTE for Tricuspid Disease

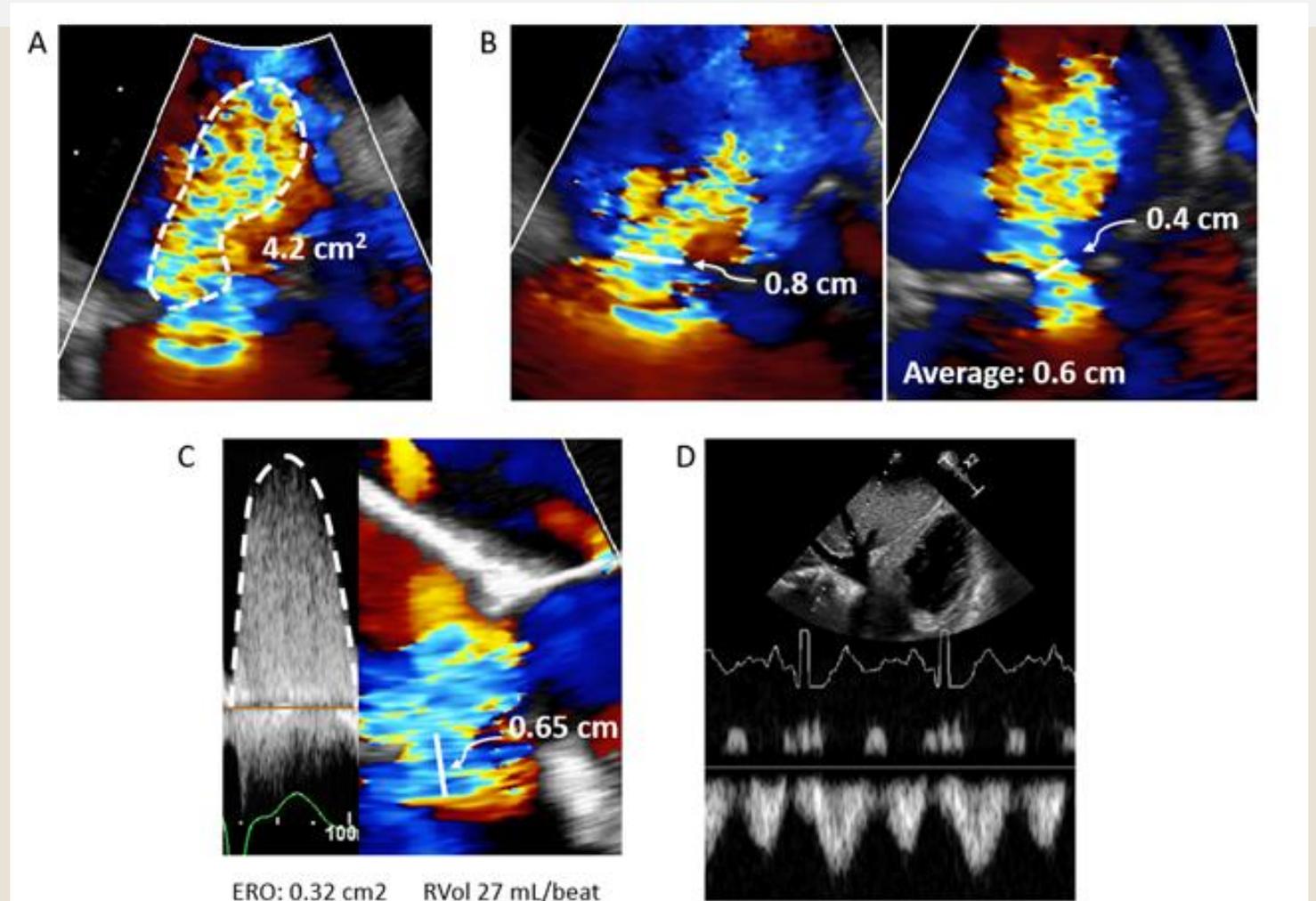
- Assess RA size, RV size and function, estimated PASP, left-sided heart disease
- Determine morphology of tricuspid leaflets
- Evaluate tricuspid annulus size, leaflet motion and coaptation
- Understand interaction of tricuspid leaflets with PPM/ICD leads

When is Advanced Imaging Needed?

- TEE → better visualization of leaflet number, position, origin of regurgitant jets
- Cardiac MRI → accurate, noninvasive quantification of TR severity, measurement of RV volumes and EF, myocardial fibrosis
- Cardiac CTA → high-resolution 3D images of the leaflets, annulus, subvalvular apparatus and adjacent structures

Assessment of TR Severity

- Jet area $\geq 10 \text{ cm}^2$
- Vena contracta $\geq 0.7 \text{ cm}$
- PISA, TR VTI, peak velocity
- Hepatic vein pulsed wave Doppler
- Regurgitant volume $\geq 45 \text{ mL/beat}$

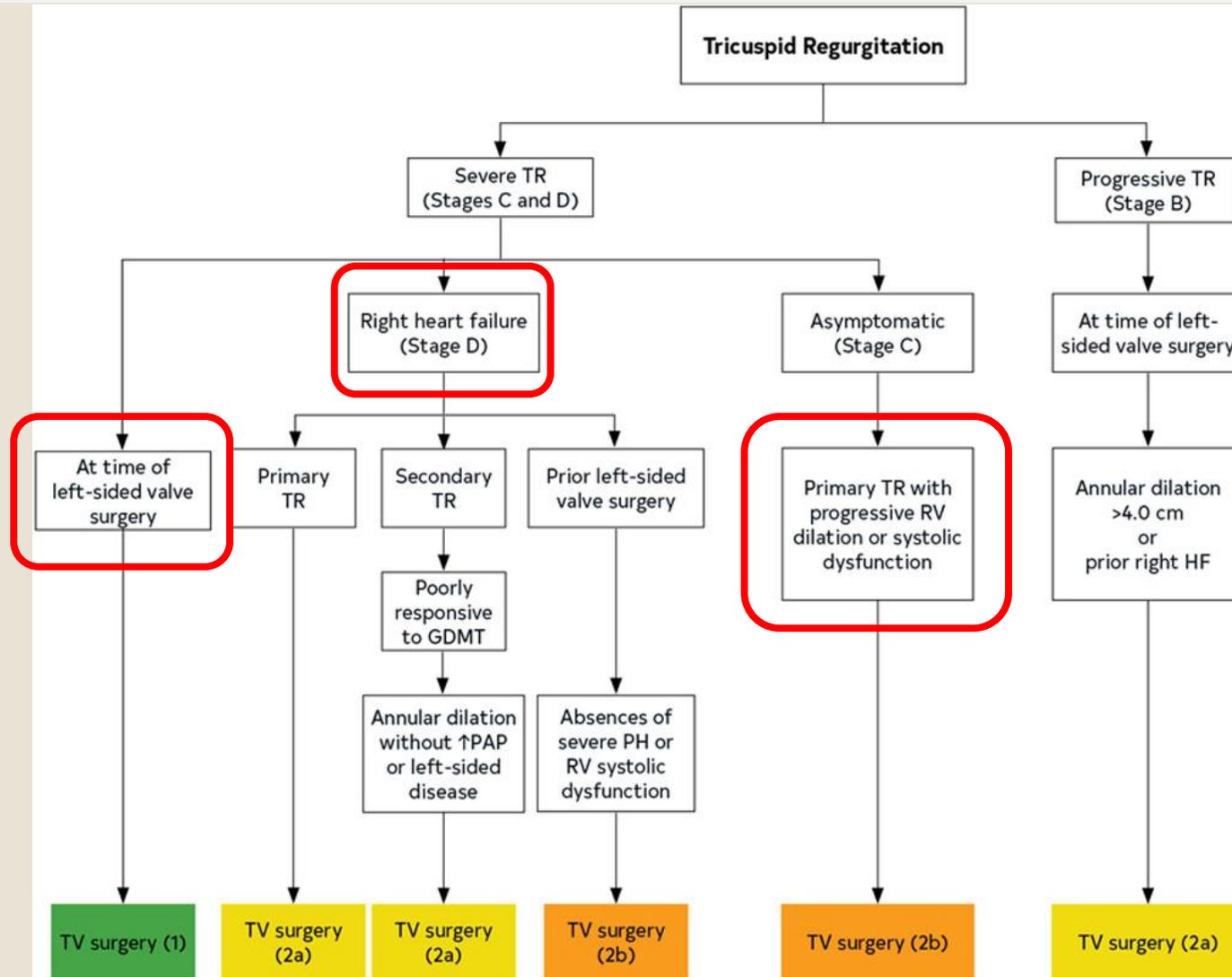


Source: J Meyer, et al. ACC Expert Analysis. 2021.

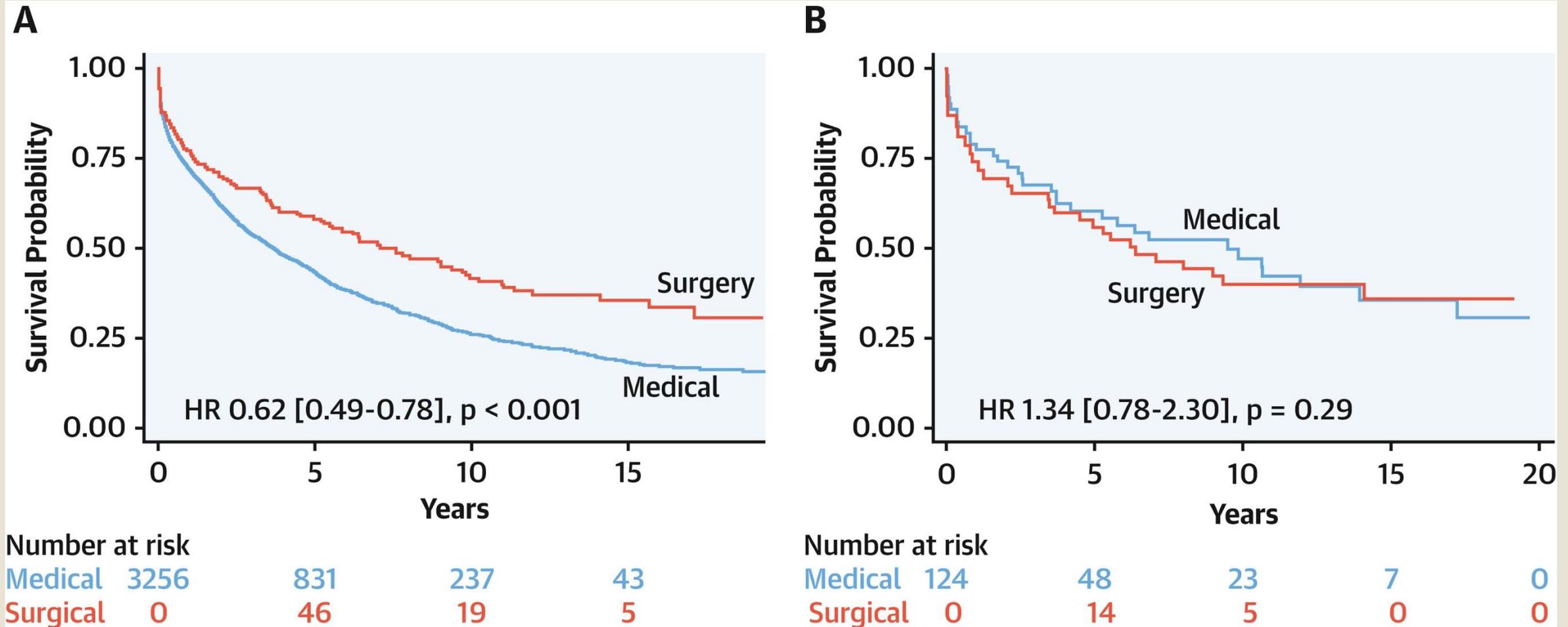
Medical Therapy for TR

- Diuretics are the cornerstone of symptomatic management but do not impact underlying disease process and prognosis
- Therapies aimed at etiology of secondary TR may be helpful

How to Decide When Medical Therapy Isn't Enough

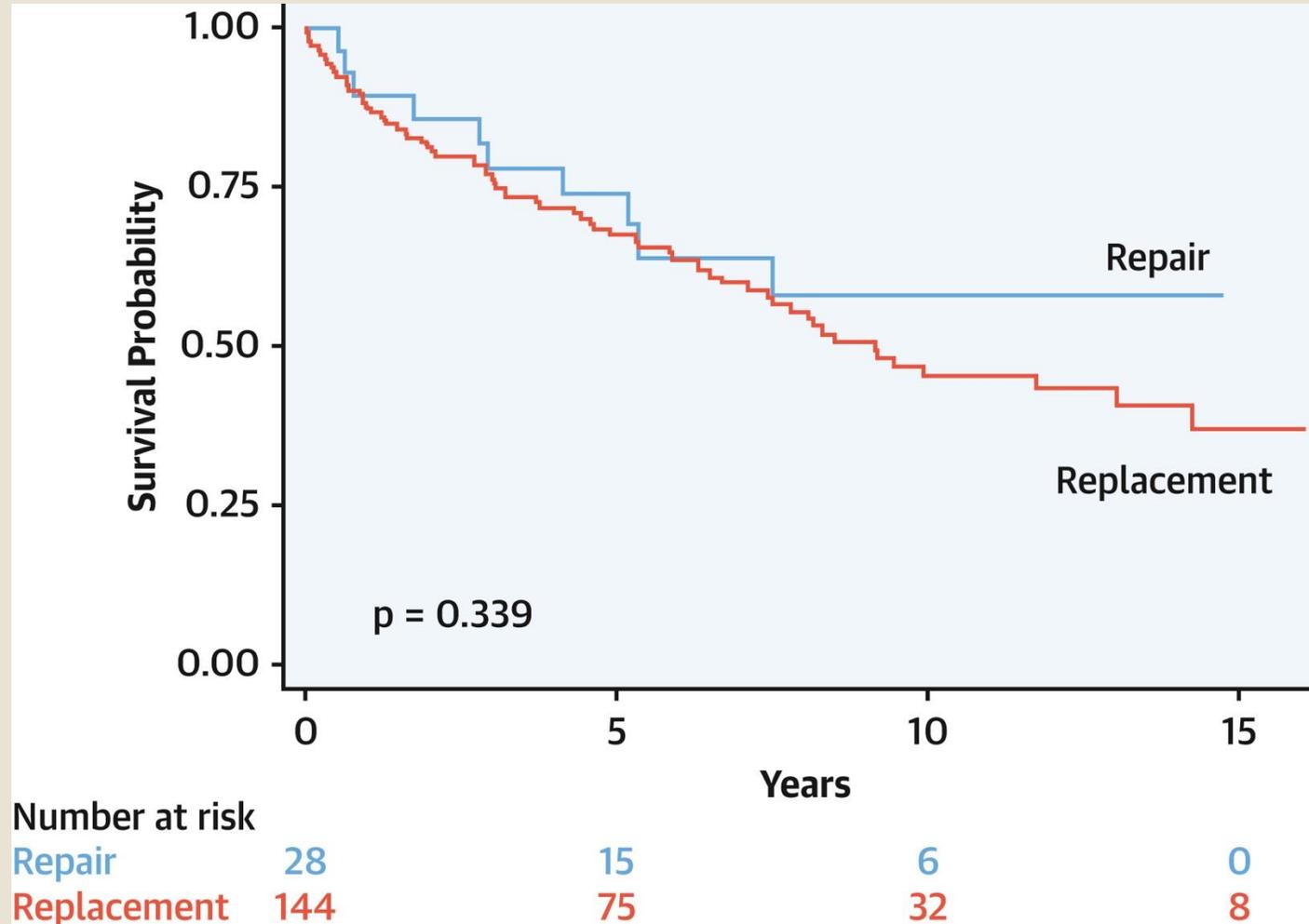


Surgery for Isolated TR Does Not Improve Survival



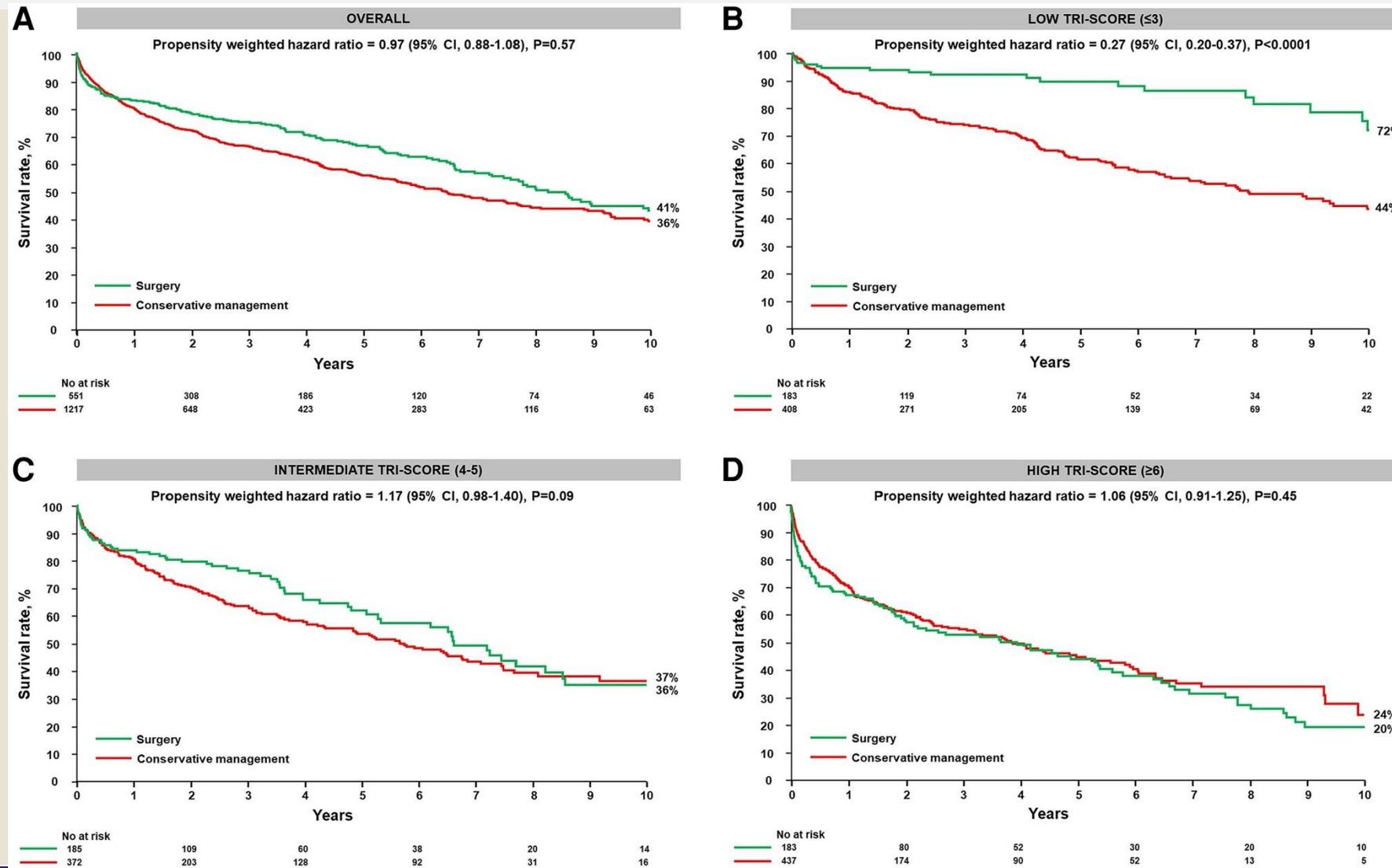
Source: A Axtell, et al. JACC. 2019.

Surgical Repair May be Better than Replacement

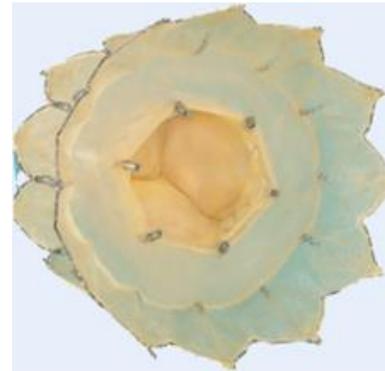
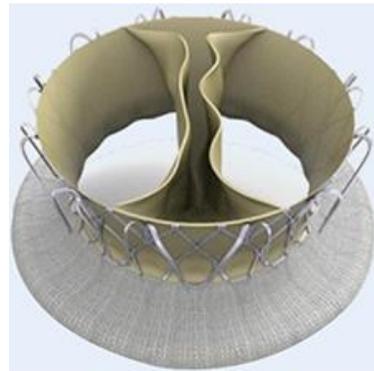
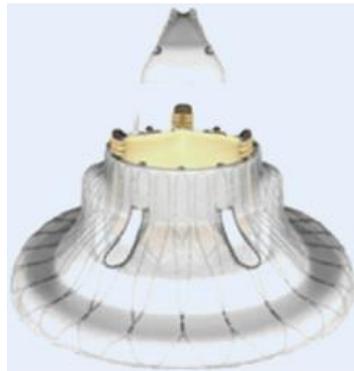
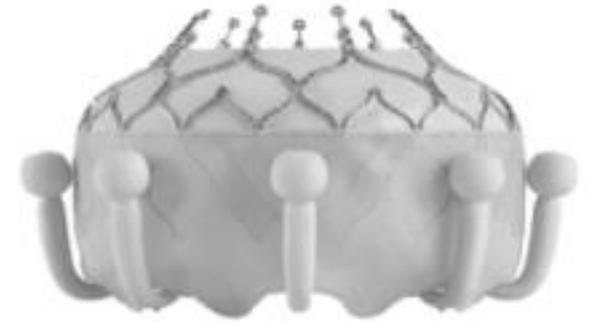
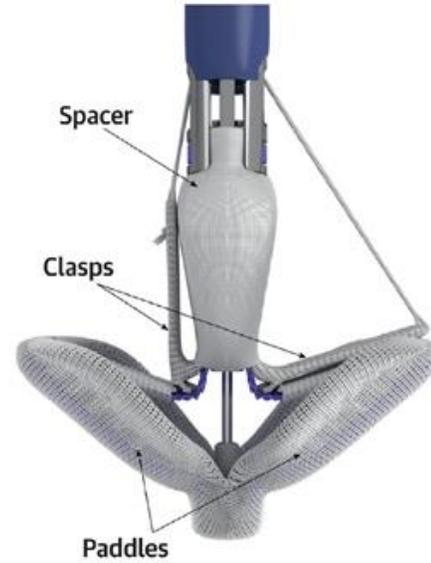
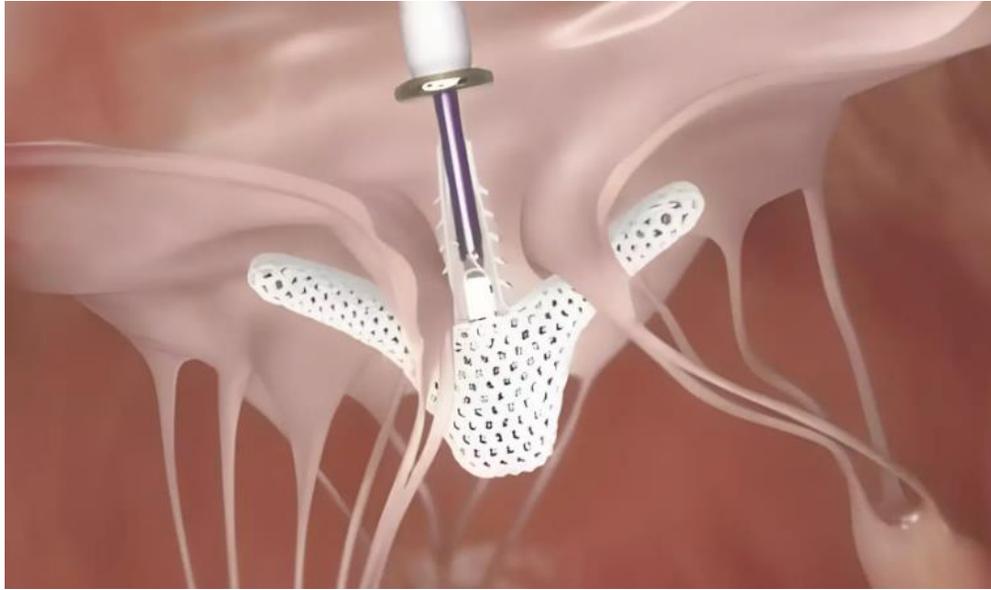


Source: A Axtell, et al. JACC. 2019.

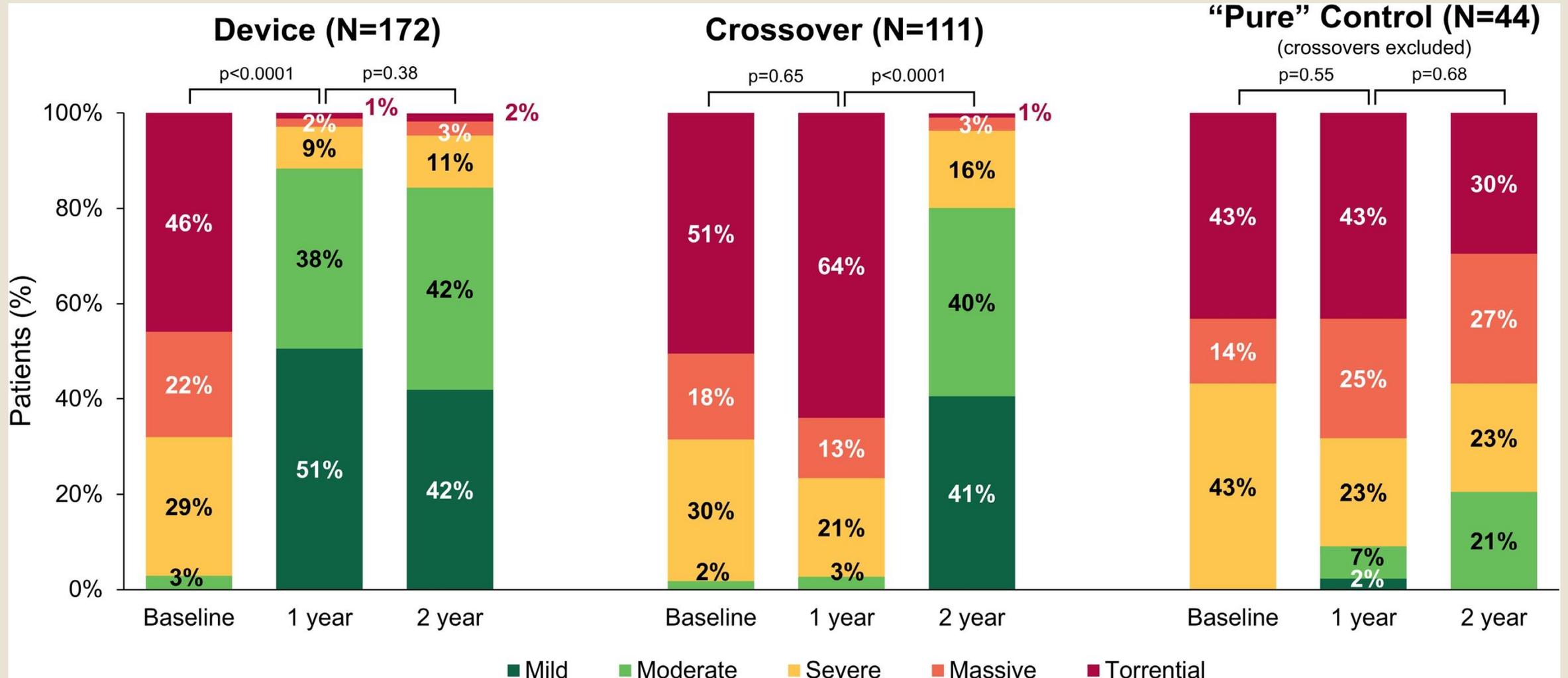
Timing Matters – Refer Before End-Organ Damage



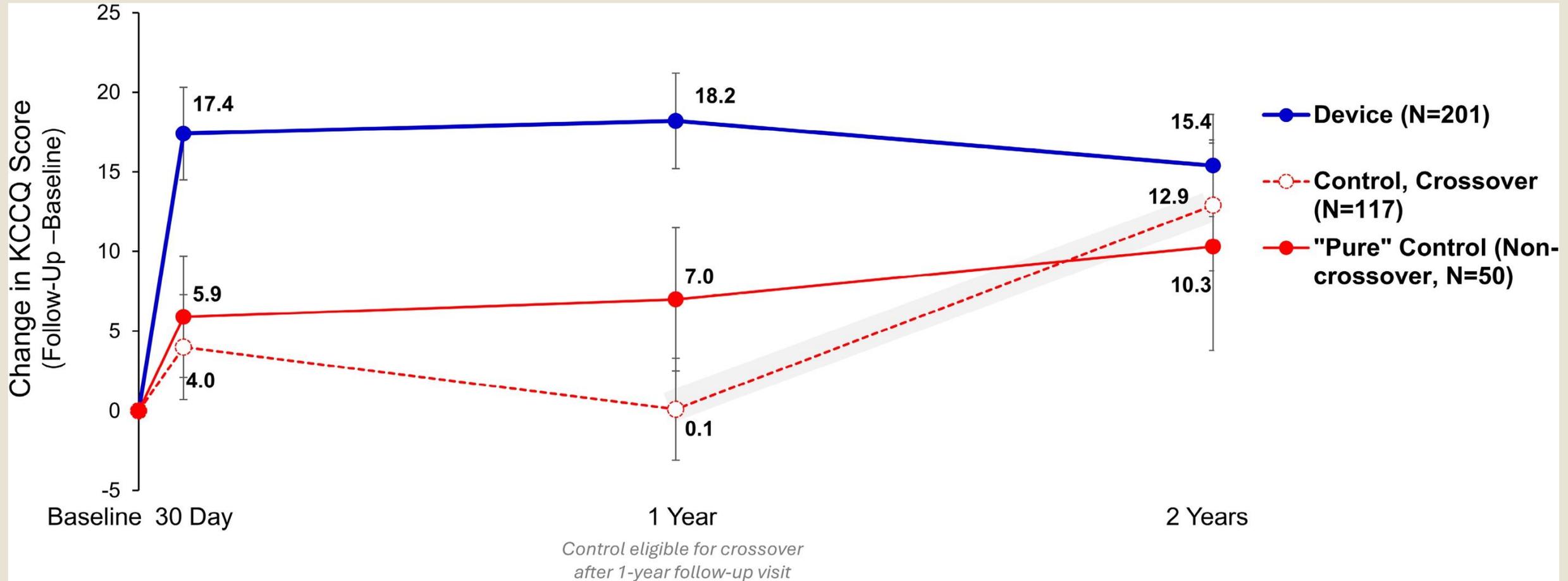
Transcatheter Therapies for Tricuspid Disease



Tricuspid Transcatheter Edge to Edge Repair Reduces TR

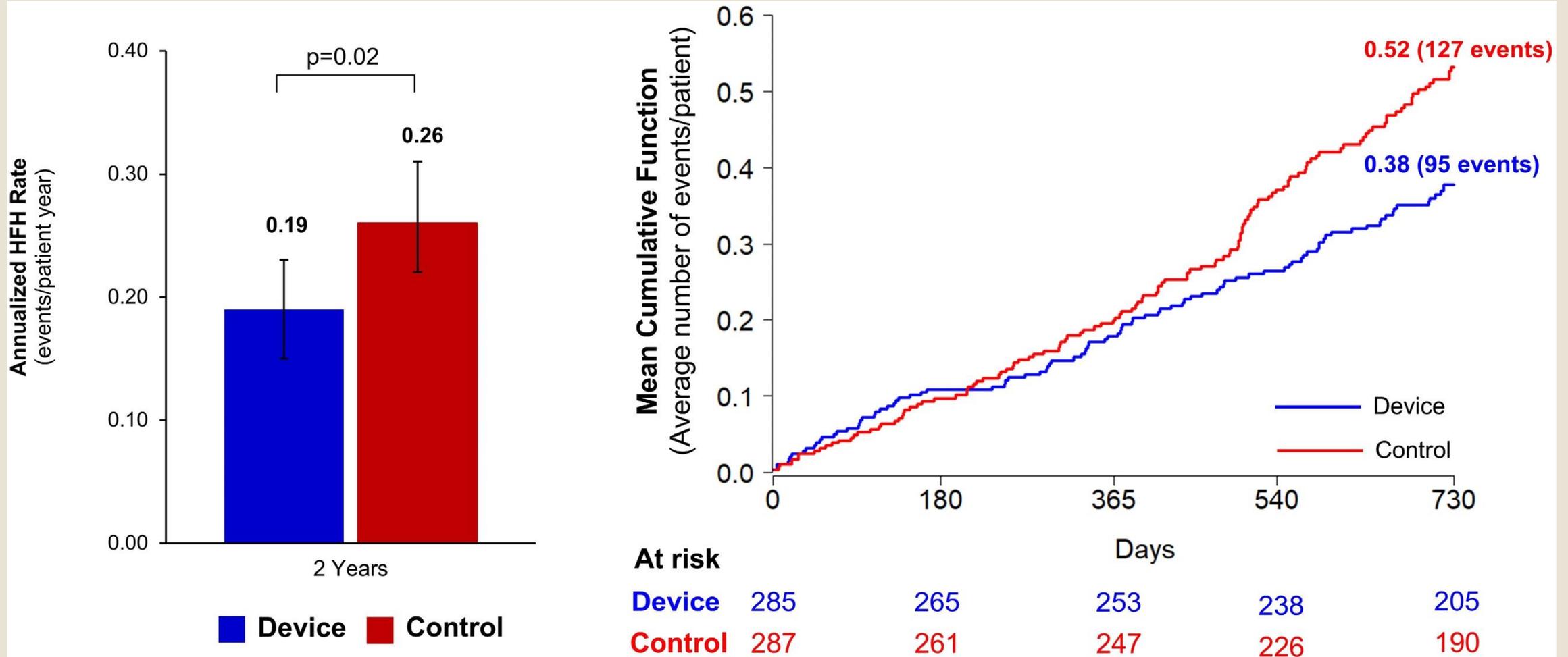


T-TEER Improves QOL, with Some Decrement Over Time



Source: S Kar, et al. Circulation 2025.

Tricuspid TEER Reduces HF Hospitalizations at 2 Years

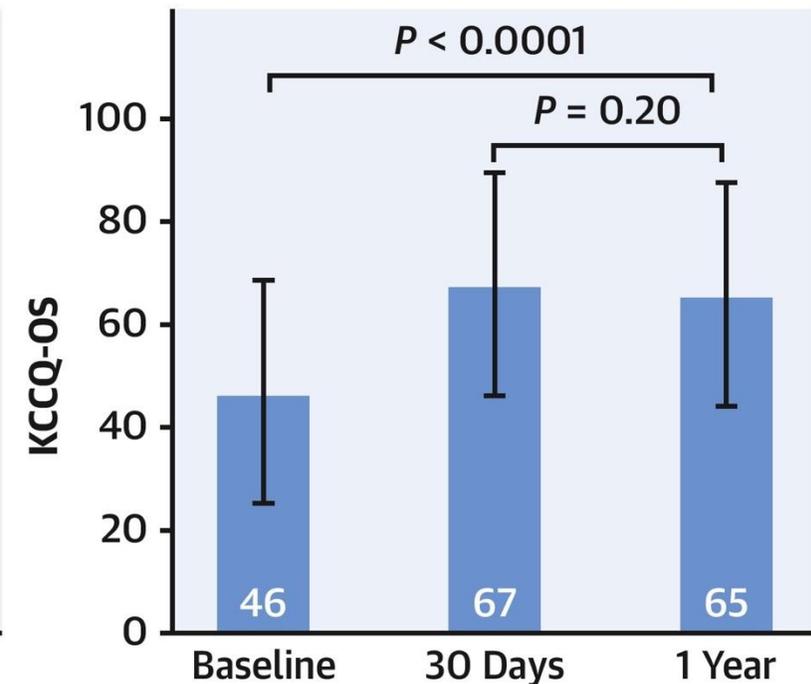
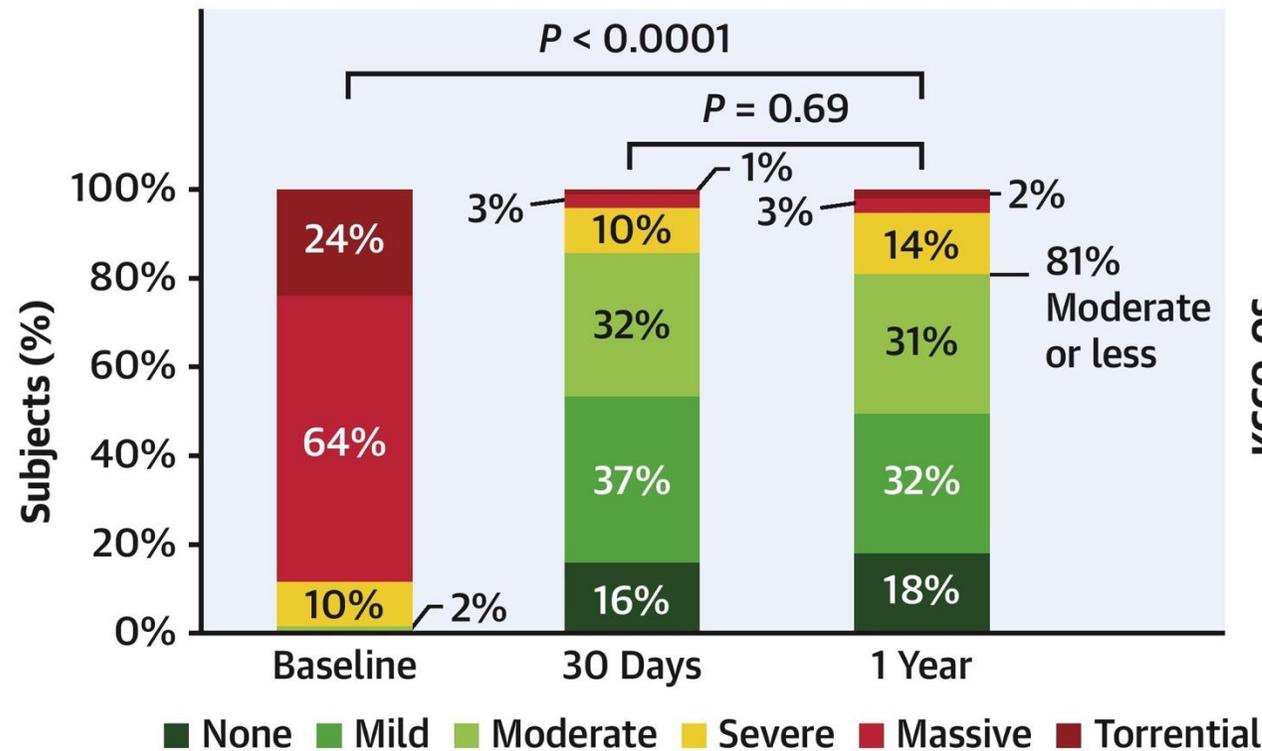


Source: S Kar, et al. Circulation 2025.

Real-World Outcomes with T-TEER

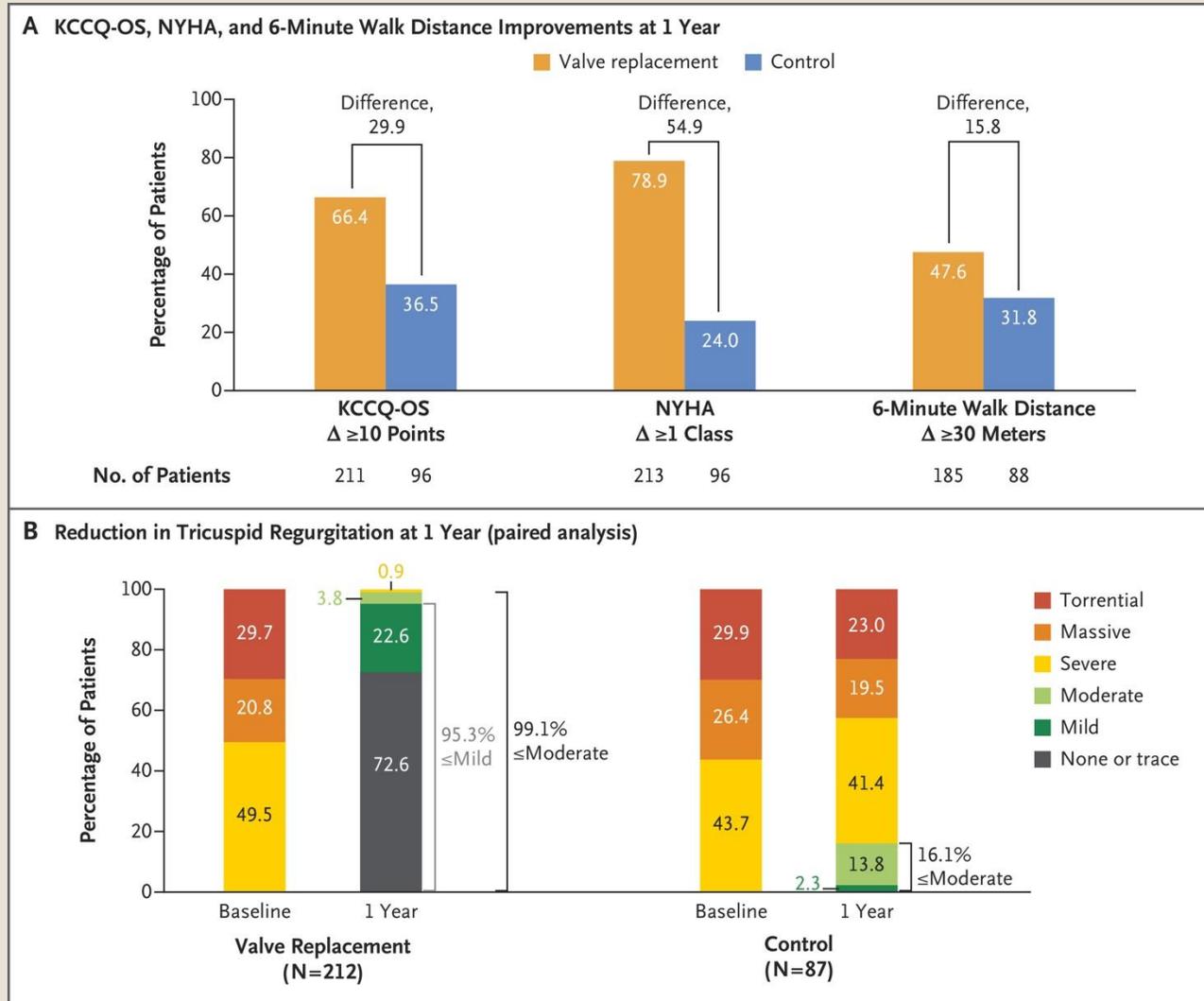
Diverse Real-World Population Treated With Tricuspid Transcatheter Edge-to-Edge Repair

Significant and Sustained 1-Year TR Reduction and Quality-of-Life Improvement

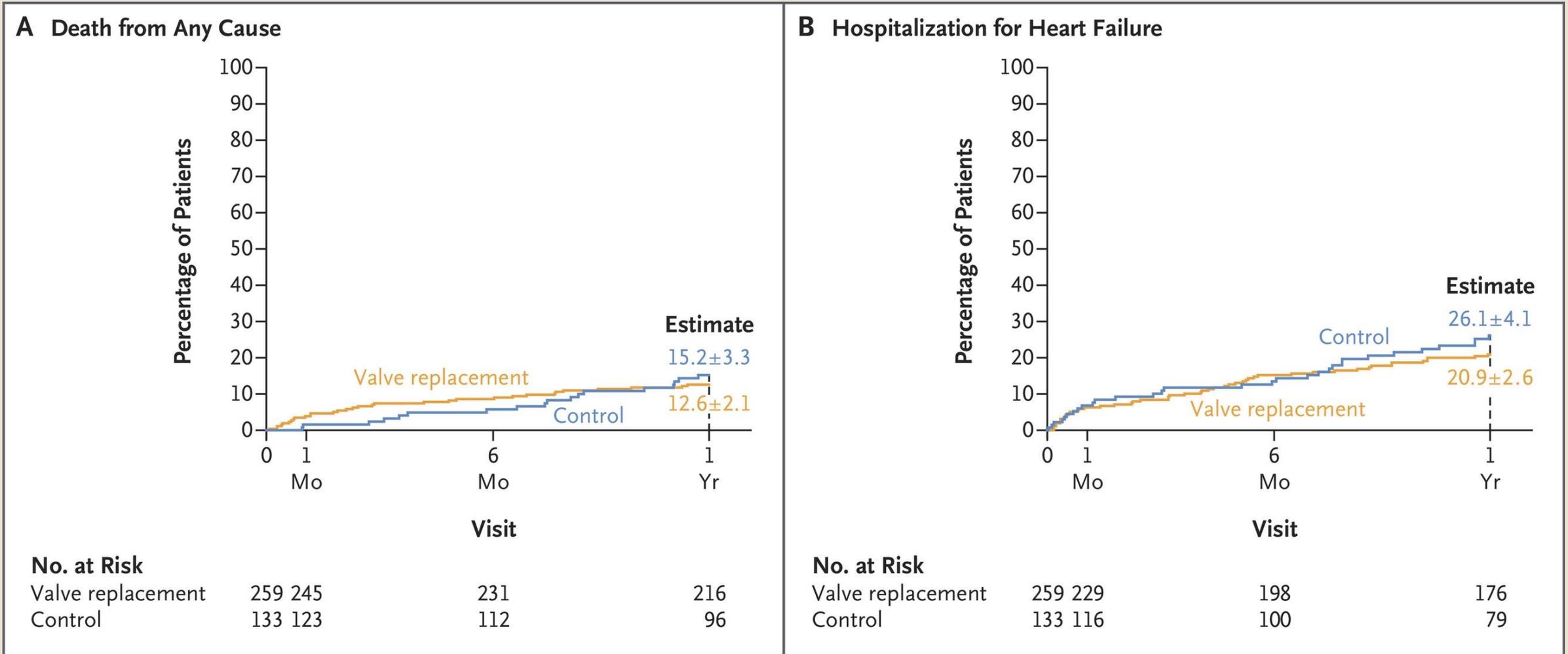


Lurz P, et al. J Am Coll Cardiol. 2024;84(7):607-616.

Transcatheter Tricuspid Valve Replacement Improves QOL



TTVR Decreases HF Hospitalizations



Source: S Kar, et al. Circulation 2025.

Real-world Outcomes with Evoque TTVR

30-Day Outcomes of Real-World TTVR With Evoque System in Europe, N = 176

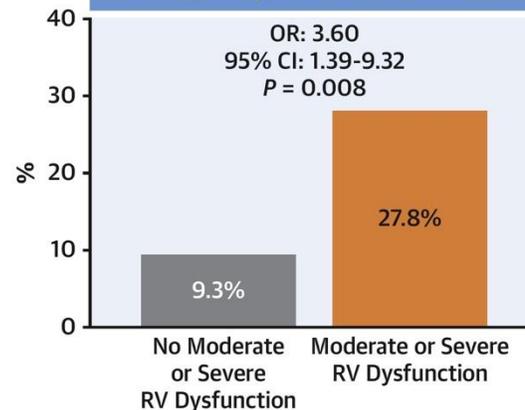
Patient Population

- Mean age 77.8 years
- 72% women
- Median TRI-SCORE 5 (IQR 2)
- Treated with the EVOQUE system October 2023 to February 2025
- 12 Heart Valve Centers

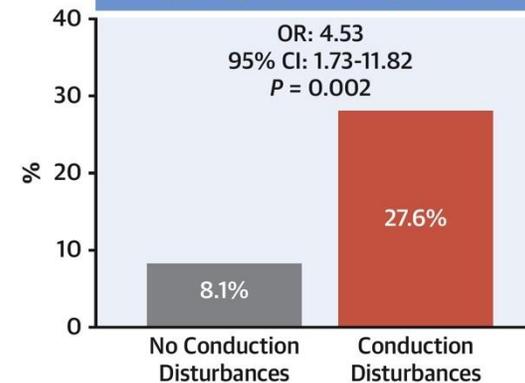
Outcomes at 30 Days

- T-VARC clinical success: 86.9%
- Improvement of ≥ 1 NYHA functional class: 71%
- Improvement in renal function: eGFR mean difference +6.7 mL/min/1.73 m², $P < 0.001$
- Reduction in bilirubin levels: mean difference -3.1 $\mu\text{mol/mL}$, $P < 0.001$

Frequency of Clinical Failure



Frequency of PPM Implantation



- Successful TR reduction after TTVR was associated with significant improvements in functional status and hepato-renal function.
- Moderate or severe RV dysfunction at baseline (20.5%) predicted clinical failure.
- Conduction disturbances at baseline (32.4%) predicted PPM implantation.

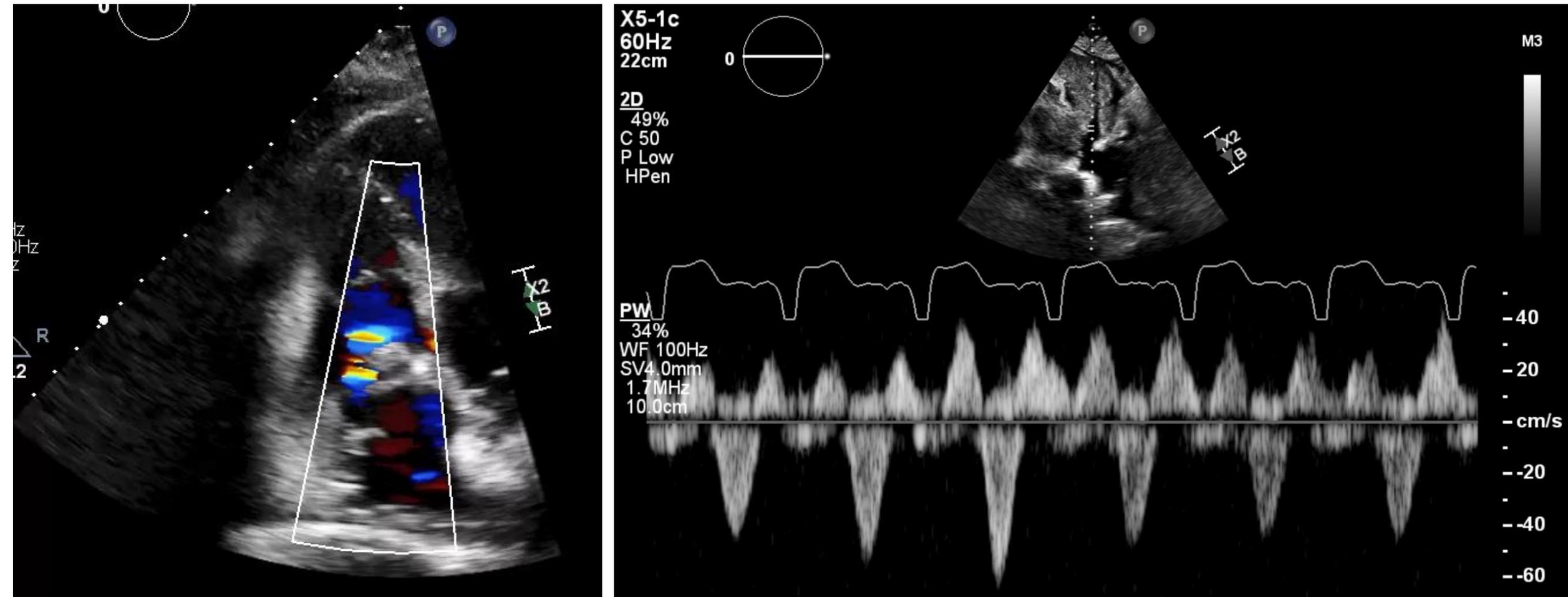
Angellotti D, et al. JACC Cardiovasc Interv. 2025;18(15):1896-1909.

Case Presentation

52-year-old woman

- PMH: HCM s/p subaortic membrane repair x2 (septal myectomy 2019, Ross-Konno 2022), s/p dual-chamber PPM with 100% pacer dependence, paroxysmal atrial fibrillation on DOAC, tricuspid regurgitation s/p T-TEER in 2023, OSA, HFpEF
- Presents with worsening diuretic resistance, NYHA 3 dyspnea, fatigue

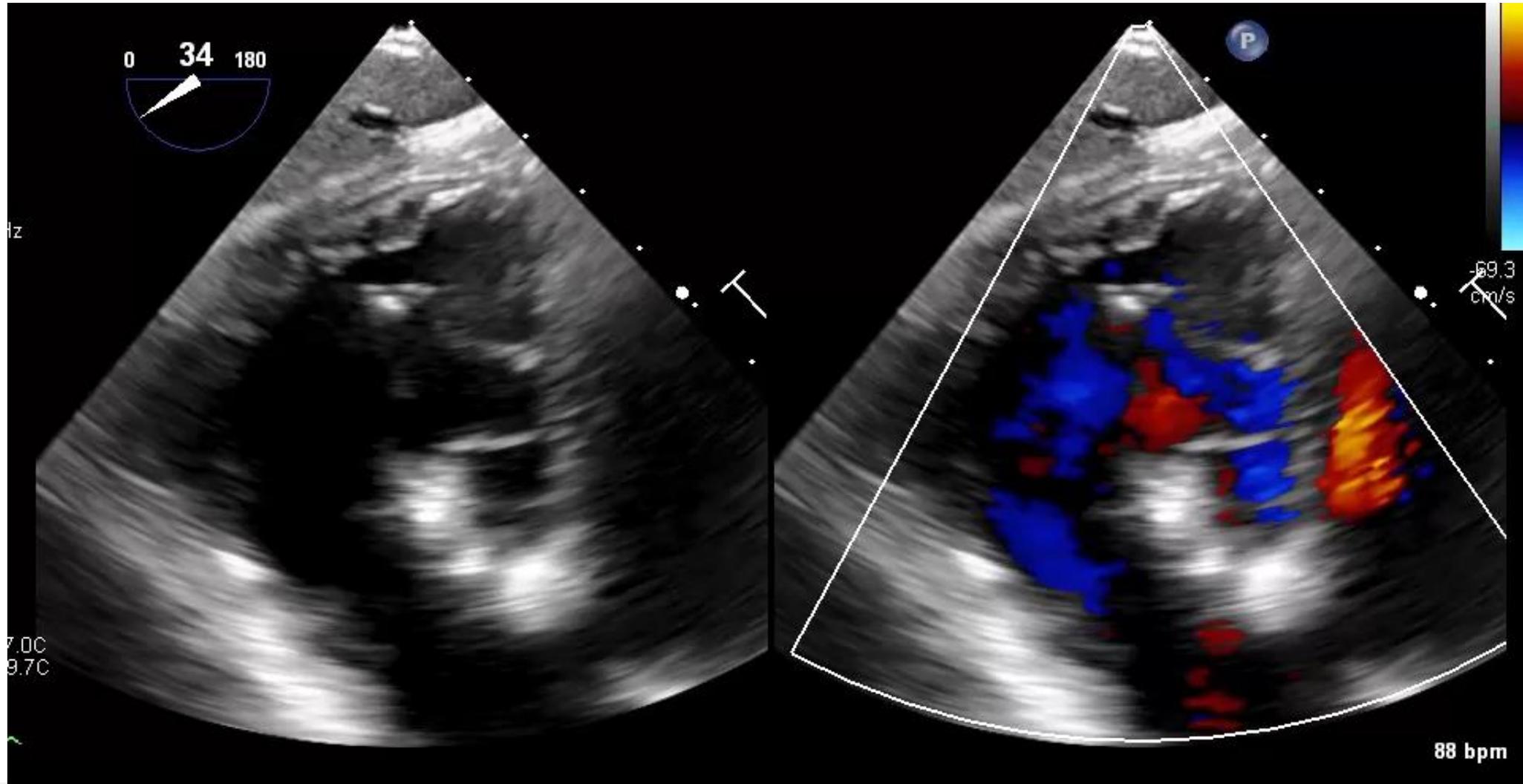
Transthoracic Echocardiogram



Right Heart Catheterization

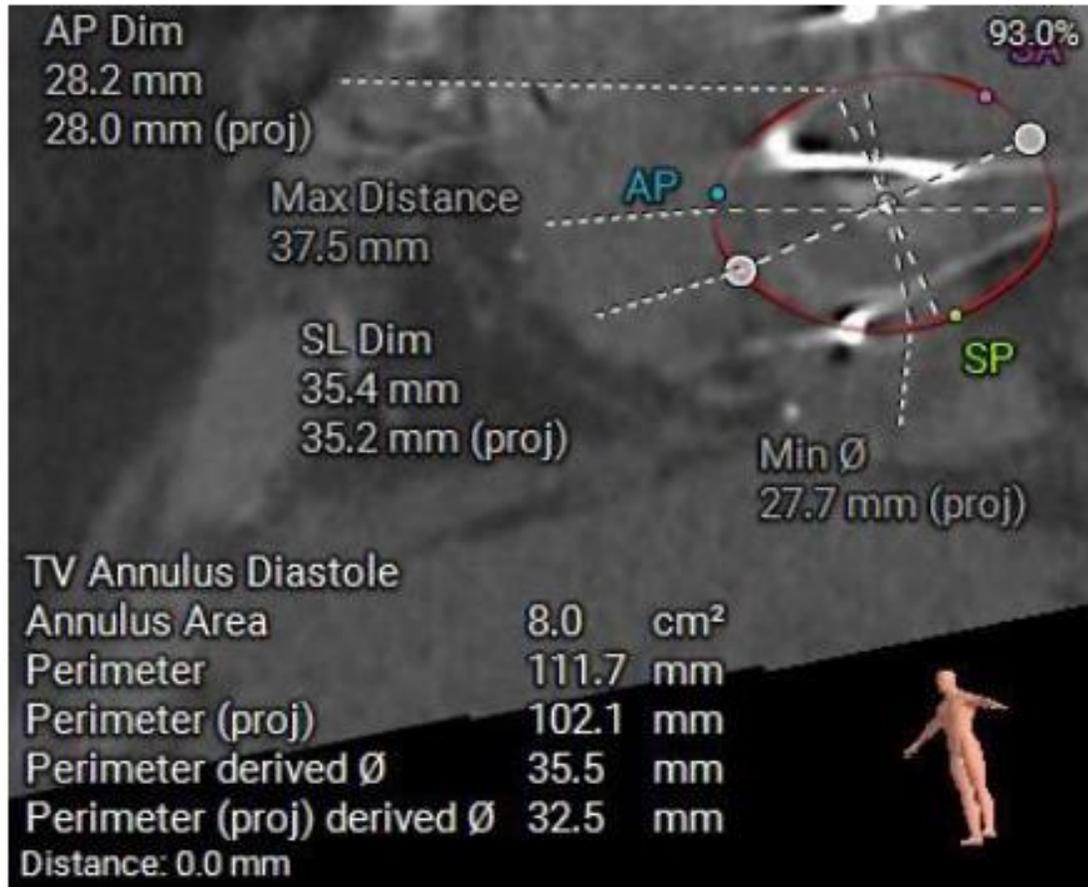
- RA 17 mmHg
- Mean PAP 25 mmHg
- PCWP 17 mmHg, v waves to 27 mmHg
- Fick CI 2.6
- PVR 1.5 Wood units

Transesophageal Echocardiogram



Cardiac CTA

(1) TVA Diastole:



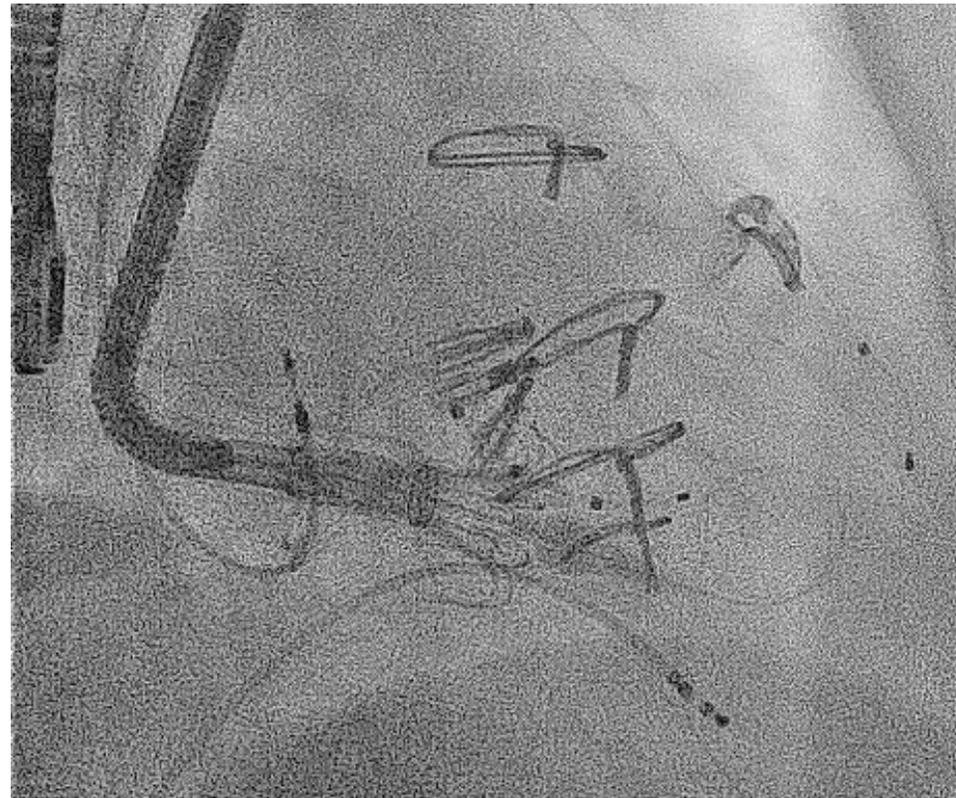
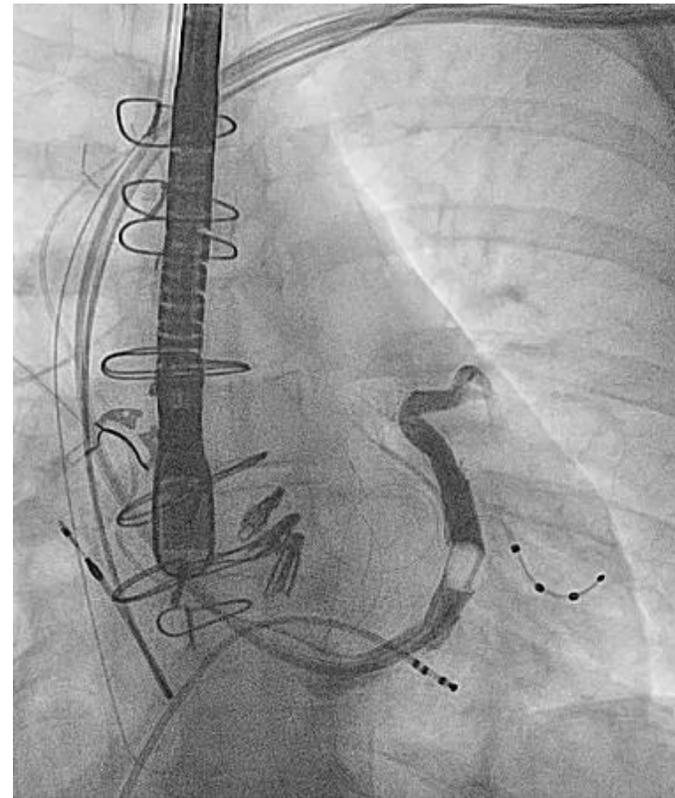
(2) Basal RV Diastole:



Procedural Planning

- Multidisciplinary discussion with AHFT, HOCCM specialist, EP and CT Surgery
- Lead extraction followed by implantation of additional CS lead, TTVR via L IJ due to small RA height, TTVR with 44 mm Evoque valve

Tricuspid Transcatheter Valve Replacement



Clinical Course

- Treated with escalating diuretics including IV Diuril and empirically started on milrinone with minimal response
- RHC: RA 20 mmHg, PA 48/19/31 mmHg, PCWP 19 mmHg, Fick CI 3.2, TD CI 2.94, PVR 1.8 WU, PAPI 1.45
- Inotrope stopped, admitted to CCU for SCUF x4 days
- Ultimately discharged 3 weeks post-op 11kg below admission weight

Key Takeaways for Management of TR



>80% of TR is secondary, often occurring with left-sided heart failure



Signs and symptoms of severe TR reflect venous congestion and progressive RV failure



Historically, surgery for isolated TR has not improved survival but likely reflects referral and selection bias



New and emerging transcatheter therapies for TR offer opportunities to treat patients earlier and expand our understanding of benefits of intervention

Thank You!



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