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Estenosis Aortica con Bajo Gradiente y Bajo Flujo Selección TAVI

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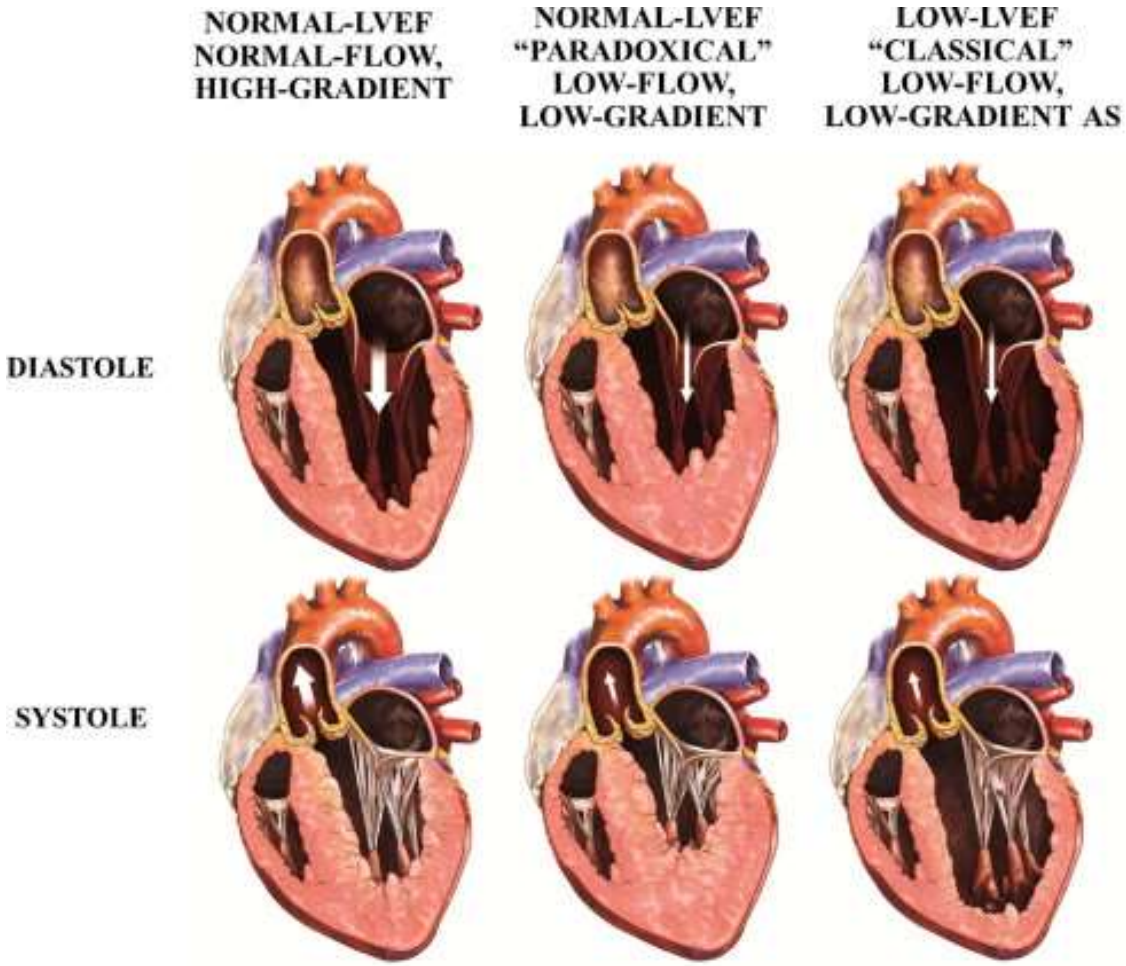
UNIVERSITY OF MIAMI
MILLER SCHOOL
of MEDICINE

Different Patterns of Severe AS According to Flow, Gradient, and LV Geometry



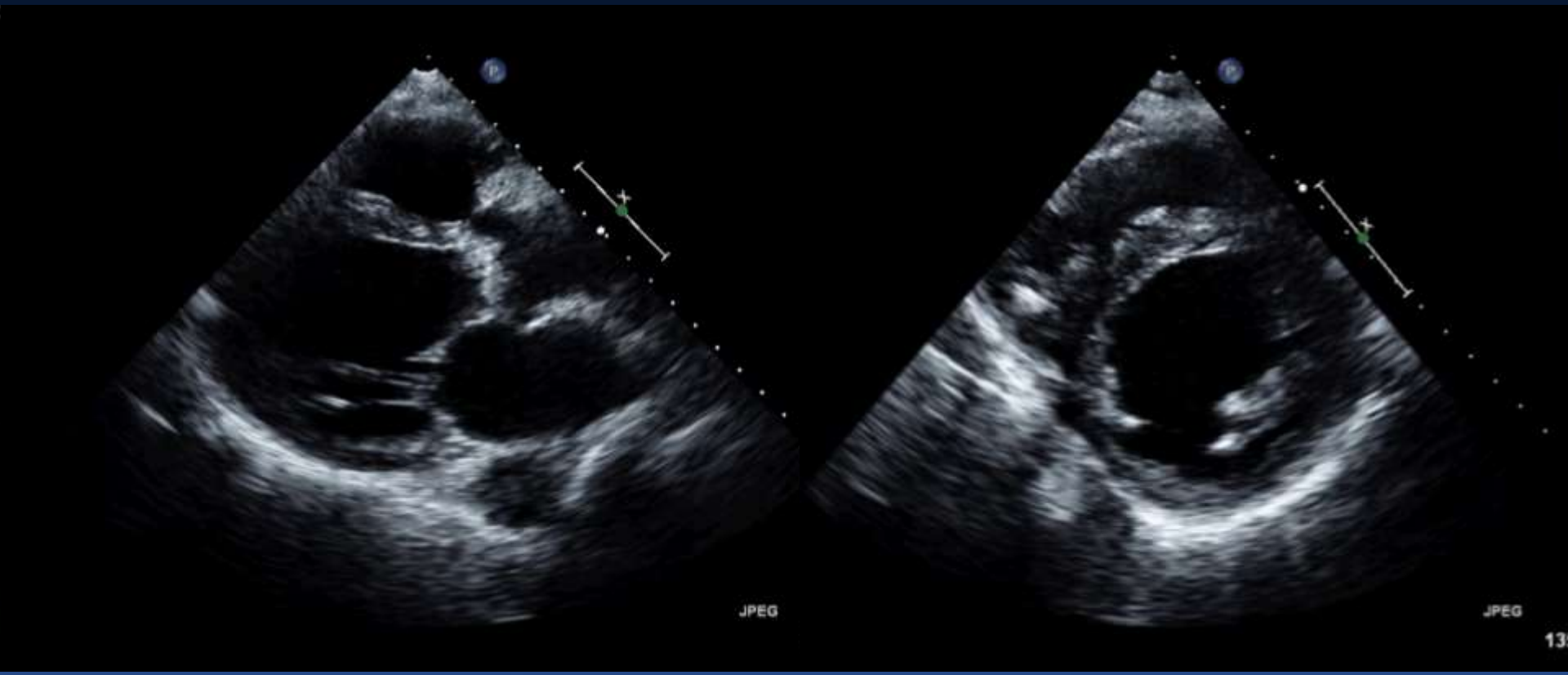
Low-flow state is generally defined as a stroke volume index <35 mL/m^2

Pibarot & Dumesnil
JACC, 2012

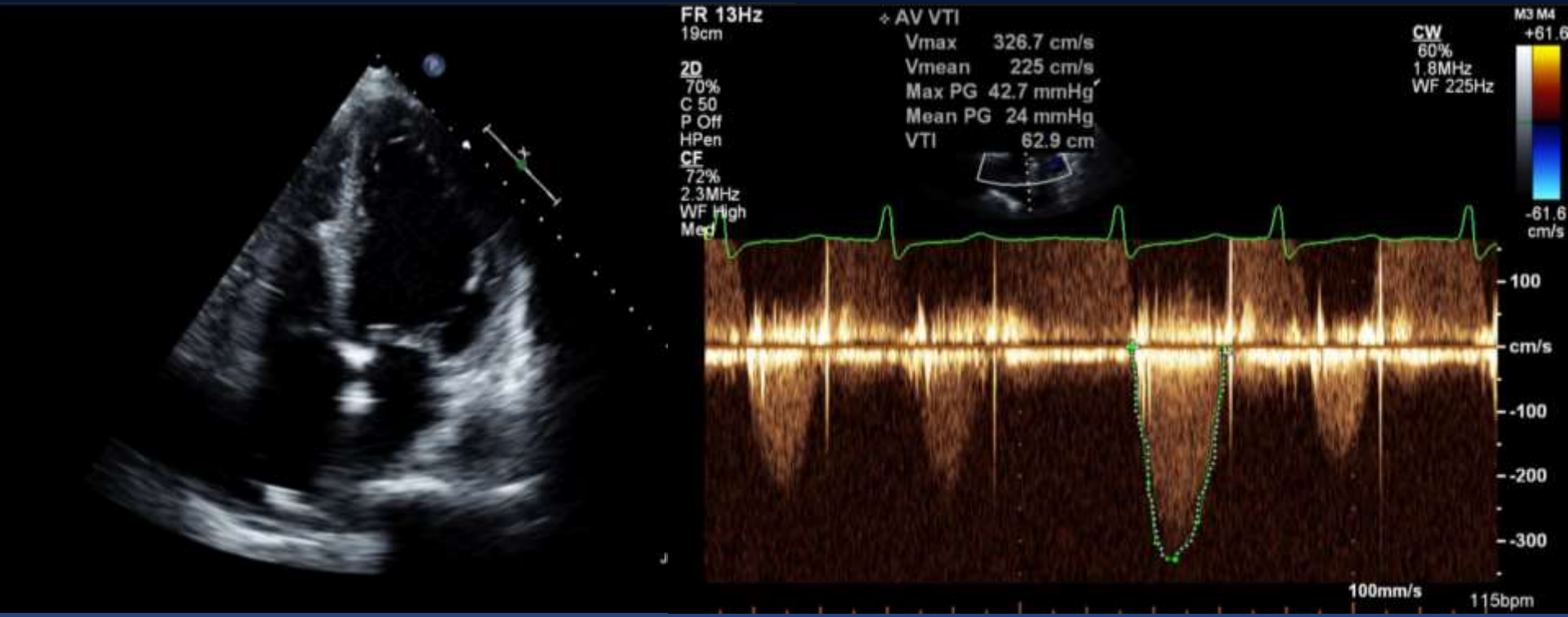
Clinical TAVR

- 72 y/o male with severe AS, NYHA class IV
- Chest pain episodes
- Low EF 10-15%
- Hepatitic C, Cirrhosis, ascitis
- ICD placed and sent to hospice at an OSH

Case: Baseline ECHO



Baseline ECHO



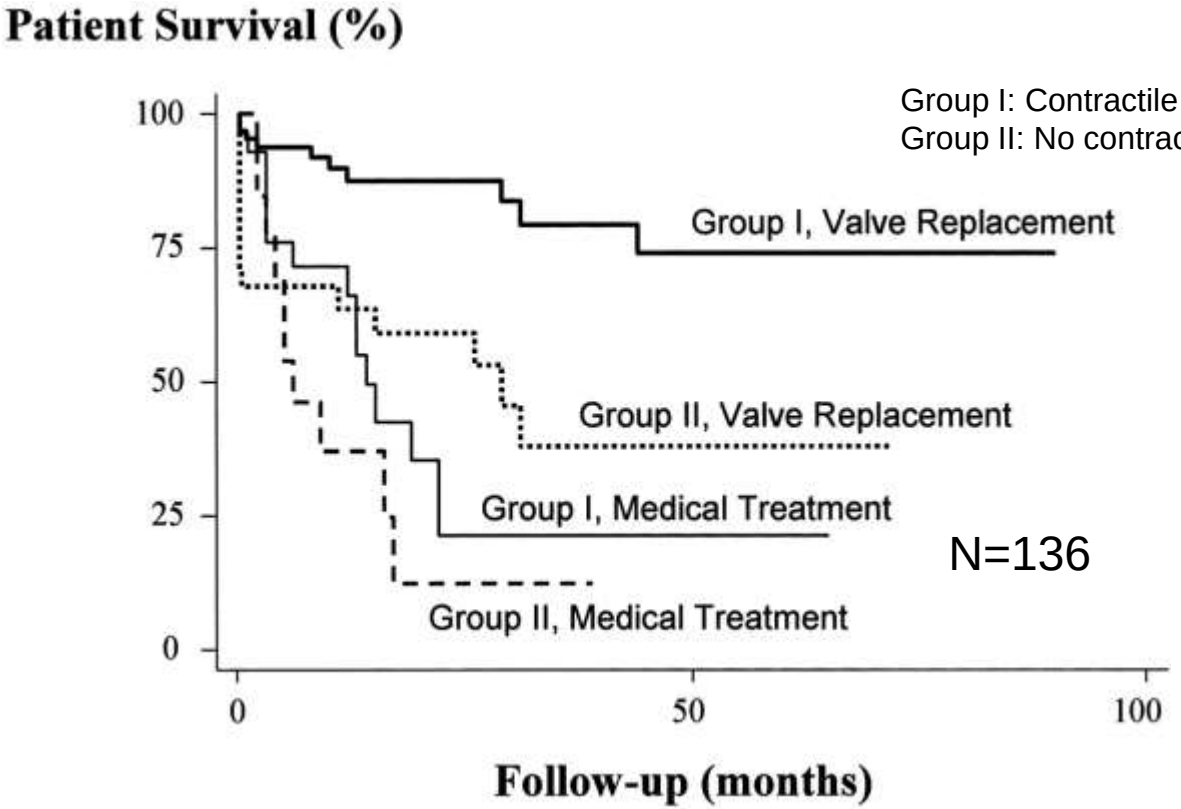
Identifying patients who will experience LV reverse remodeling is challenging

- **Absence of fixed myocardial damage, structural remodeling and scarring, associated with LV EF recovery**
  - Dobutamine stress ECHO - Cardiac MR
- **BAV considered a clinical tool**
  - Small gradient reductions can stabilize patients
- **Revascularization may be beneficial**
  - Should be reserved for severe proximal stenoses

Low-Gradient Aortic Stenosis

Operative Risk Stratification and Predictors for Long-Term Outcome: A Multicenter Study Using Dobutamine Stress Hemodynamics

Jean-Luc Monin, MD; Jean-Paul Quéré, MD; Mehran Monchi, MD; Hélène Petit, MD; Serge Baleynaud, MD; Christophe Chauvel, MD; Camélia Pop, MD; Patrick Ohlmann, MD; Claude Lelguen, MD; Patrick Dehant, MD; Christophe Tribouilloy, MD, PhD; Pascal Guéret, MD



Group I: Contractile reserve (n=92)
Group II: No contractile reserve (n=44)

LV contractile reserve: ↑ in stroke volume ≥ 20% during DSE

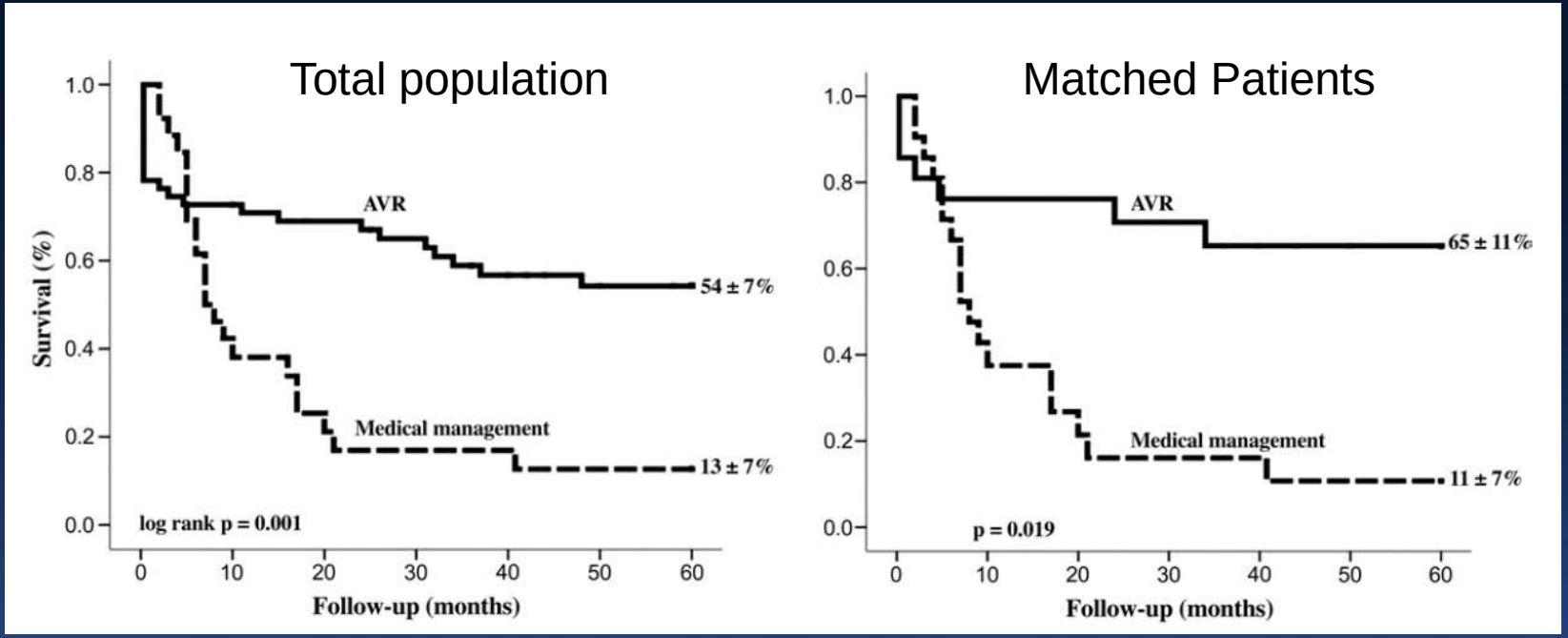
Circulation 2003;108:319-324

Reasons Why DSE May not Accurately Predict LV Recovery

- Afterload mismatch due to an imbalance between the severity of the stenosis and myocardial reserve
- Inadequate increase of myocardial blood flow due to associated CAD
- Irreversible myocardial damage due to previous myocardial infarction or extensive myocardial fibrosis.

AVR for LF LG AS without Contractile Reserve in DSE

N=81

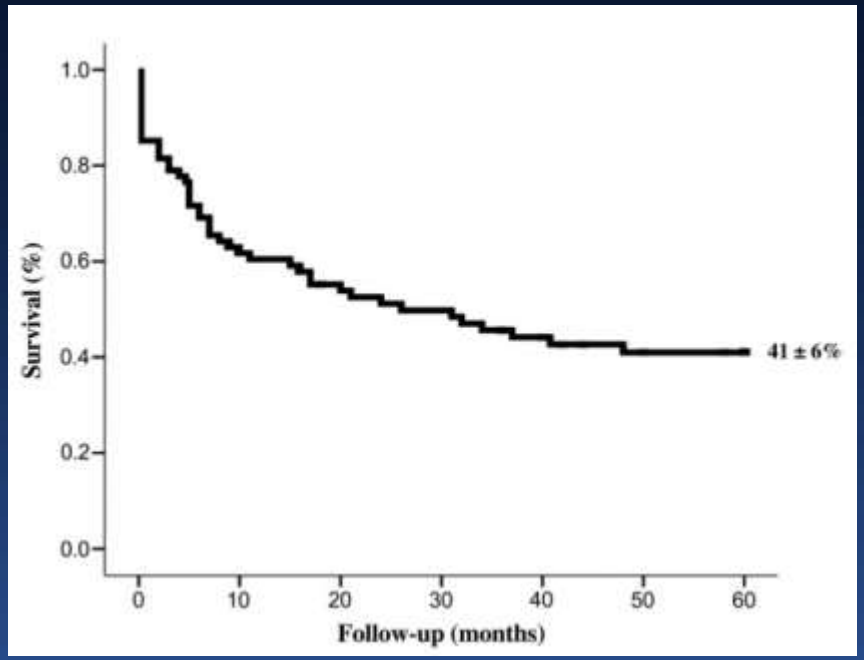


Absence of CR: absence of increase in stroke volume of 20%

Tribouilloy C, et al. JACC 2009;53:1865–73

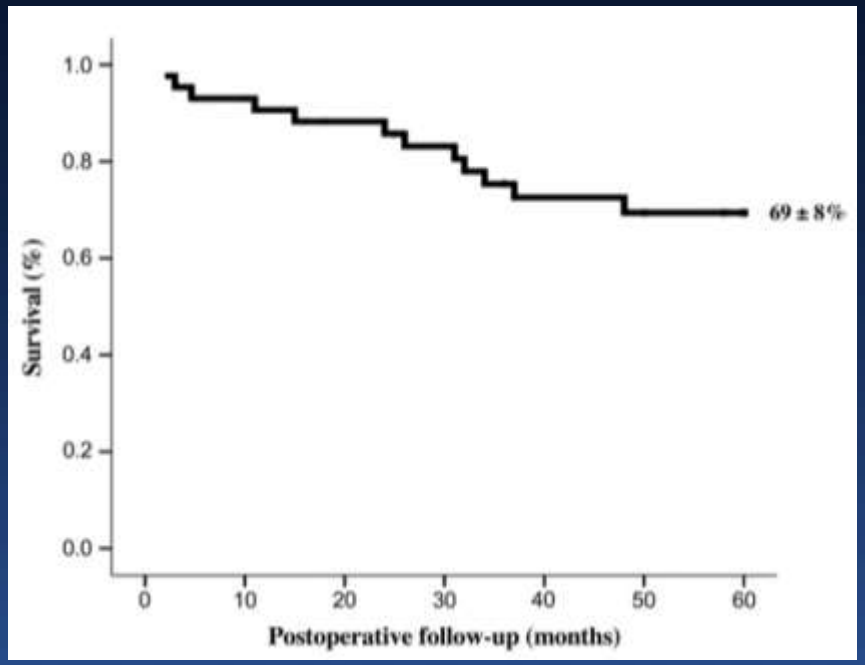
Lack of Contractile Reserve Predicts Increased Surgical Mortality

Overall Survival



Late Survival

Excluding Perioperative Mortality



Tribouilloy C, et al. JACC 2009;53:1865–73

2014 AHA/ACC Guideline for the Management of Patients With Valvular Heart Disease

A Report of the American College of Cardiology/American Heart Association Task Force on Practice Guidelines

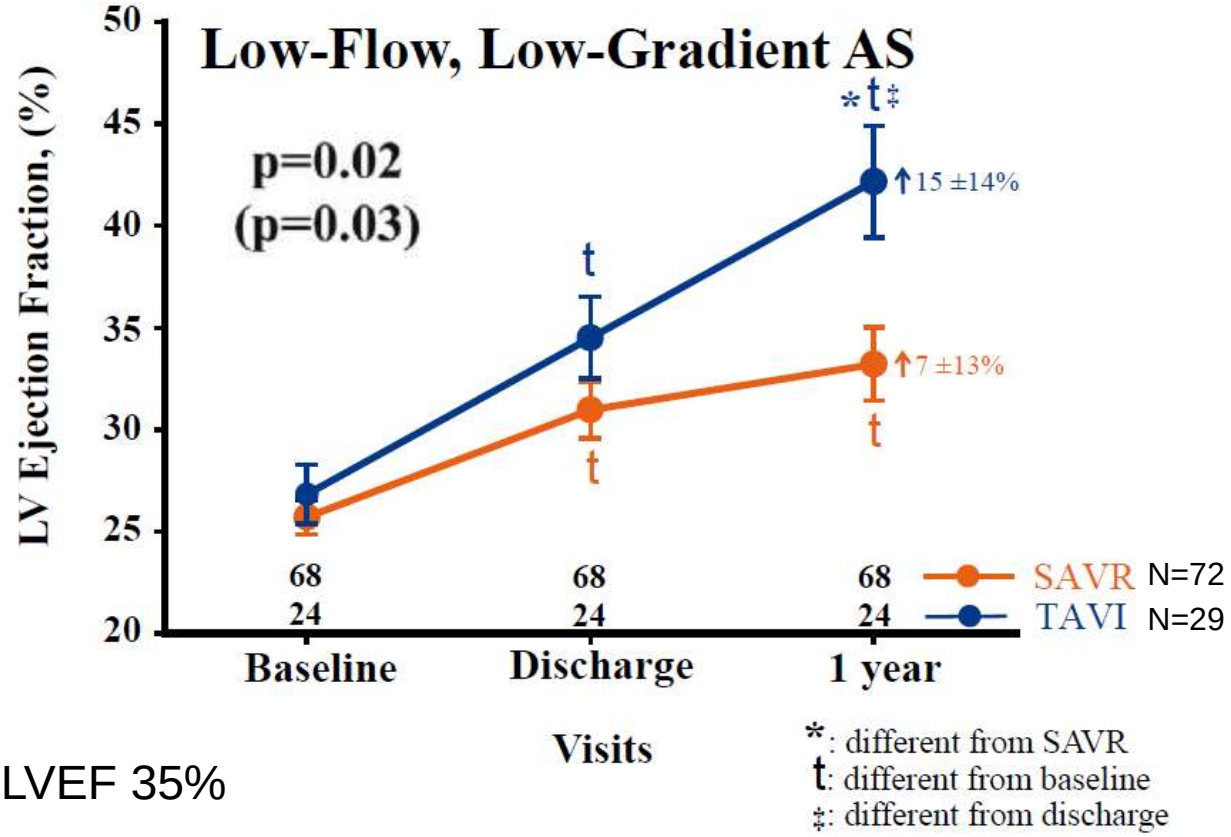
CLASS IIa

3. **AVR is reasonable in symptomatic patients with low-flow/low-gradient severe AS with reduced LVEF (stage D2) with a (43,141,142) *(Level of Evidence: B):***
   a. **Calcified aortic valve with reduced systolic opening;**
   b. **Resting valve area 1.0 cm^2 or less;**
   c. **Aortic velocity less than 4 m per second or mean pressure gradient less than 40 mm Hg;**
   d. **LVEF less than 50%; and**
   e. **A low-dose dobutamine stress study that shows an aortic velocity 4 m per second or greater or mean pressure gradient 40 mm Hg or higher with a valve area 1.0 cm^2 or less at any dobutamine dose.**

Nishimura RA, et al. *J Am Coll Cardiol*. 2014;63:e57-185

Comparison Between Transcatheter and Surgical Prosthetic Valve Implantation in Patients With Severe Aortic Stenosis and Reduced Left Ventricular Ejection Fraction

M.A. Clavel, DVM, MS; J.G. Webb, MD; J. Rodés-Cabau, MD; J.B. Masson, MD; E. Dumont, MD; R. De Larochellière, MD; D. Doyle, MD; S. Bergeron, MD; H. Baumgartner, MD; I.G. Burwash, MD; J.G. Dumesnil, MD; G. Mundigler, MD; R. Moss, MD; A. Kempny, MD; R. Bagur, MD; J. Bergler-Klein, MD; R. Gurvitch, MD; P. Mathieu, MD; P. Pibarot, DVM, PhD



Preprocedural LVEF 35%

Clavel M et al. Circulation 2010;122:1928-1936

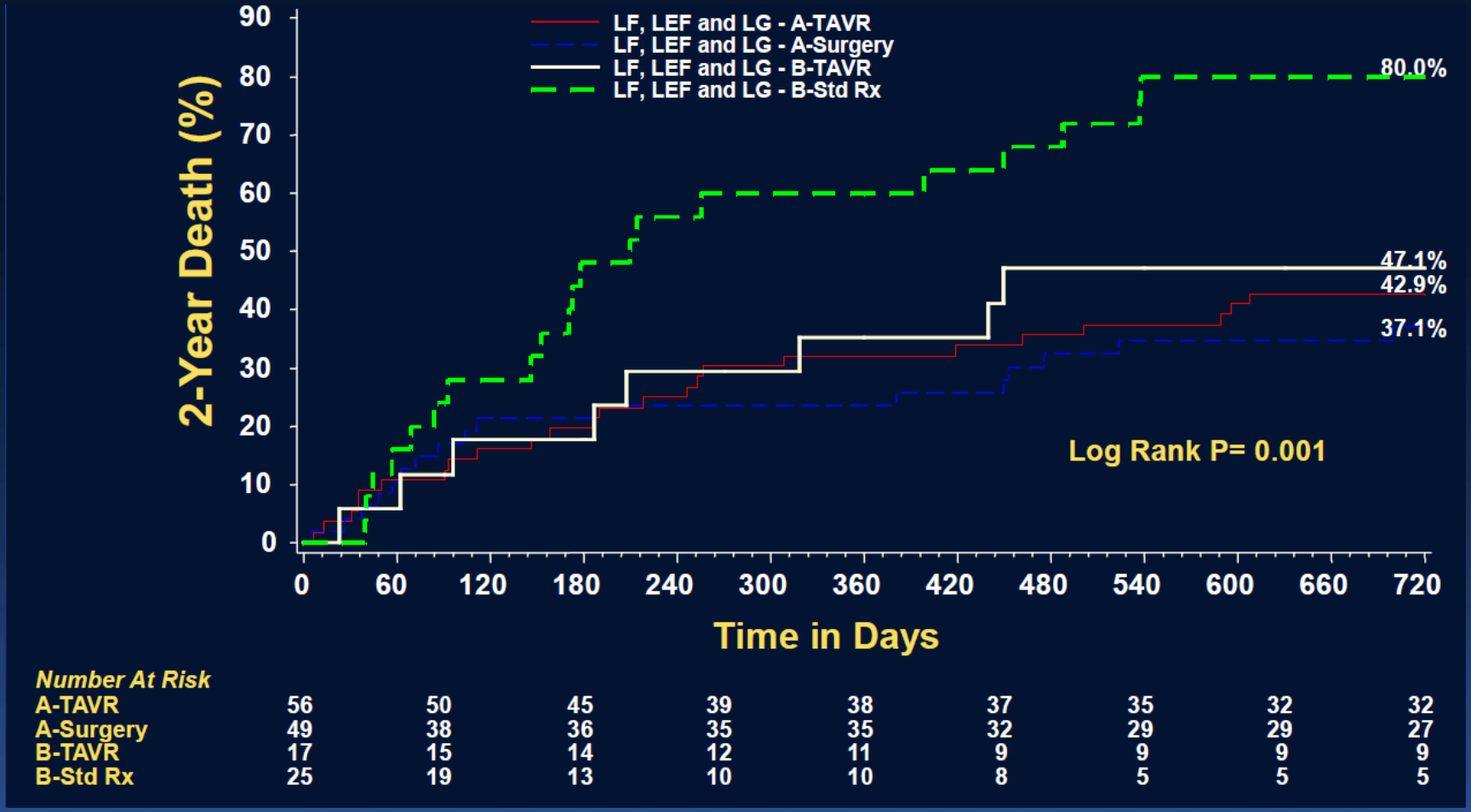
Postprocedural Changes in AVA and Gradient

Variable	SAVR Group	TAVI Group	*P*, ANOVA	*P*, ANCOVA
AVA, cm^2			<0.001	0.0009
Baseline	0.71±0.17	0.64±0.18*		
Discharge	1.43±0.42†	1.65±0.55*†		
1-y follow-up	1.39±0.40†	1.56±0.38*†		
Indexed AVA, cm^2/m^2			<0.001	0.0003
Baseline	0.38±0.09	0.36±0.10*		
Discharge	0.76±0.22†	0.92±0.32*†		
1-y follow-up	0.71±0.19†	0.87±0.20*†		
Mean gradient, mm Hg			0.005	0.04
Baseline	35±14	37±14		
Discharge	13±5†	10±5*†		
1-y follow-up	14±6†	9±4*†		

Tukey posthoc test: *$P<0.05$ versus SAVR; †$P<0.05$ versus baseline.

Clavel M et al. Circulation 2010;122:1928-1936

PARTNER A & B: Low-EF, Low-Flow, Low-Gradient (both cohorts)



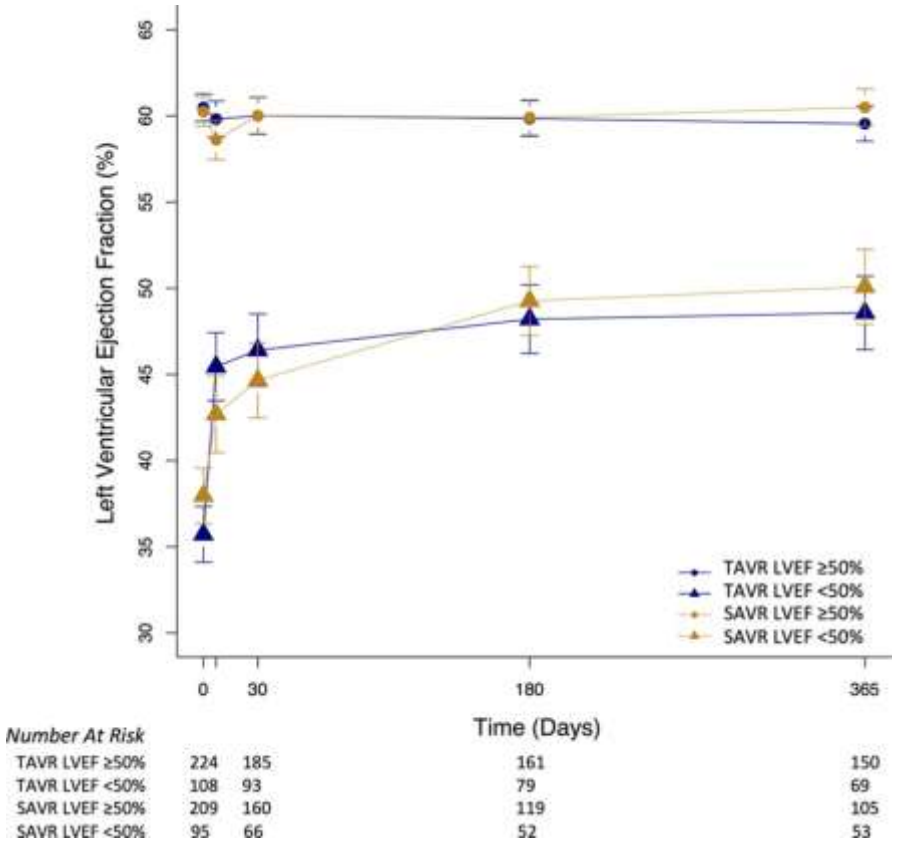
Herrmann, H et al. Circulation 2013, published online

PARTNER A & B Low Flow Findings

- **In patients with severe AS, low flow, defined by a SVI < 35 ml/m2, is associated with a significant 50% increase in 2-year all-cause mortality as compared to patients with normal flow.**
- **Low flow was a more powerful predictor of outcome than EF or mean transvalvular gradient.**
- **Low flow experienced similar benefits with therapy**
  - TAVR was better than MM for inoperable patients
  - TAVR was similar to SAVR in high risk patients

Herrmann, H et al. Circulation 2013, published online

Partner Trial (A) – LV Recovery



Multivariable Predictors of LV Improvement at 30 Days in Patients with EF < 50%

	OR [95% CI]	P
Permanent pacemaker	0.34 [0.15, 0.77]	0.01
Mean AVG	1.03 [1.01, 1.06]	0.03
Baseline LVEF	0.91 [0.86, 0.95]	<0.0001

Elmariah, S et al. *Circ Cardiovasc Interv*. 2013;6:604-614

Usefulness of AoV Ca Scoring by MDCT to Differentiate True vs. Pseudo- Severe Stenosis in Low-Flow, Low-Gradient AS

Pseudo-Severe

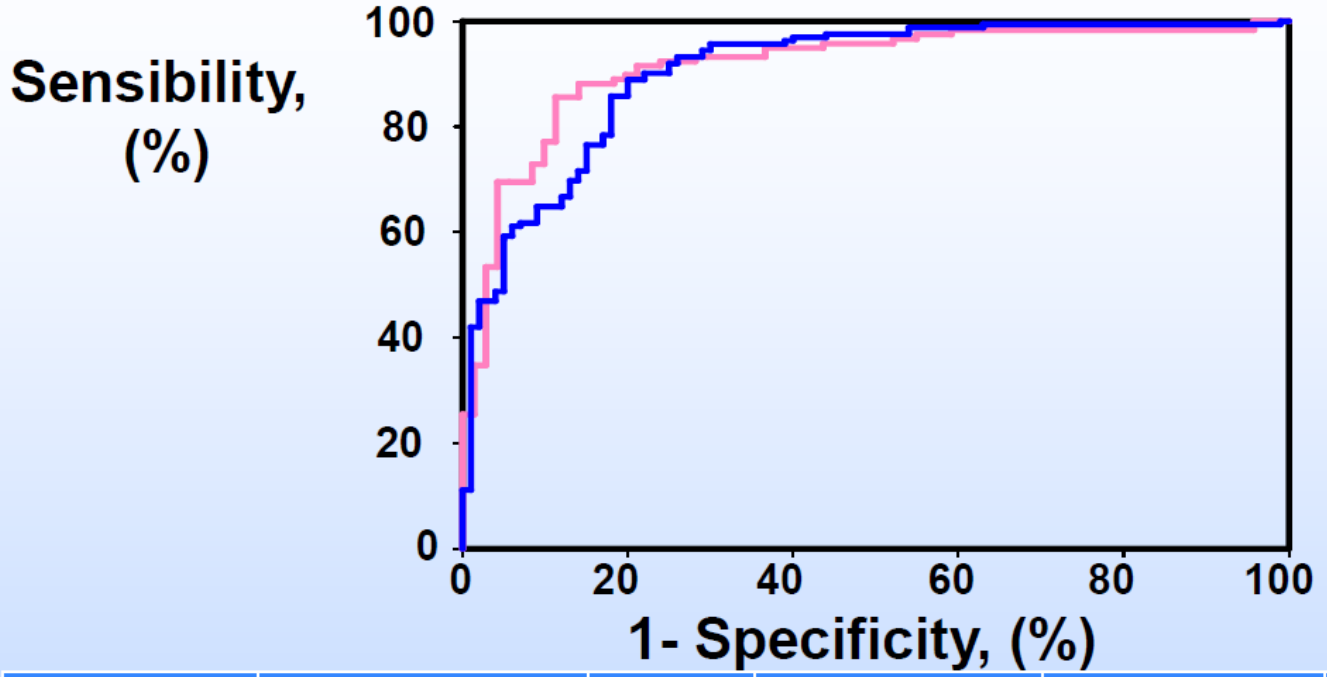
AVC: 1034 AU

True-Severe

AVC: 4682 AU

Mayo-Québec-Bichat Collaboration:

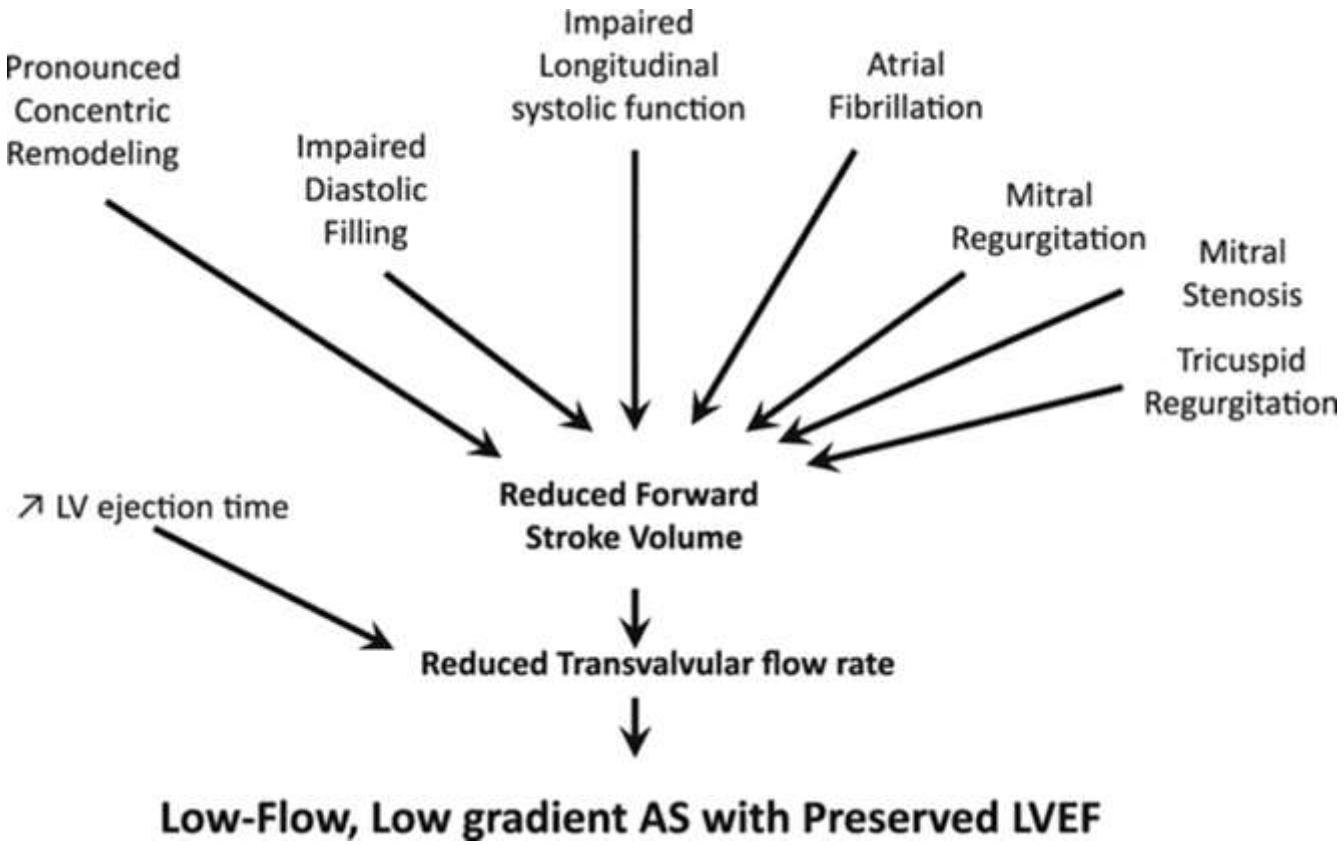
Accuracy of AVC to identify severe AS



Gender	Threshold	AUC	Sensitivity (%)	Specificity (%)	PPV (%)	NPV (%)
Women	1274 AU	0.91	89	86	93	79
Men	2065 AU	0.90	89	80	88	82

Clavel et al. JACC 2013

Factors Contributing to Low-Flow State in AS Patients and Preserved LV EF



Pibarot P, Dumesnil JG. *Circulation*. 2013;128:1729-1732

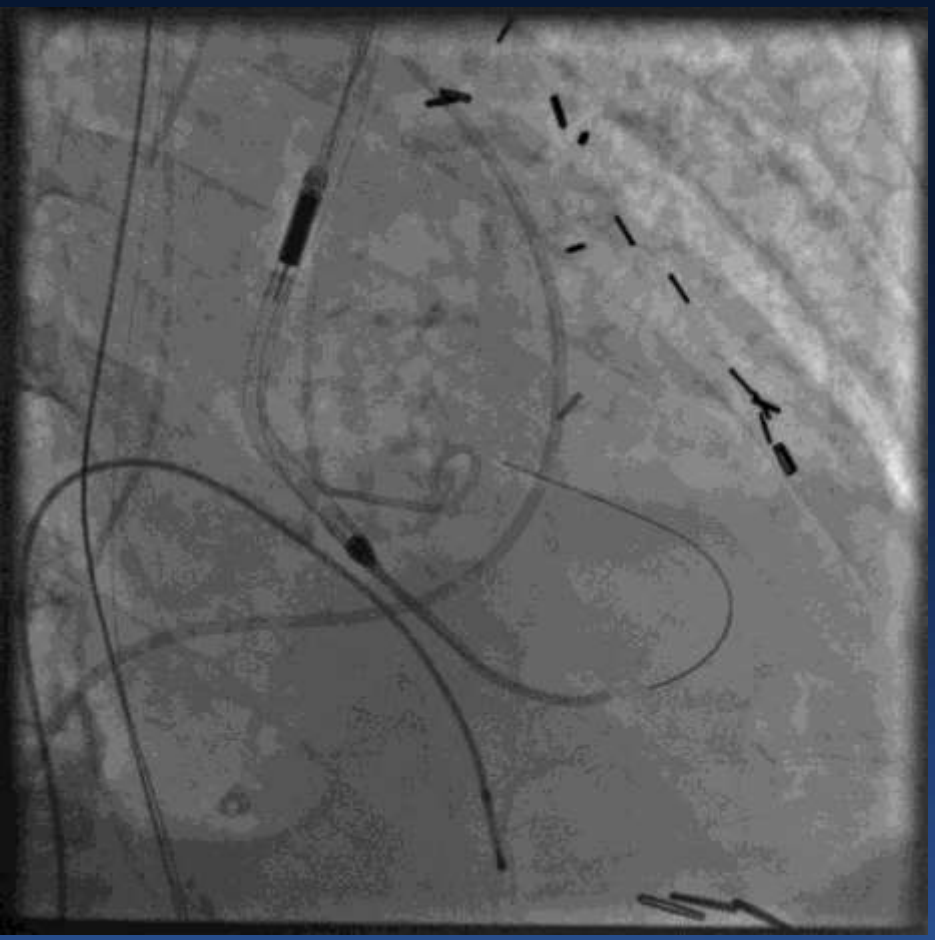
Editorial Comment

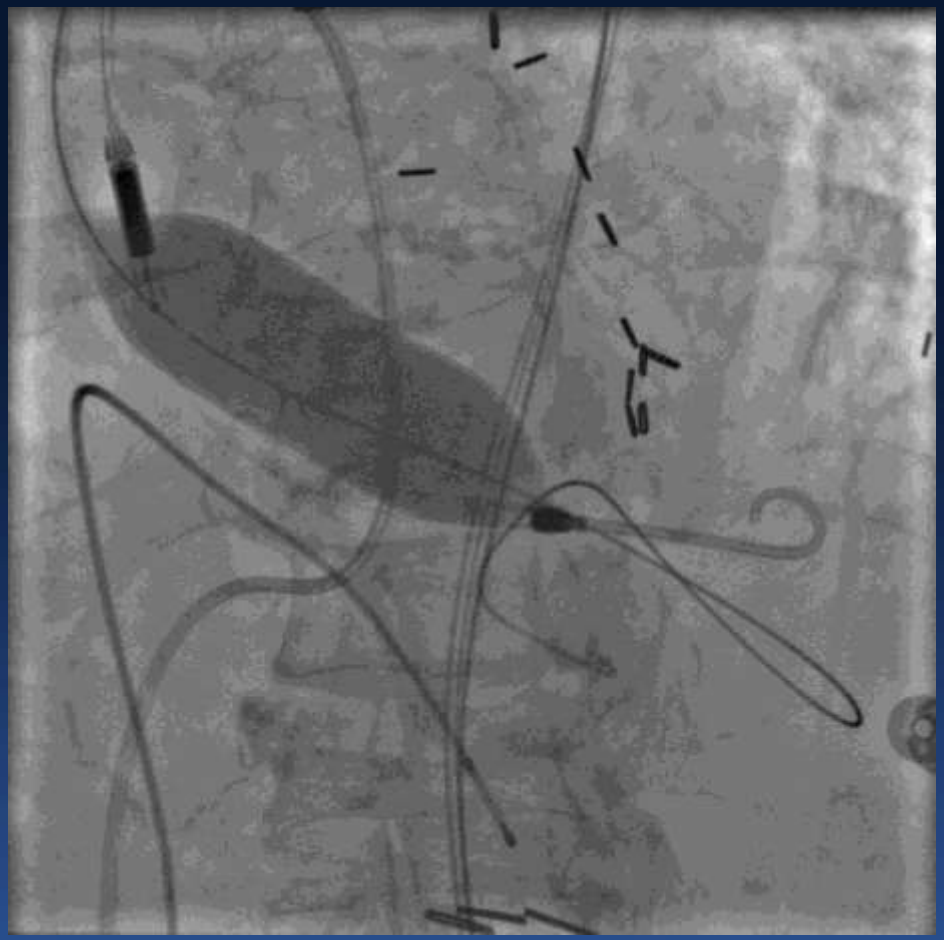
Aortic Balloon Valvuloplasty and Severe Systolic Dysfunction. Is there a Danger Zone?

Abdulla A. Damluji, MD, MPH, and Mauricio G. Cohen,* MD, FSCAI
Division of Cardiology and Elaine and Sydney Sussman Cardiac Catheterization Laboratory, University of Miami Hospital, Miller School of Medicine, Miami, Florida

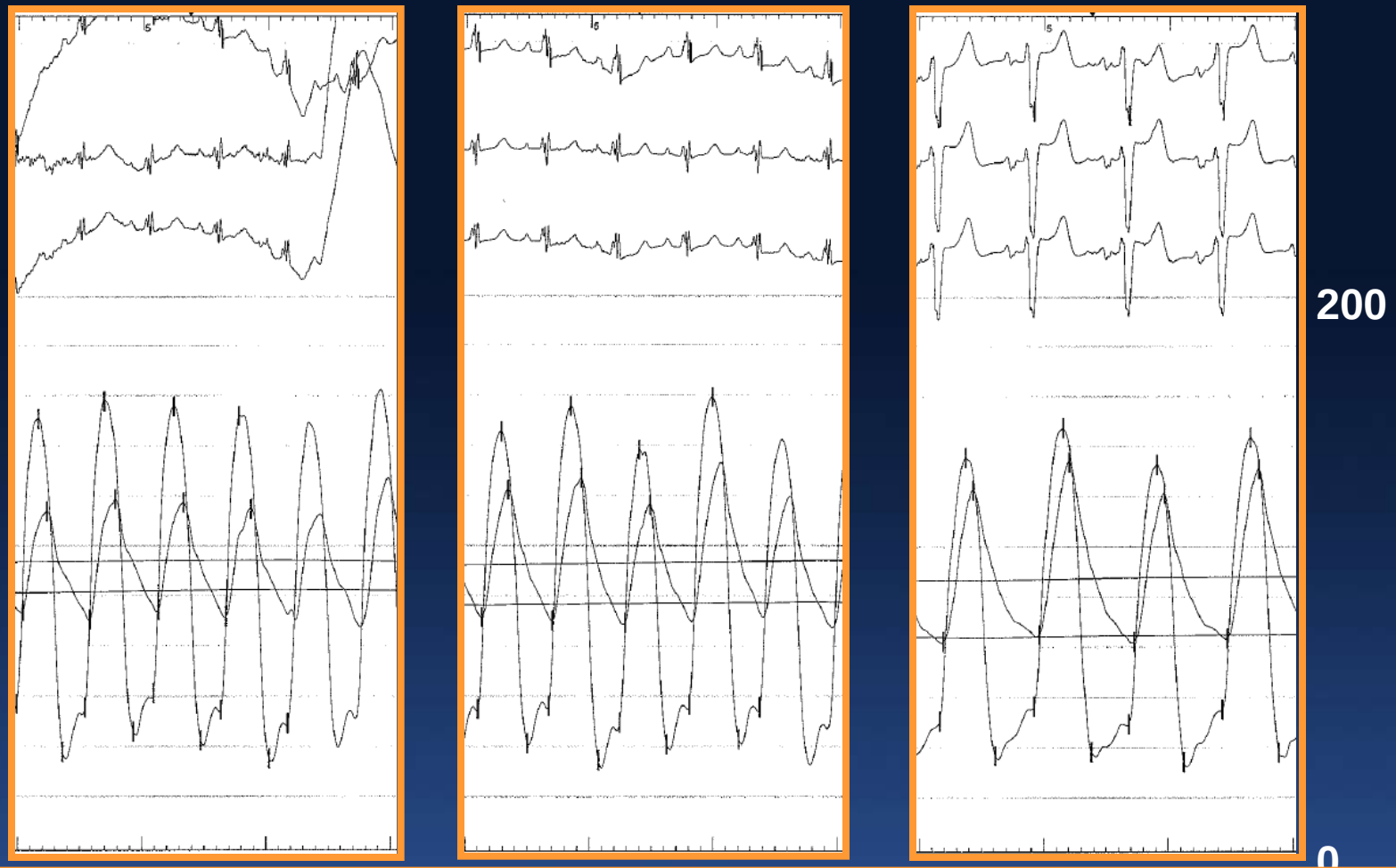
Catheterization and Cardiovascular Interventions 84:832–833 (2014)

Balloon Aortic Valvuloplasty on Impella Support



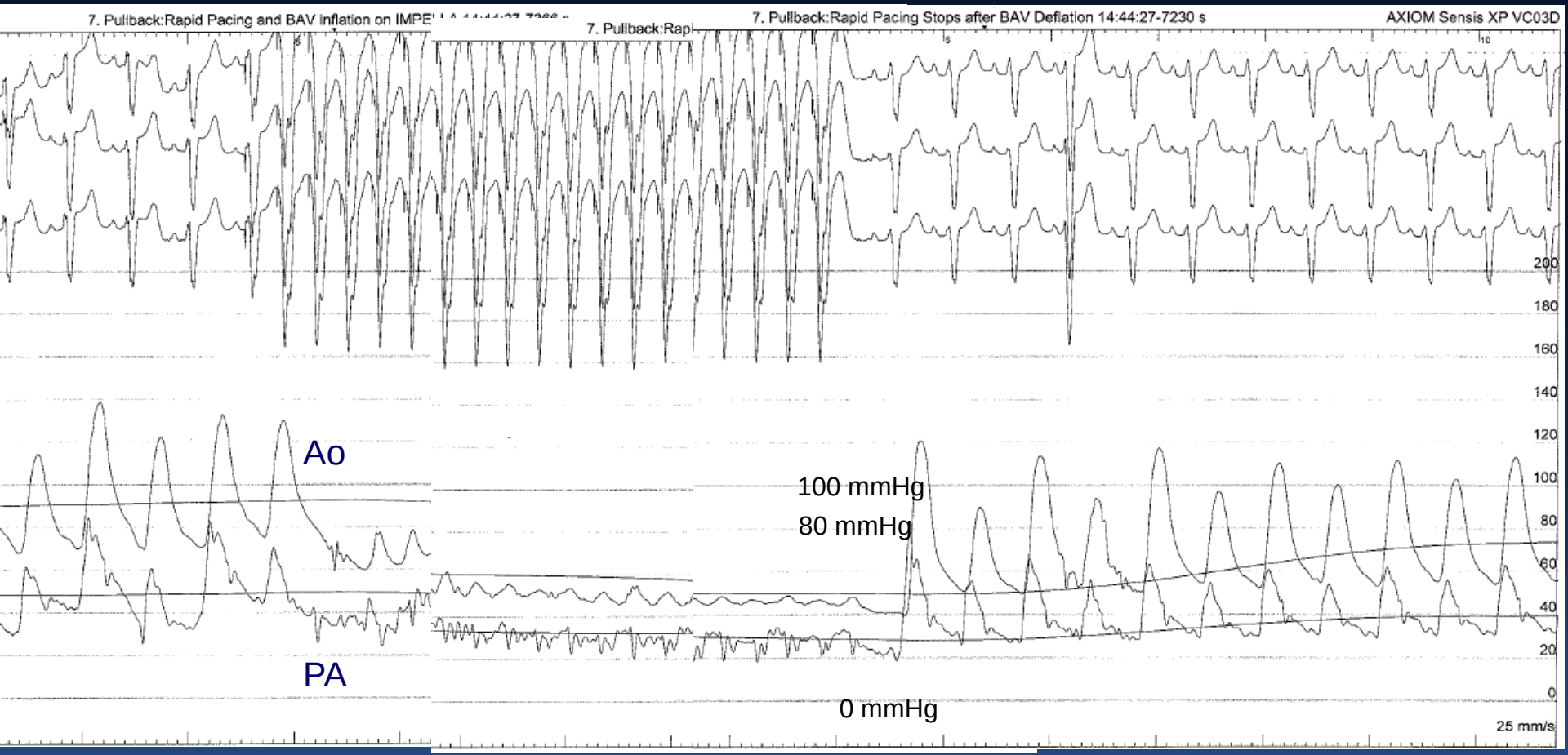


Aortic Gradient



	Baseline	Impella Support	Post-BAV (Impella out)
LV:	149/33	145/35	142/32
Ao:	116/73 (92)	117/69 (90)	129/63 (88)

Aortic Balloon Inflation



VALVULAR AND STRUCTURAL HEART DISEASES

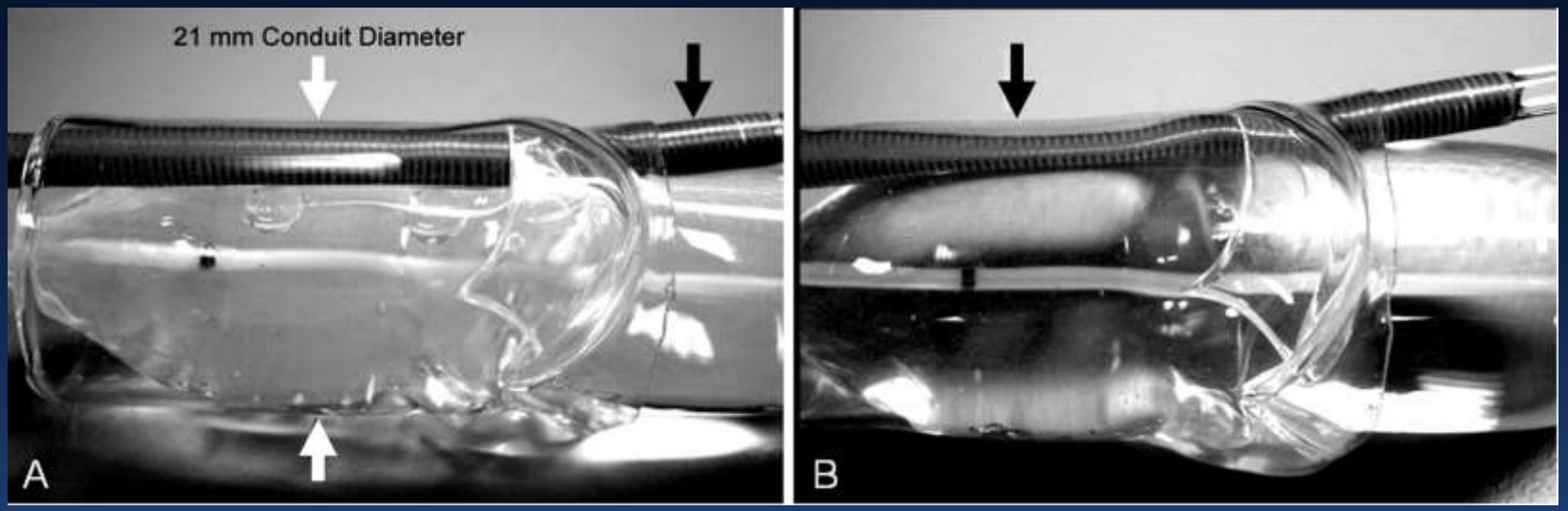
Original Studies

Percutaneous Retrograde Left Ventricular Assist Support for Interventions in Patients with Aortic Stenosis and Left Ventricular Dysfunction

Claudia A. Martinez,[1*] MD, Vikas Singh,[1] MD, Juan C. Londoño,[1,2] MD, FSCAI, Mauricio G. Cohen,[1] MD, FSCAI, Carlos E. Alfonso,[1] MD, William W. O'Neill,[1] MD, FSCAI, and Alan W. Heldman,[1] MD, FSCAI

Martinez CA, et al. Catheter Cardiovasc Interv 2012;80:1201-9

BenchTesting



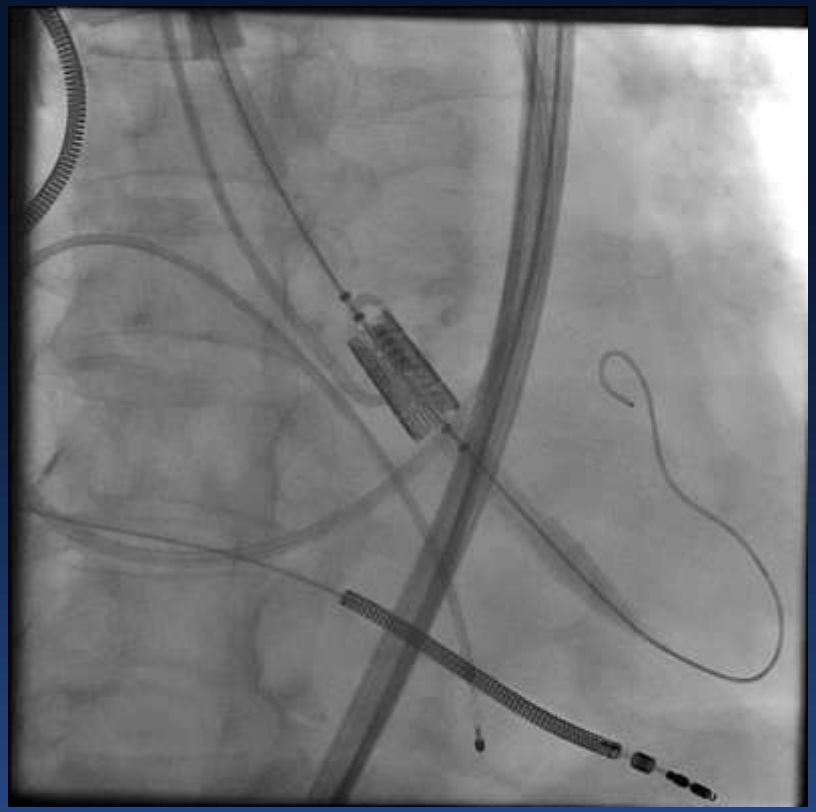
Londoño JC, Martinez CA, Singh V, O'Neill WW. J Interv Cardiol 2011

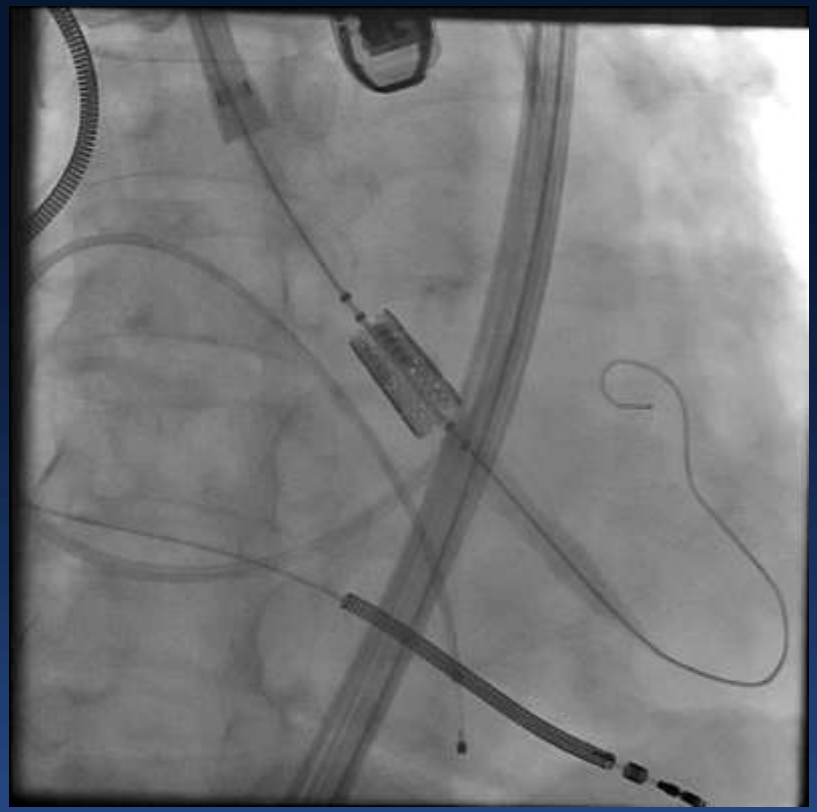
Impella-Assisted BAV

- **21 AS patients**
  - High-risk PCI (n = 3)
  - BAV with subsequent PCI (n = 8)
  - BAV alone (n = 7)
  - during cardiac arrest immediately following BAV (n = 3)
- **STS score: 14% (range 7.3–24.7%)**
- **Impella inserted successfully in all patients.**
- **Retrograde advancement of two catheters across the aortic valve (for concomitant BAV in 15 patients) was technically feasible.**
- **Periprocedural complications: 19% (n = 4) patients**
- **No periprocedural deaths**
- **Mortality at 30 days was 14.2%.**

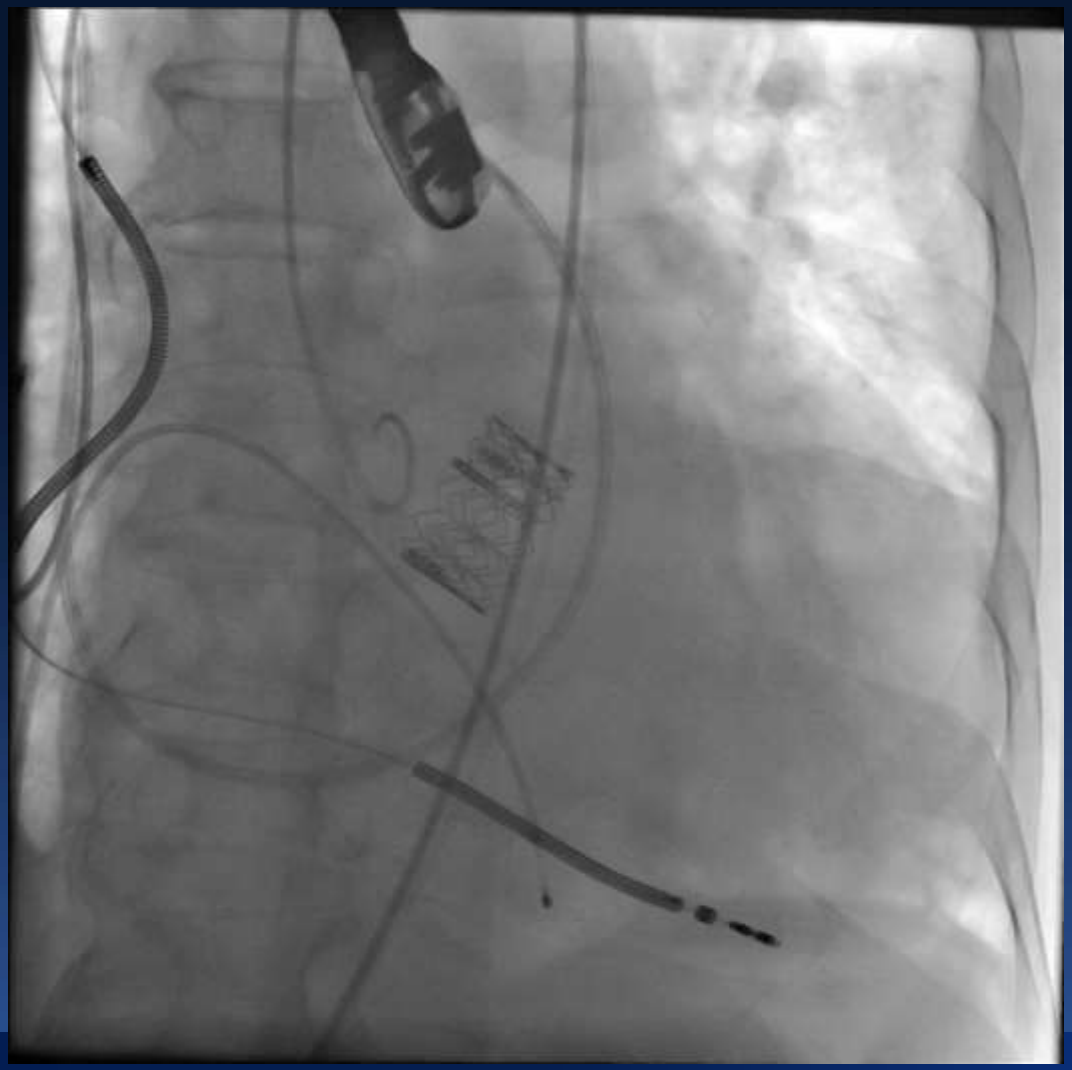
Martinez CA, et al. Catheter Cardiovasc Interv 2012;80:1201-9

TAVR

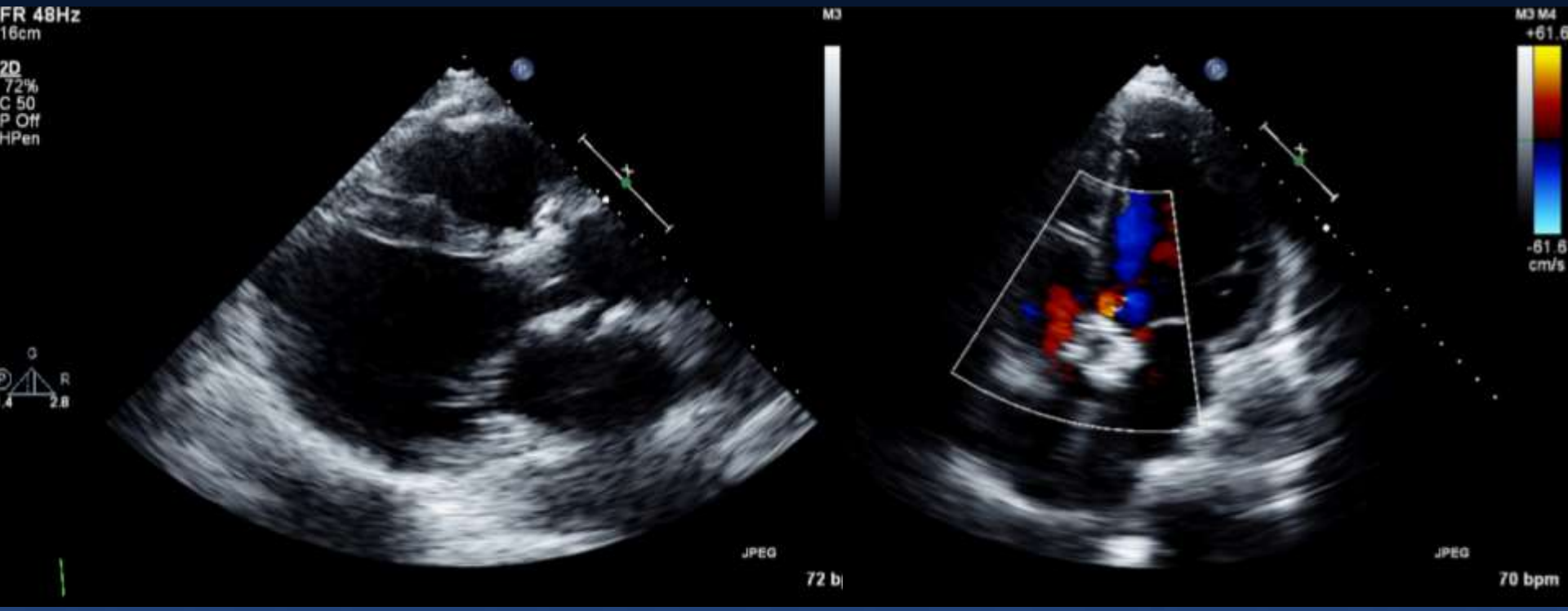




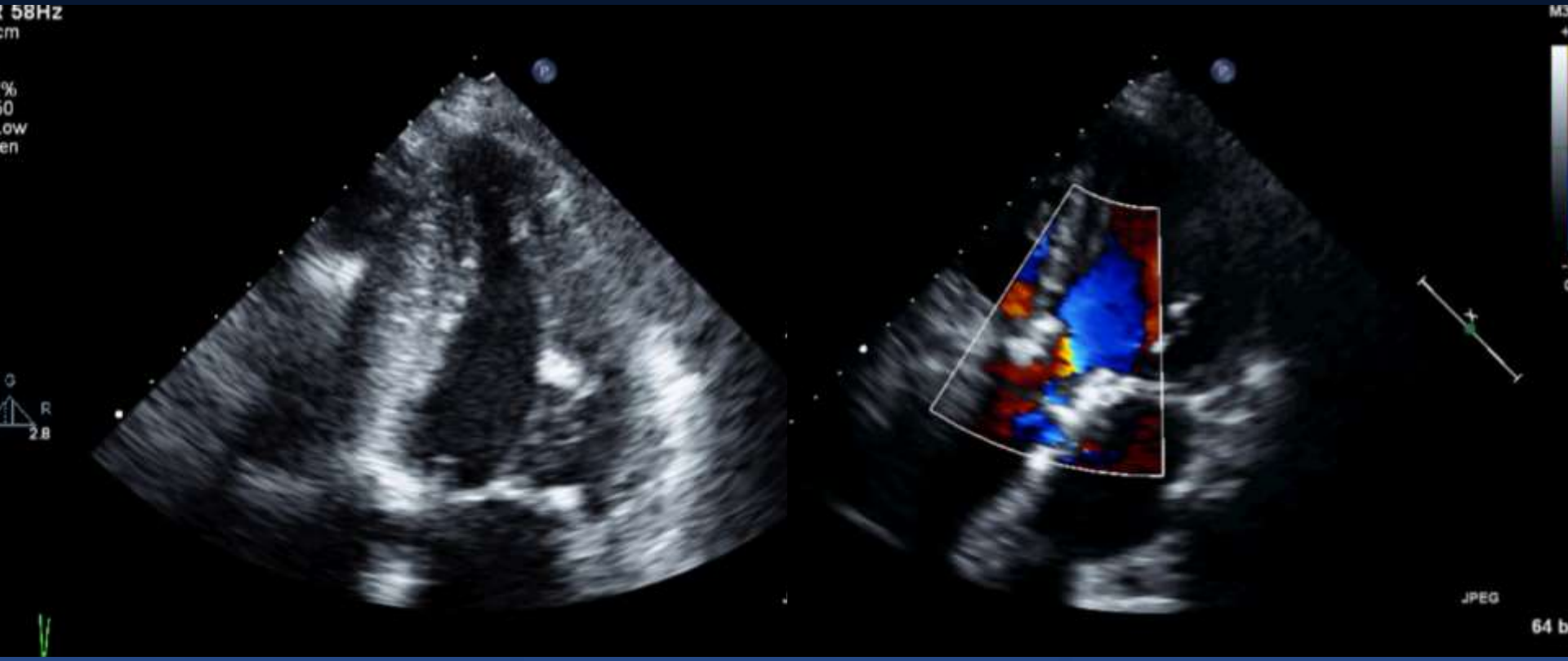
TAVR



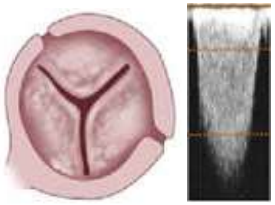
ECHO Post-TAVR



ECHO 2 years Later



LVEF≤40%
ΔP<35
AVA≤1.0



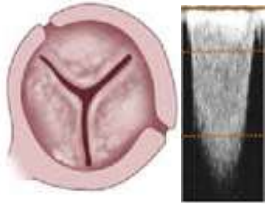
Dobutamine-Stress Echo

↑ SV ≥ 20 %

↑ SV < 20 %

Contractile (Flow) Reserve

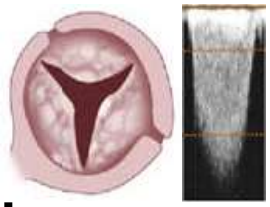
No Contractile (Flow) Reserve



AS Severity:
Indeterminate

ΔP≥35
AVA<1.0-1.2

ΔP<35
AVA ≥1.0-1.2



MSCT: Ca Score ≥1650?

No

Yes

True-Severe AS

Pseudo-Severe AS

True-Severe AS

TAVR ± PCI

MEDICAL Rx TRIAL

TAVR

Conclusions

- Low flow portends poor prognosis
- Predicting LV function recovery is challenging
- Lack of functional reserve by DSE predicts high surgical mortality
- Calcium scoring may aid in differentiation true AS from pseudo AS
- TAVR may be associated with better LV function recovery
- Outcomes with SAVR and TAVR appear to be comparable
- However patients without functional reserve may benefit from less invasive TAVR