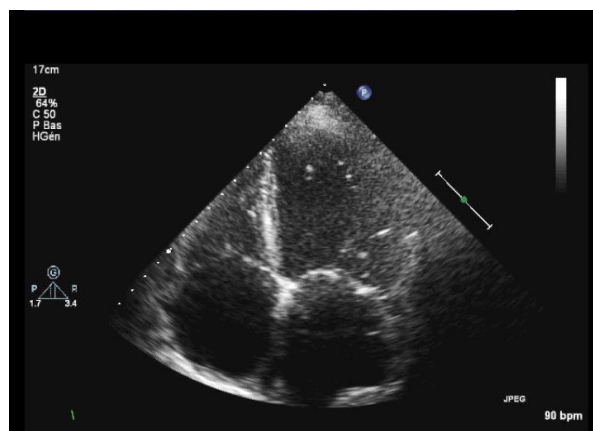
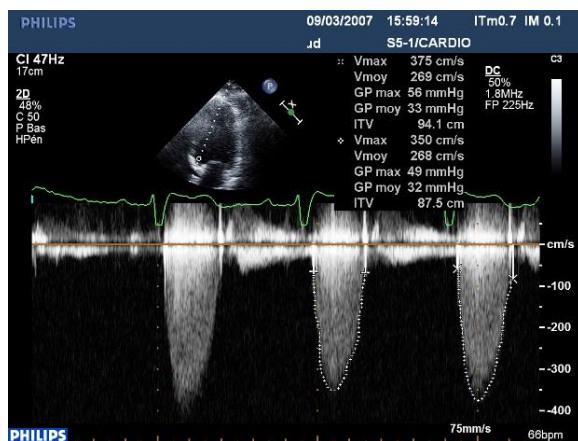


EuroValve

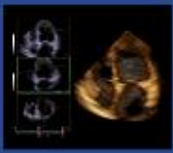


Focus on aortic valve

Clinical case: a 70-year old attorney with severe AS, impaired systolic function and mitral regurgitation: When to operate ?



Christophe Tribouilloy, Amiens, France



Faculty Disclosure

Christophe Tribouilloy

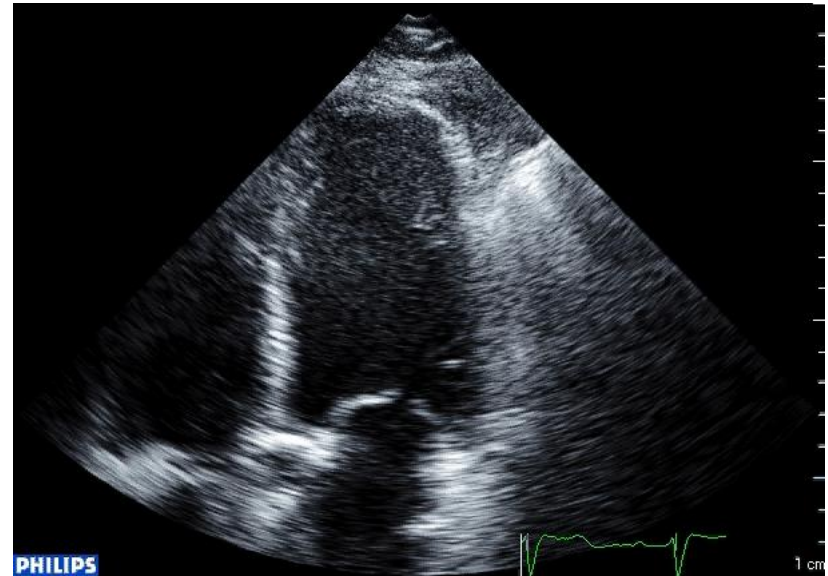
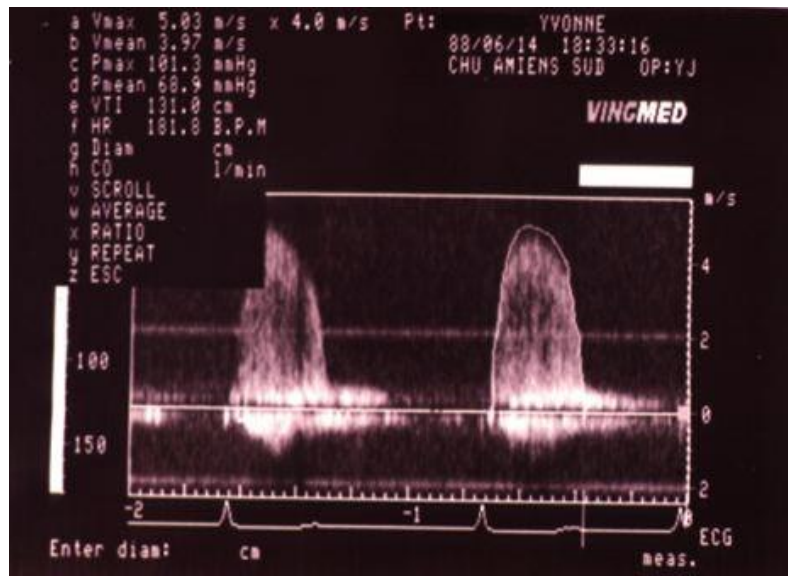
I have **no financial relationships** to disclose related to this presentation.

Low EF Aortic stenosis

- **High gradient** ($> 40\text{mmHG}$) – **low EF**
- **Low gradient** ($<40\text{mmHg}$) – **low EF**
 - Pseudosevere AS
 - True severe AS with flow reserve (dobu)
 - AS without flow reserve (dobu)

High gradient – low EF severe AS

Mean gradient 68 mmHg, Vmax 5m/s, AVA 0.62 cm² LV EF 18%



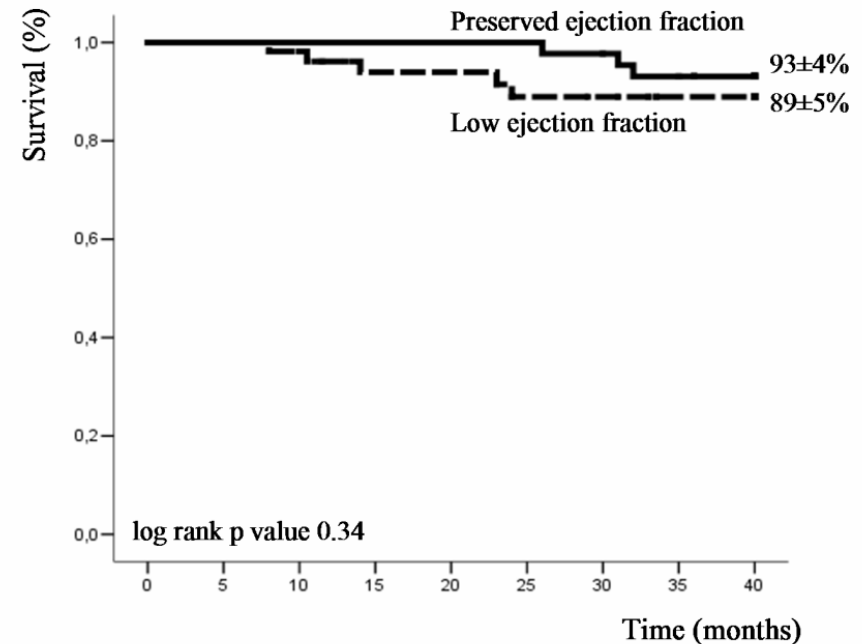
Low EF due to afterload mismatch

- LVH inadequate and unable to normalize the systolic wall stress
- myocyte function is generally preserved

High Gradient - Low EF Severe AS

Class I Level C ESC recommendation

- **Operative mortality: 5.5 %**
- **Functional improvement after AVR:**
from 87% NYHA 3-4 before AVR
to 7% after AVR ($p=0.001$)
- **increase of EF after AVR**
from 30% to 53% ($p=0.001$)
- **Presence of contractile reserve**
(dobutamine echo not indicated)



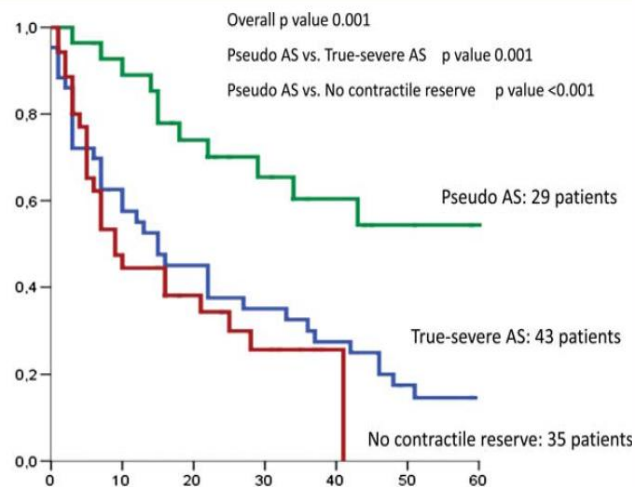
Unpublished data

Low Gradient - Low EF AS

The major role of Dobutamine echo is to rule out a pseudosevere AS , which does not require SAVR or TAVI

- Pseudosevere AS**
- True severe AS with flow reserve
- AS without flow reserve

Survival of Pseudo-severe AS on conservative management



Patients at risk

True-severe AS	43	24	18	14	11	6	4
Pseudo AS	29	25	19	14	10	7	5
No contractile reserve	35	15	10	6	1	0	0

Figure 2 Kaplan–Meier survival estimates in low-flow/low-gradient aortic stenosis under conservative treatment according to dobutamine testing.

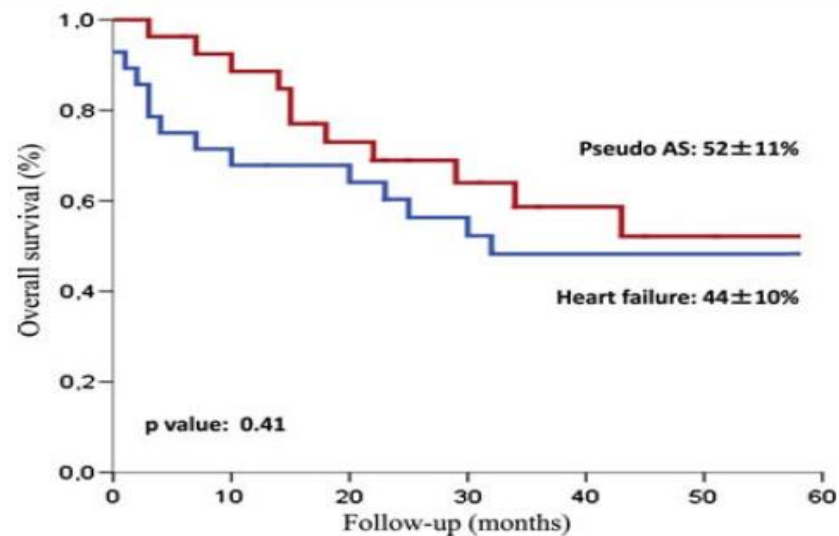


Figure 3 Kaplan–Meier survival estimates under conservative treatment among 28 patients with pseudo-severe aortic stenosis and 28 propensity-matched patients with systolic heart failure.

Pseudo-Severe Aortic Stenosis

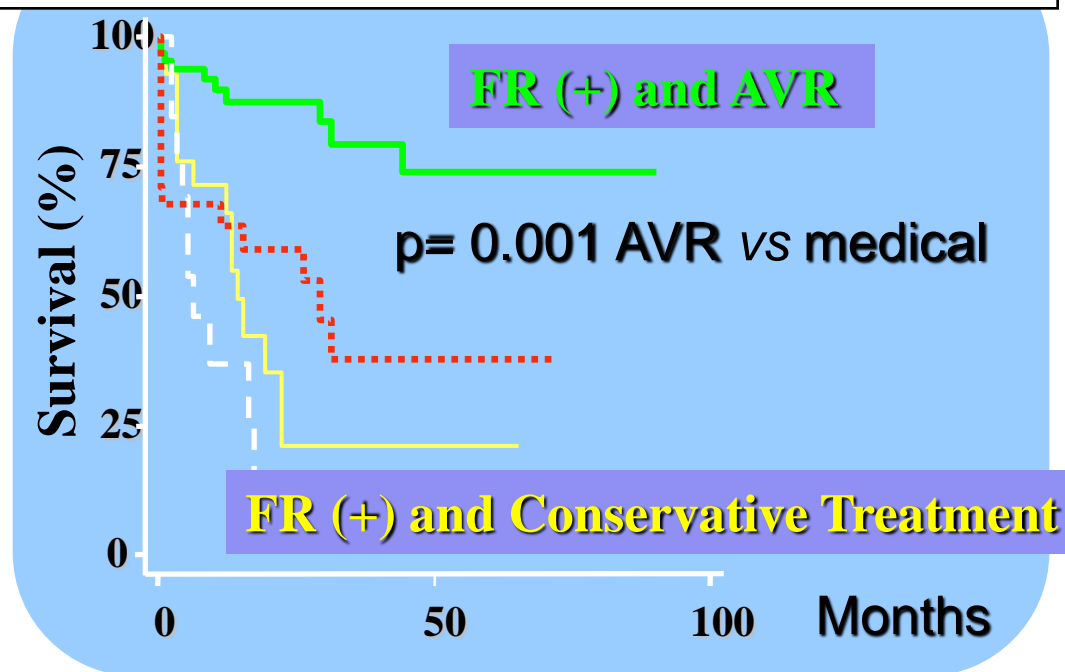
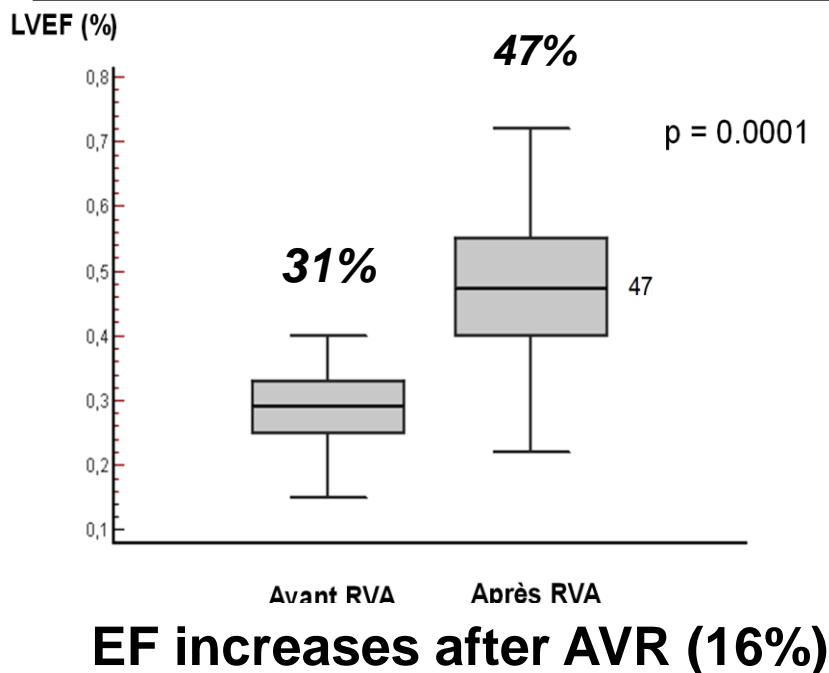
- AVR is not recommended
- Must be treated as systolic CHF (low EF)
 - Medical therapy may induce inverse remodelling and must be systematically optimized
 - Wide QRS leads to discussing cardiac resynchronisation
- Careful echo follow-up mandatory to detect any change in the severity of AS and LV function

Low EF Aortic stenosis

- High gradient ($> 40\text{mmHg}$) – low EF
- Low gradient ($<40\text{mmHg}$) – low EF
 - Pseudosevere AS
 - **True severe AS with flow reserve**
 - AS without flow reserve

Low Gradient - Low EF Severe AS with Flow Reserve

Class IIa Level C ESC recommendation



Low EF Aortic stenosis

- High gradient ($> 40\text{mmHg}$) – low EF
- **Low gradient ($<40\text{mmHg}$) – low EF**
 - Pseudosevere AS
 - True severe AS with flow reserve
 - **AS without flow reserve**

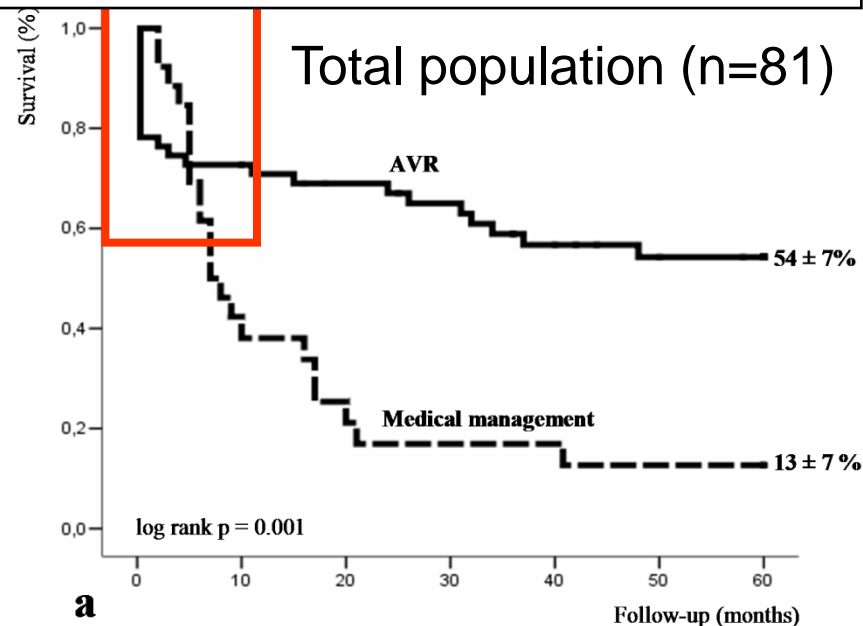
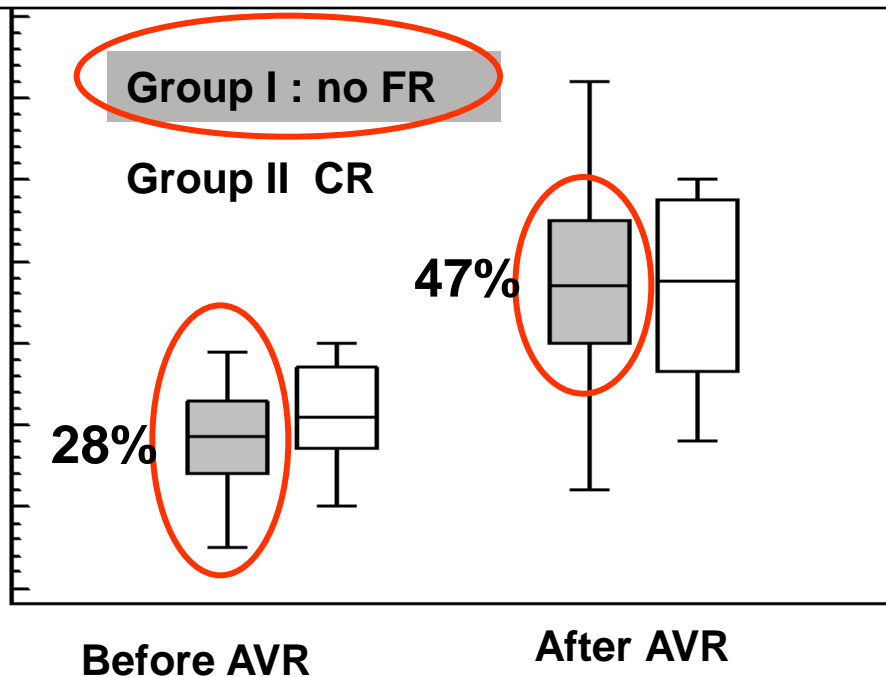
Low Gradient – Low EF AS

Without Flow Reserve on Dobu Echo

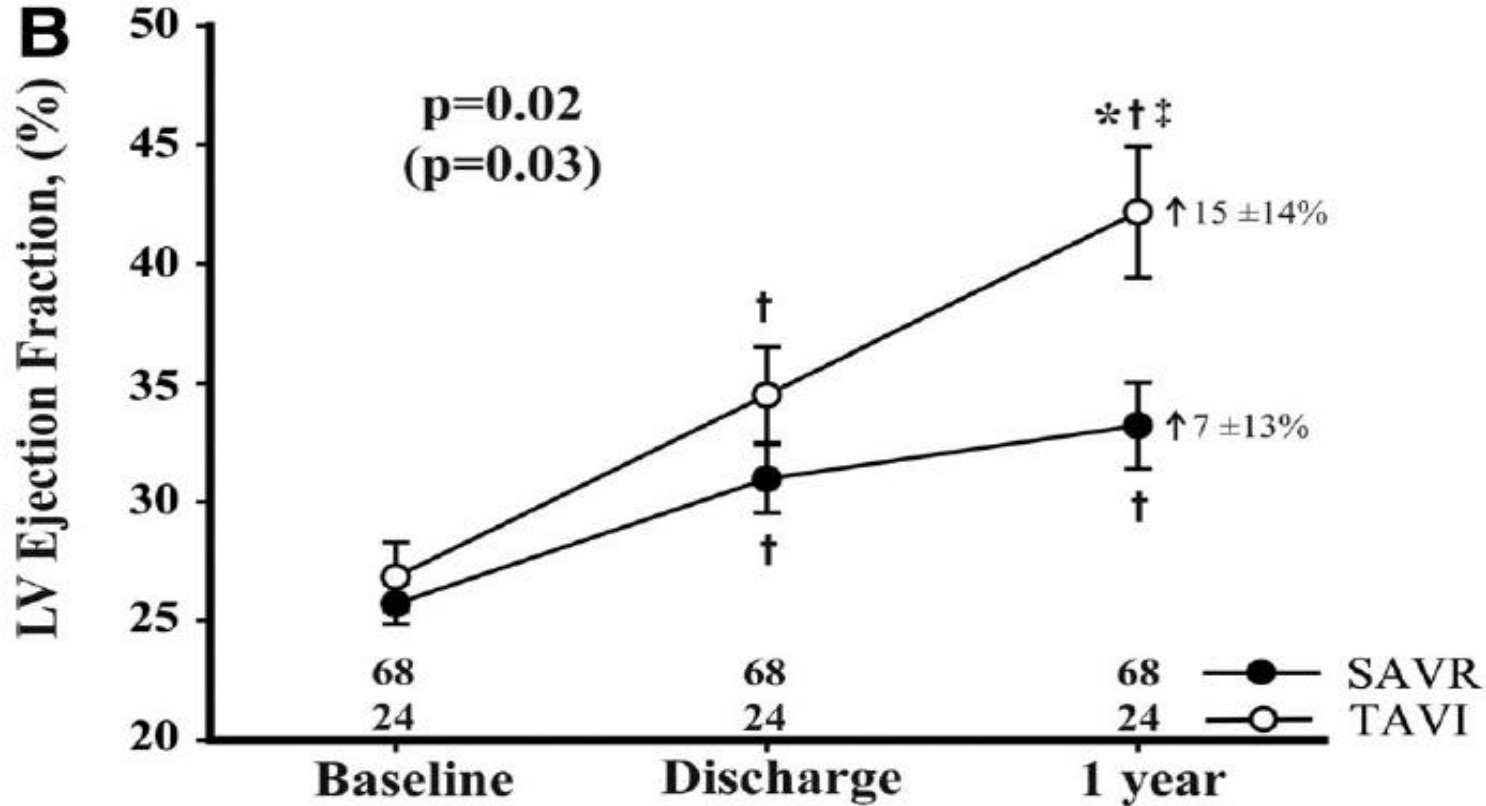
- The severity of AS remains indeterminate after dobutamine infusion
- Aortic valve calcification is a potent argument in favour of severe AS (CT calcification score > 1600)

Low Gradient - Low EF severe AS without Flow Reserve

AVR: Class IIb Level C ESC recommendation



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



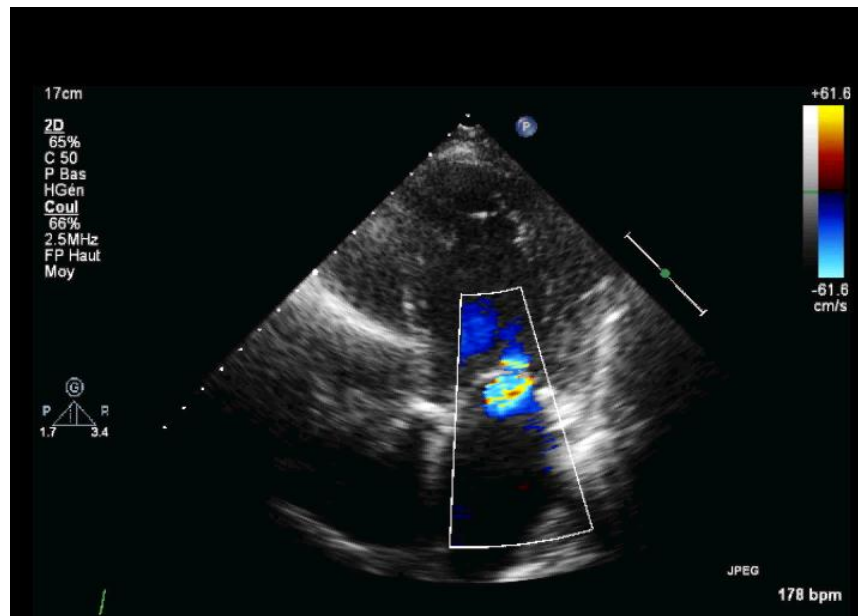
FE < 35%

Visits TAVI group:

- Operative mortality 22%
- Logistic euroscore 32%

Our patient has low-EF severe AS
with an indication SAVR or TAVI

Now, look at the mitral valve



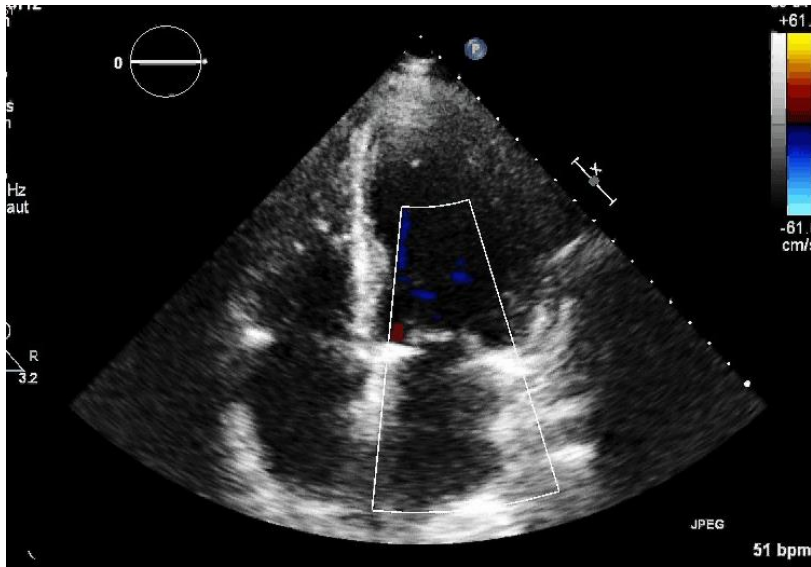
Prevalence of associated MR in pts with AS requiring SAVR/TAVI

- Frequent
- Mild MR reported in up to 80 %
- Moderate to severe MR in 13 to 33% of patients

Nombela-Franco et al JACC 2014,

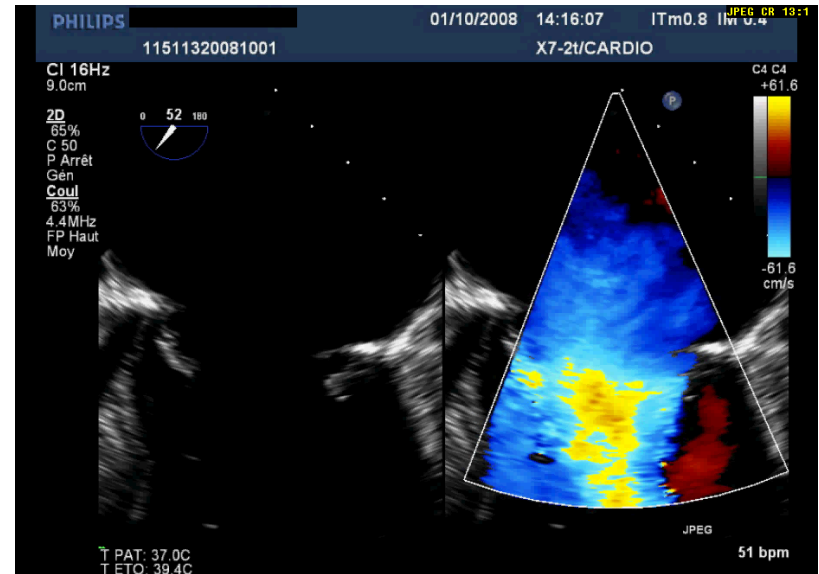
Barreiro et al Circulation. 2005;112 [suppl I]

Mechanisms and etiologies of associated MR



FUNCTIONAL MR

- No intrinsic valvular lesion
- MR secondary
 - to LV remodelling and
 - increased LV systolic pressure
- > 50% of cases



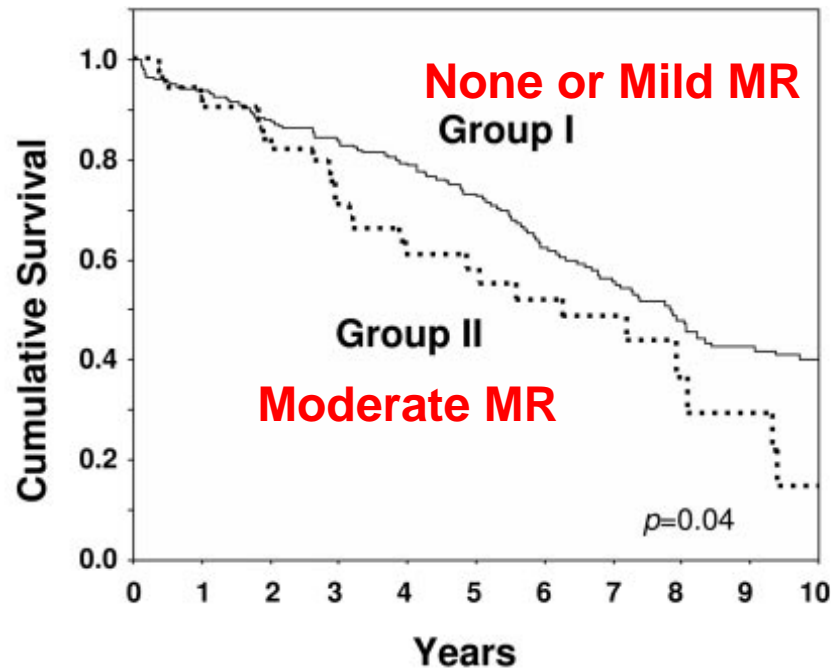
ORGANIC MR

- MR due to calcification of mitral apparatus
- Mitral valve prolapse
- Rheumatic MR
- MR due to IE

Impact of preoperative MR on outcome after isolated SAVR

408 consecutive elderly (>70yo) patients

Isolated AVR



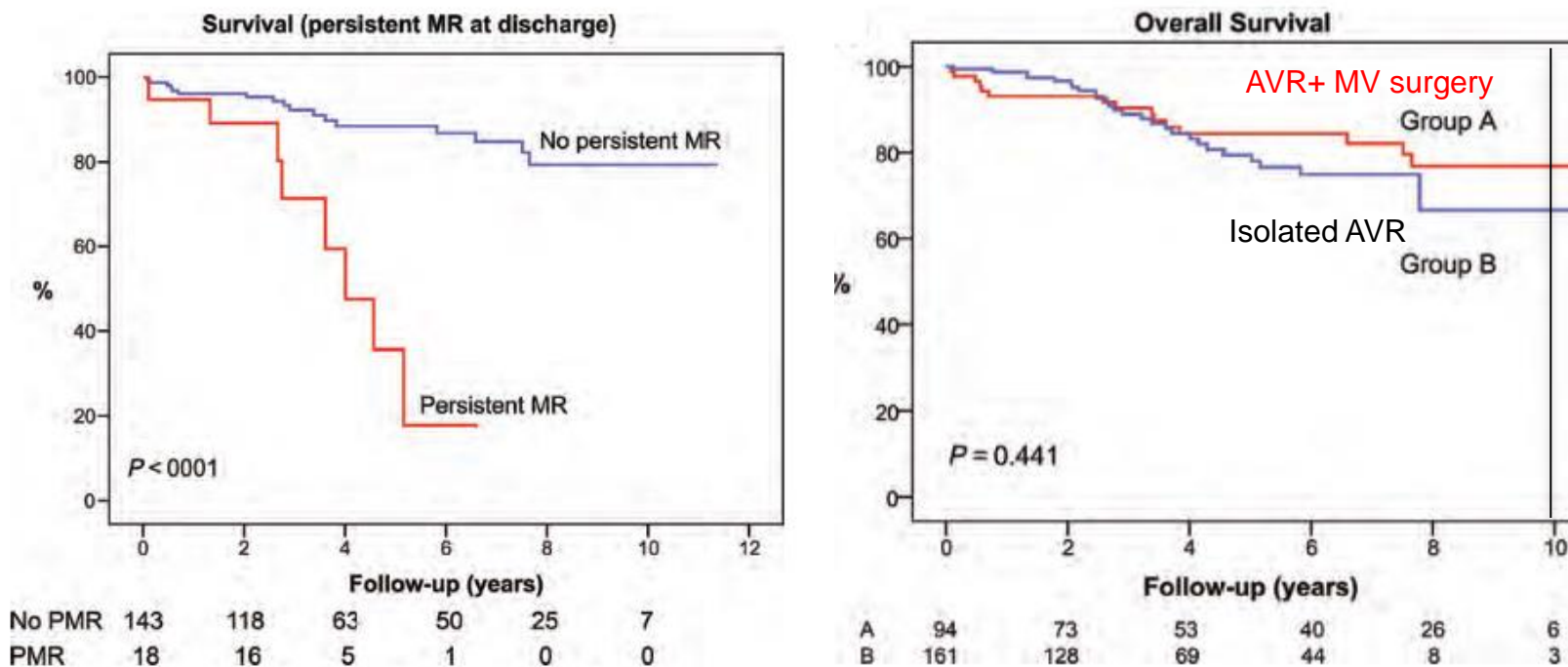
Preoperative moderate MR is associated with an excess long-term mortality after isolated AVR

Management of moderate secondary mitral regurgitation at the time of aortic valve surgery[†]

Gonçalo F. Coutinho, Pedro M. Correia, Rita Pancas and Manuel J. Antunes*

Eur J Cardio-Thoracic Surgery 2013;44 ; 32–40

3339 patients underwent AVR of whom 255 had secondary MR >2+



Pts with secondary MR >2+ submitted to isolated AVR or to combined AVR and mitral valve surgery have similar survival

Impact of MR on late mortality after TAVI

Concomitant moderate to severe MR is a predictor of late mortality after TAVI:

OR/HR 1.44 [1.12-1.68], p<0.001 (n=6734)

Study	n	Severe MR	Outcome	OR/HR	p-value
Late (>30-day) mortality					
Rodés-Cabau, 2010 (33)	339	Severe: 27 (8.0%)	10.7% vs. 7.2%	—	—
Hutter, 2013 (51)	268	Moderate and severe: 60 (22.4%)	30.2% vs 21.2%, p = 0.009	—	—
Sabaté, 2013 (40)	890	≥3: 55 (6.2%)	2.63 (1.58-4.36), p = 0.001	1.67 (0.94-2.96), p = 0.09	0.003§
Bedogni, 2013 (41)	1,007	Moderate: 243 (24.1%) Severe: 94 (9.3%)	25% vs. 20% vs. 15%, p = 0.02	2.9 (2.5-3.8), p = 0.001	0.001
Overall (weighted analysis)	6,734			1.44 (1.23-1.68)	p <0.001

- Preoperative functional moderate to severe MR associated with higher early and long term mortality after isolated AVR or after TAVI
- The beneficial effects of correcting functional MR during surgery is not demonstrated

Changes in severity of MR after isolated SAVR or TAVI

- Severity of functional MR decreases early in at least 50% of cases after SAVR/TAVI:
 - systolic LV pressure and systolic transmitral pressure gradient drop early after SAVR/TAVI resulting in a decrease of RV
 - acute reverse LV remodeling after SAVR/TAVI may lead to improvement in MR

Unger P et al. *Am J Cardiol* . 2008;

Nombela-Franco et al *JACC* 2014

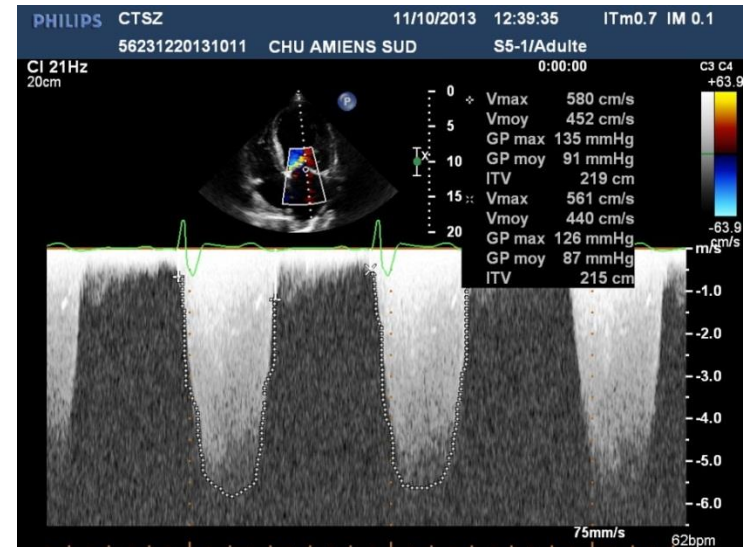
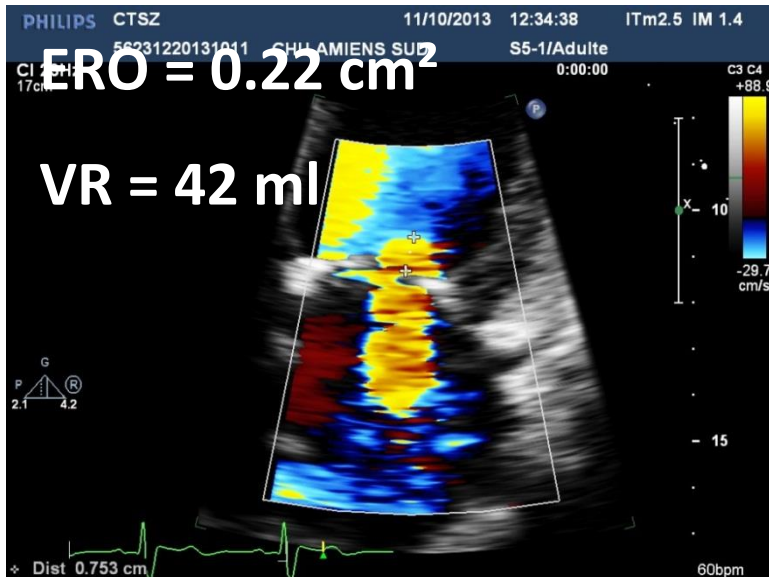
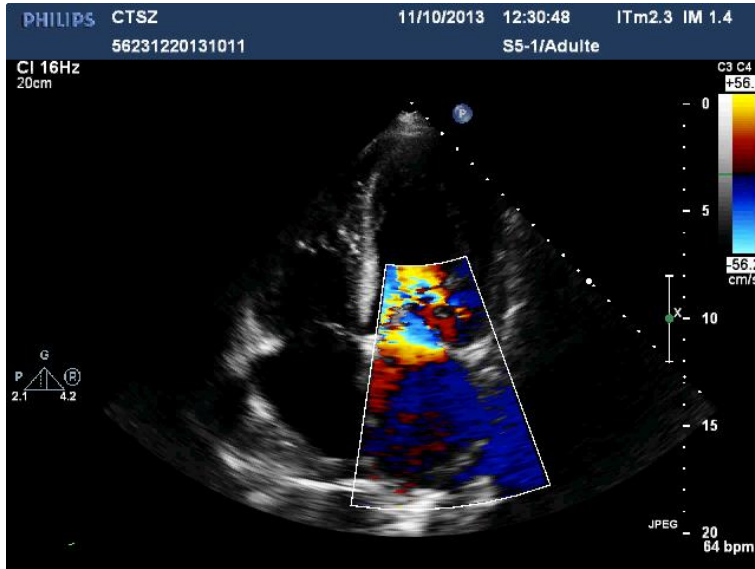
Predictors of changes in MR severity after TAVI/SAVR

	Improvement	No improvement
SAVR	Functional MR Low EF CHF	Organic MR Enlarged LA AF Pulmonary HT
TAVI	Functional MR Low EF	Organic MR AF Pulmonary HT Mean Gradient<40 mmHg

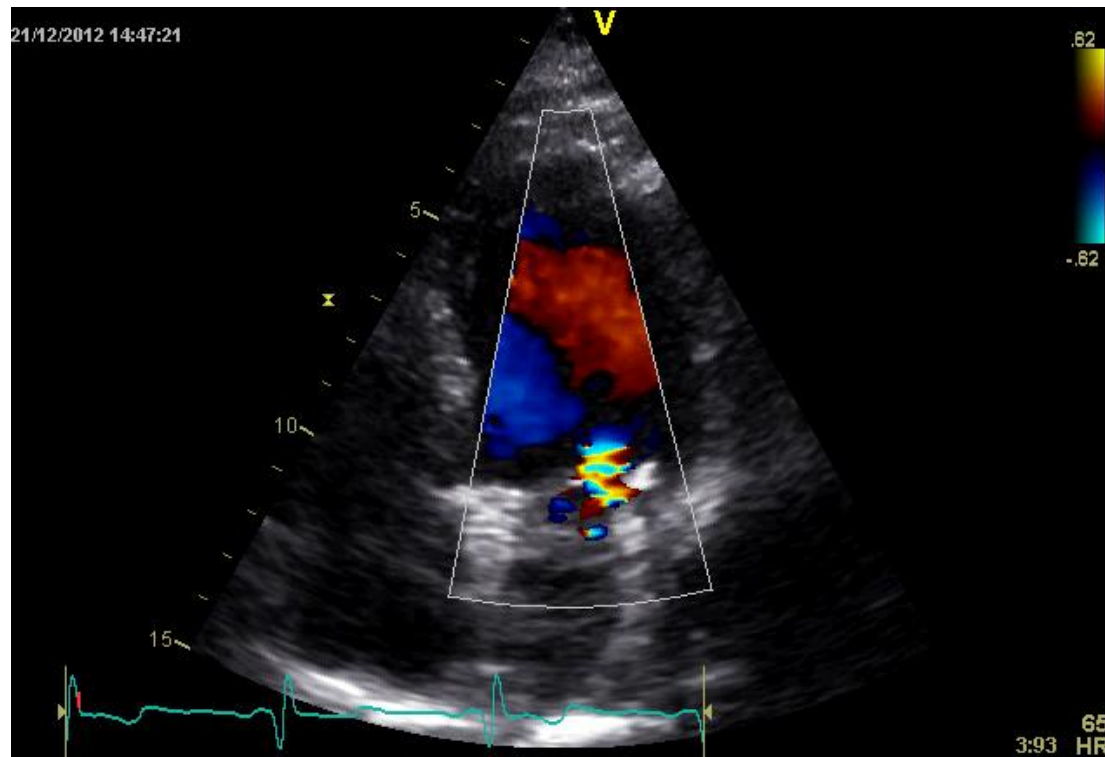
*Nombela-Franco et al JACC 2014,
Unger , et al. Heart 2011*

Severe AS + Functional MR + CHF

associated with mild anterior leaflet calcification

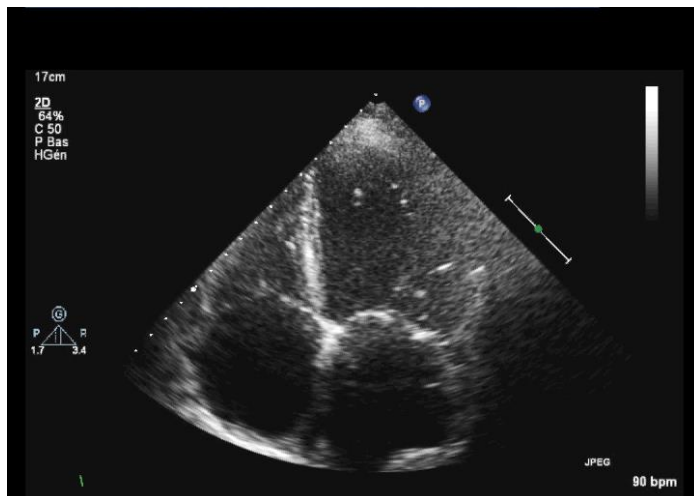
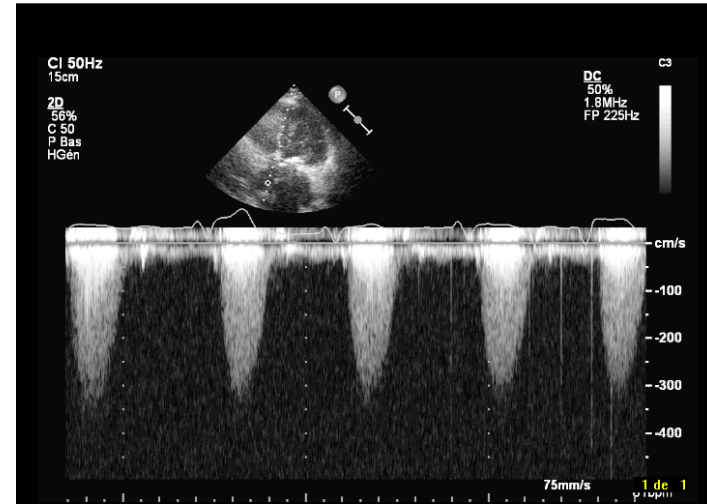
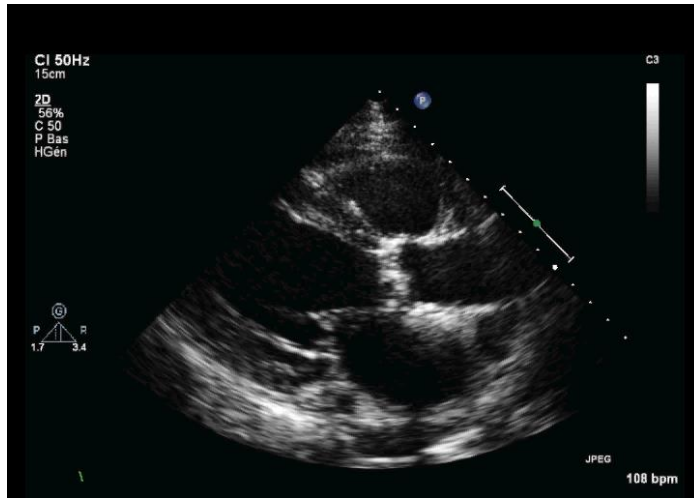


decision making: isolated AV replacement (Trifecta Aortic Bioprosthesis)



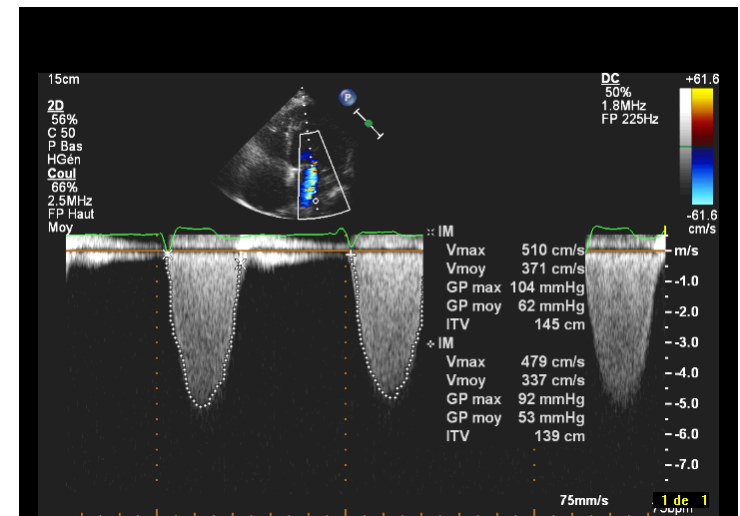
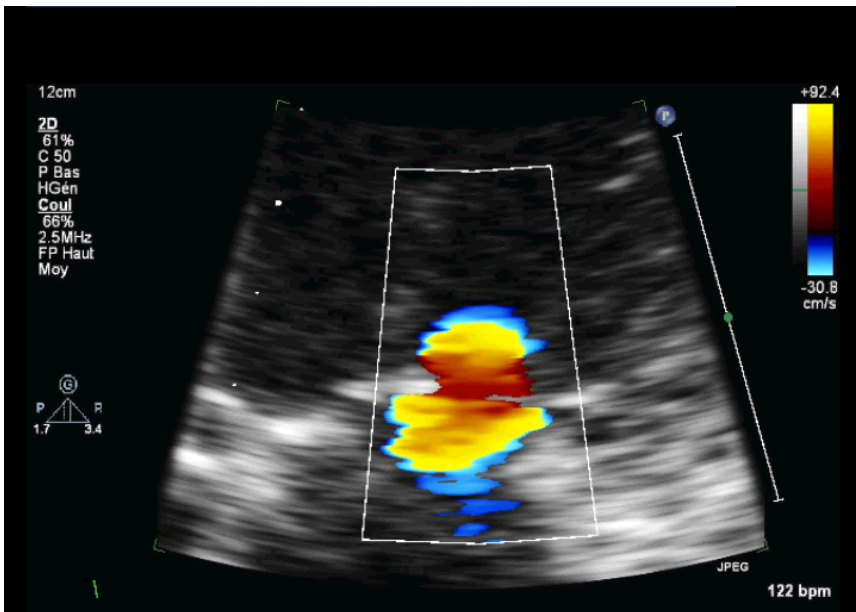
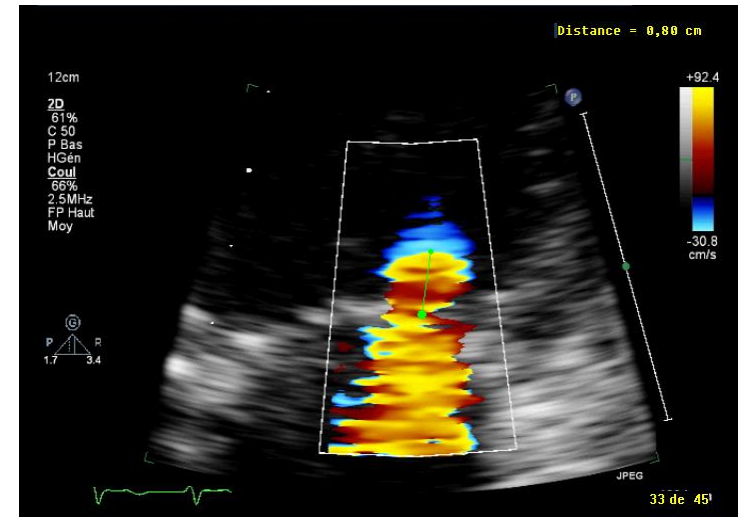
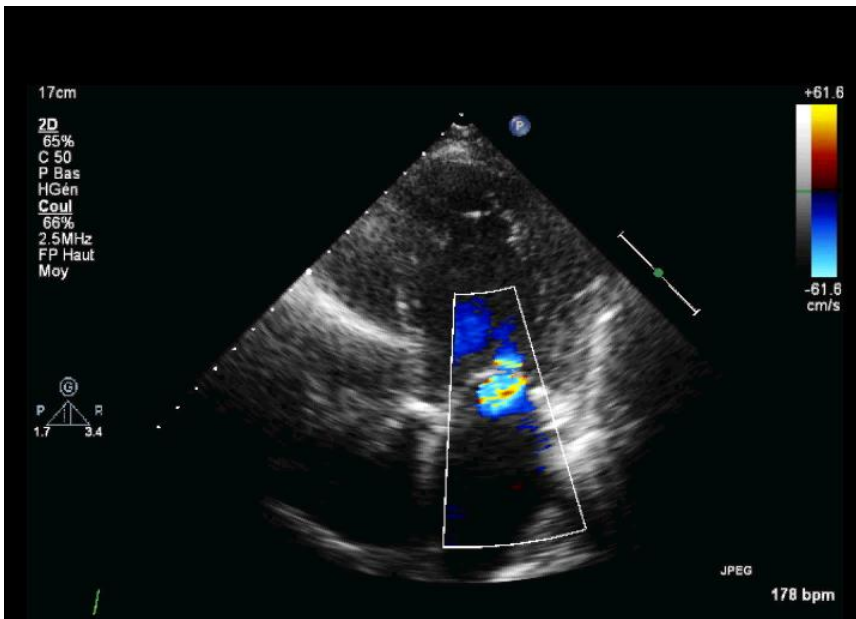
7 days after surgery: Functional MR decreased significantly post operatively to a mild degree of severity

- 80-year old woman in AF, hospitalized for CHF
- Severe calcified low EF - low gradient AS, with FR
- Normal coronary angiography ; Logistic euroscore 20%



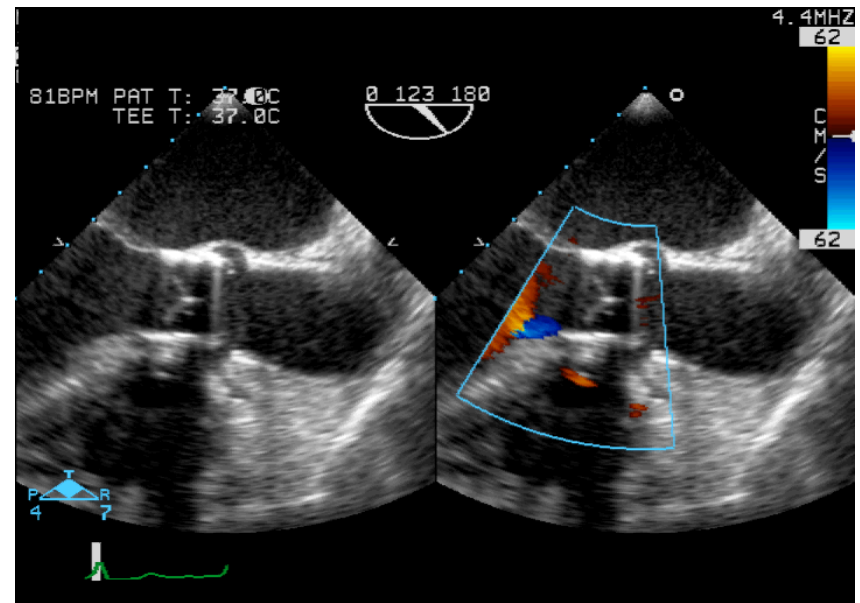
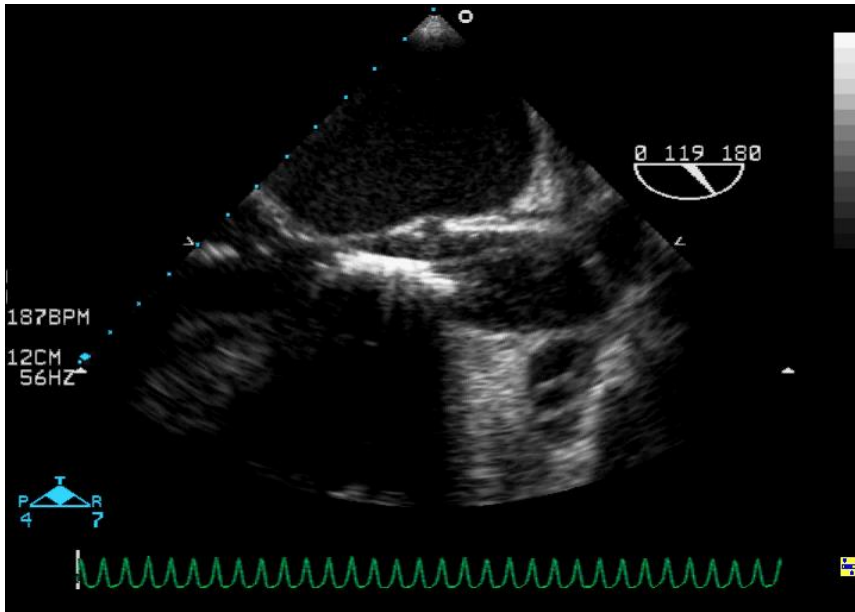
- Calcified AV
- Mean gradient 26 mm Hg
- SVI = 20 ml/m²
- AVA = 0.45 cm²
- EF 25%
- flow reserve on dobutamine
- Associated MR

Courtesy of Philippe Unger

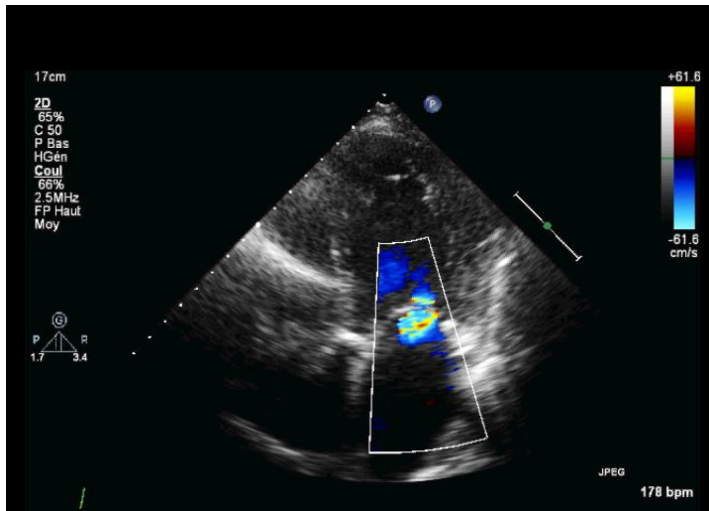


Secondary MR
- ERO 0.25 cm²
- Rvol 36 ml

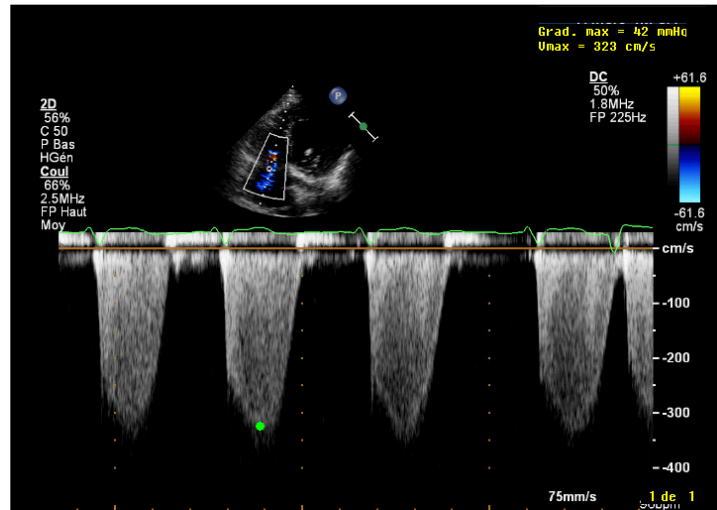
Transcatheter aortic valve implantation (transfemoral approach)



Pre-TAVI

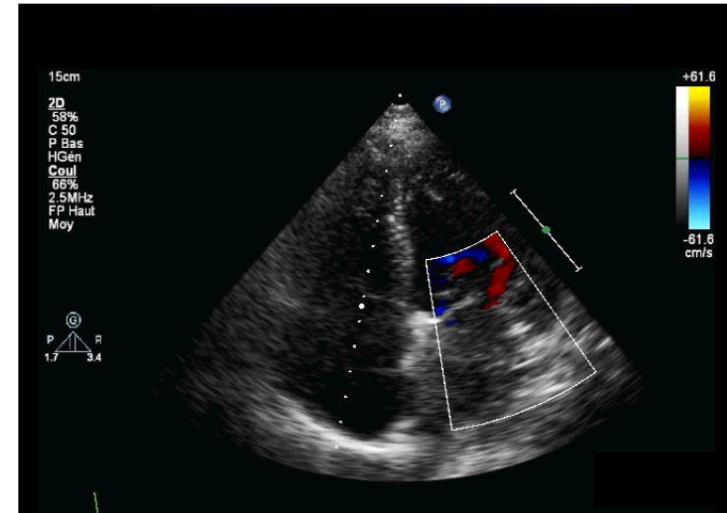


ERO 0.25 cm²; Rvol 36 ml

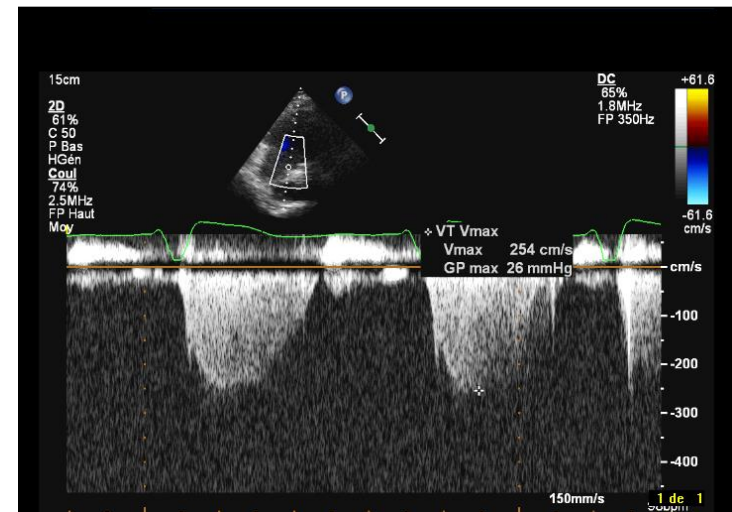


TTPG 41 mm Hg

Post-TAVI



ERO 0.06 cm²; Rvol 10 ml



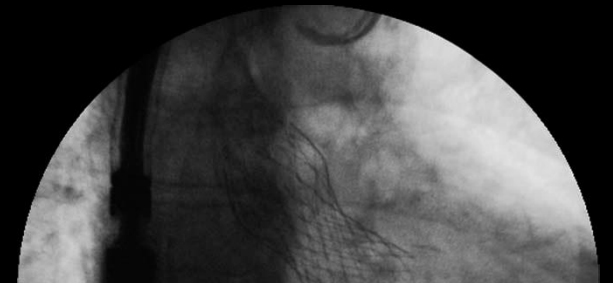
TTPG 26 mm Hg

In case of persistent MR after TAVI, some authors proposed to treat subsequently the MR using percutaneous procedure, in selected patients who remain symptomatic

Percutaneous Treatment of Aortic Stenosis and Mitral Regurgitation in the Same Patient: First Human Cases Description

Marco Barbanti,¹ MD, Gian Paolo Ussia,^{1,2*} MD, FSCAI,
and Corrado Tamburino,^{1,2} MD, PhD, FESC, FSCAI

Barbanti et al. *Catheterization and Cardiovascular Interventions* 78:650–655 (2011)



However, current experience with percutaneous MV repair after TAVI is scarce: technically feasible and may be a therapeutic option in the future for non responder patients



Management of MR associated to severe AS

ESC/EACTS Guidelines 2012

“As long as there are -no morphological leaflet abnormalities (prolapse, post-rheumatic changes, or signs of infective endocarditis), -no mitral annulus dilatation or -no marked abnormalities of LV geometry, **surgical intervention on the mitral valve is in general not necessary and non-severe secondary MR usually improves after the aortic valve is treated”**

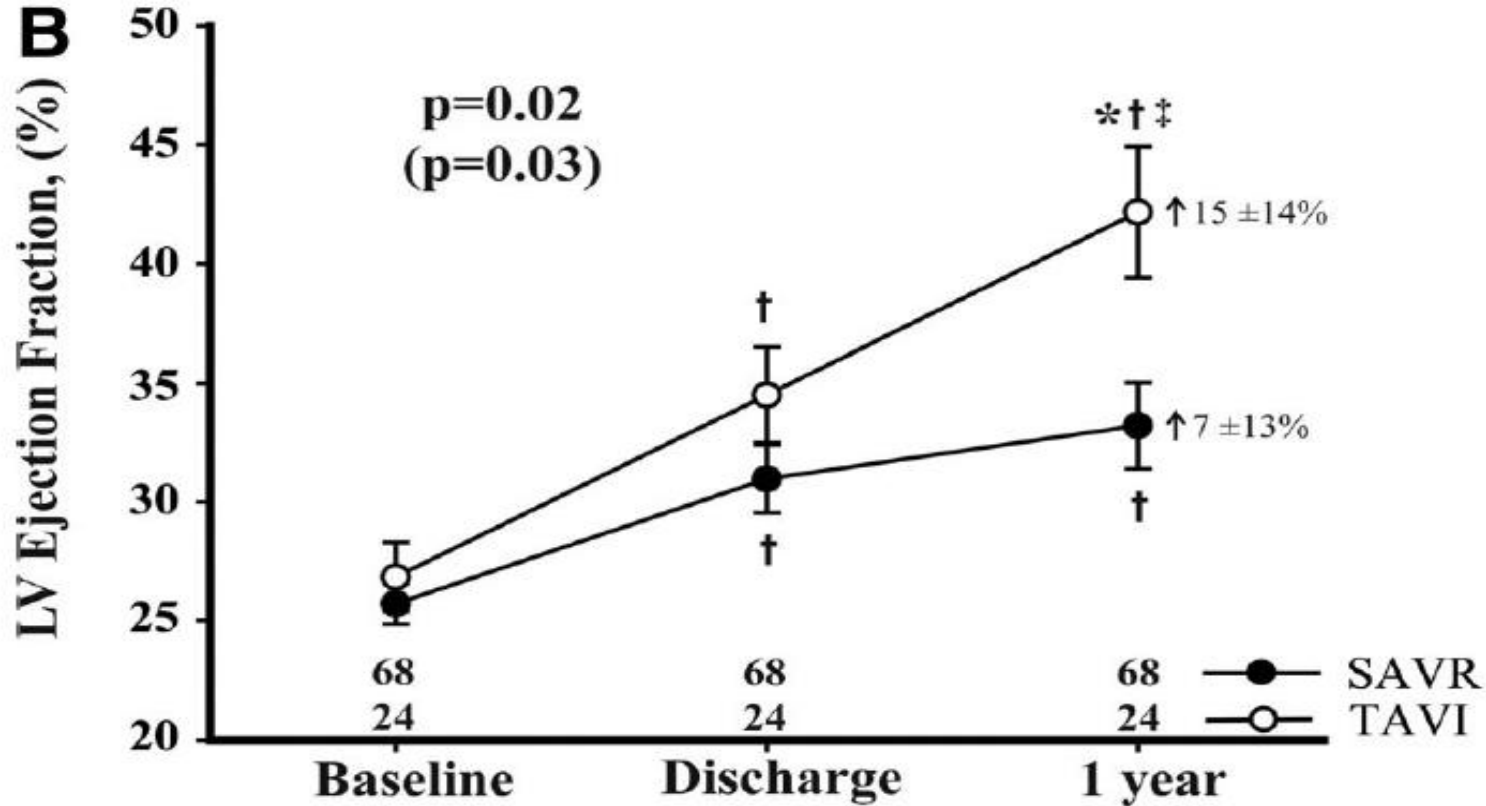
Management of MR associated to severe Low EF AS

- Consider each case individually
- Heart Team
- take into account the likelihood of MR improvement, the level EF, MR severity and etiology, comorbidities, operative risk ...
- Operative mortality for double valve surgery is twice

Management of MR associated to severe Low EF AS

- **In functional MR:**
 - isolated SAVR/TAVI should be considered in non severe FMR (the large majority of cases)
 - combined procedure must be discussed in the minority of cases with severe FMR
- **In organic MR:**
 - combined AVR and MV surgery must be discussed in moderate to severe and severe MR

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



FE < 35%

Visits TAVI group:

- Operative mortality 22%
- Logistic euroscore 32%