Multi-valvular heart disease: Risk stratification and Decision-making

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HART LONG
CENTRUM LEIDEN

FACULTY DISCLOSURE

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ESC GUIDELINES

2025 ESC/EACTS Guidelines for the management of valvular heart disease

Developed by the task force for the management of valvular heart disease of the European Society of Cardiology (ESC) and the European Association for Cardio-Thoracic Surgery (EACTS)

Lack of evidence and therefore given LEVEL C (few B)

Put the focus to the HEART TEAM decision!

Decision-making based on STEPWISE approach!

STEP 1: is one of the valvular lesions severe?

- **YES** (by using the most appropriate diagnostic approaches)
- DECIDE on indication for intervention based on the **single VHD recommendations**
  - Symptoms?
  - Cardiac damage?
  - If equivocal use additional tools such as exercise test of natriuretic peptides
- Assesses **operative risk**: candidate for surgery or transcatheter?

STEP 2: if there is indication for intervention for one severe VHD, should we treat the combined lesion?

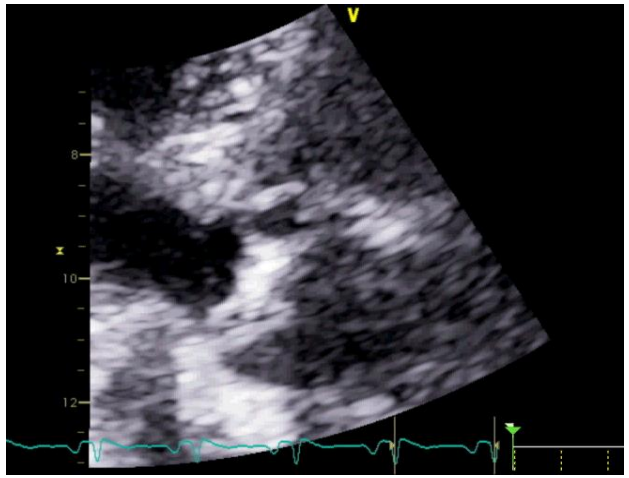
- **Depends on severity**: use all tools to assess true severity in this setting

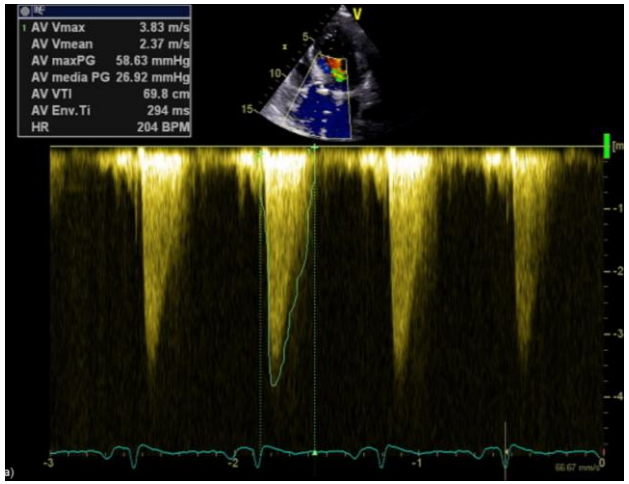
Recommendation Table 11 — Recommendations for surgery of concomitant left-sided valvular heart disease[a]

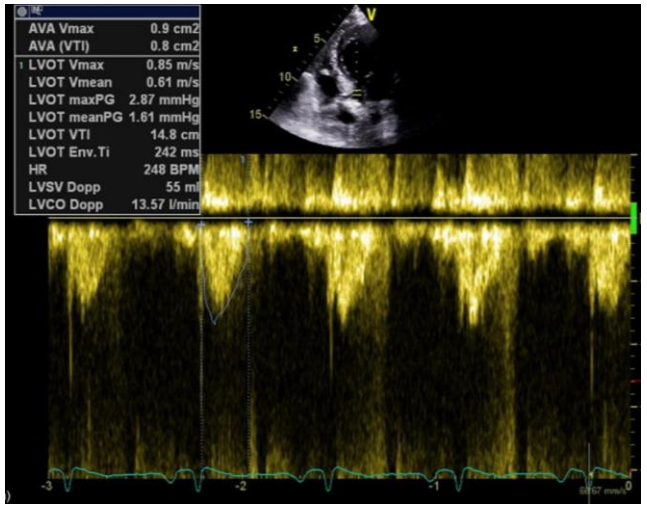
Recommendations	Class[b]	Level[c]
Concomitant aortic stenosis		
SAVR is recommended in patients with severe AS undergoing surgery for another valve.	I	C
SAVR should be considered in patients with moderate AS[d] undergoing surgery for another valve.	IIa	C
Concomitant aortic regurgitation		
AV surgery is recommended in patients with severe AR undergoing surgery for another valve.	I	C
Concomitant mitral regurgitation		
MV surgery is recommended in patients with severe MR undergoing surgery for another valve.	I	C

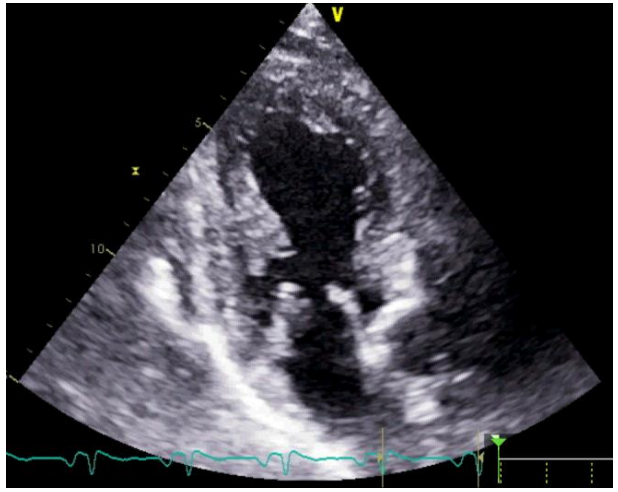
Surgery as one stop solution!

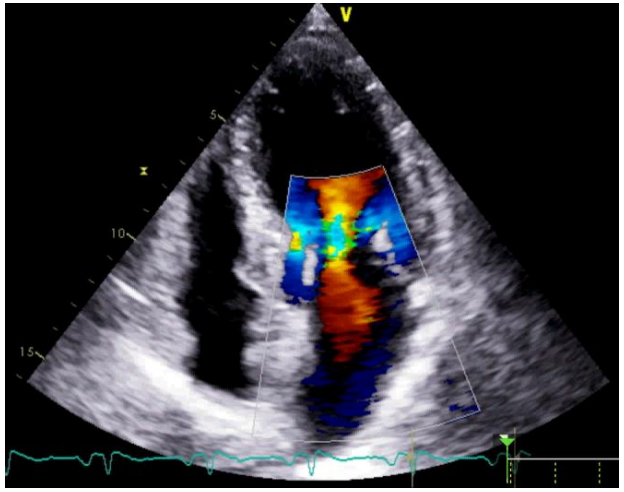
Case: severe AS and severe primary MR









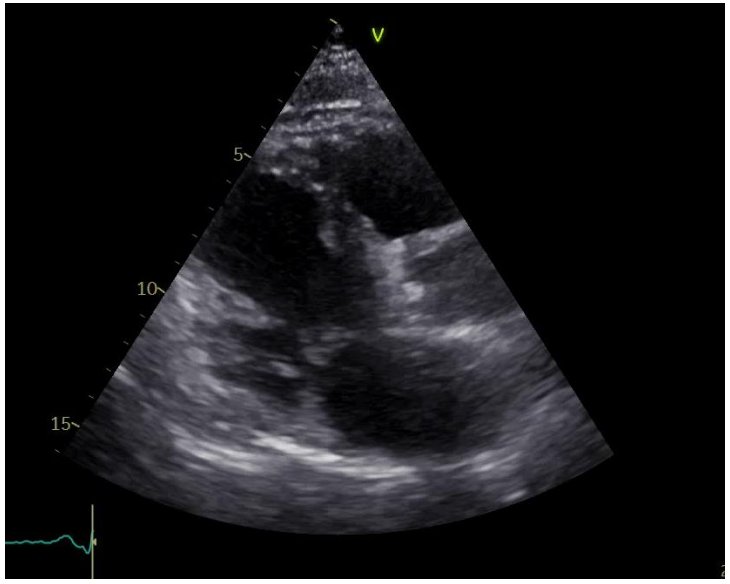


BSA = 1.75

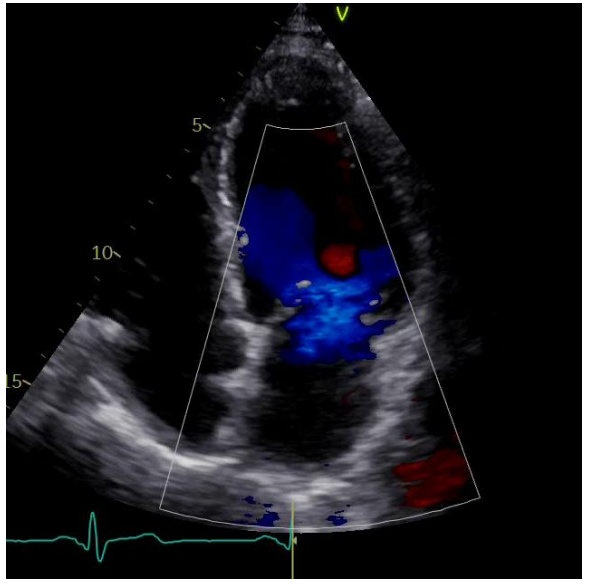
SV_i = 31 ml/m²

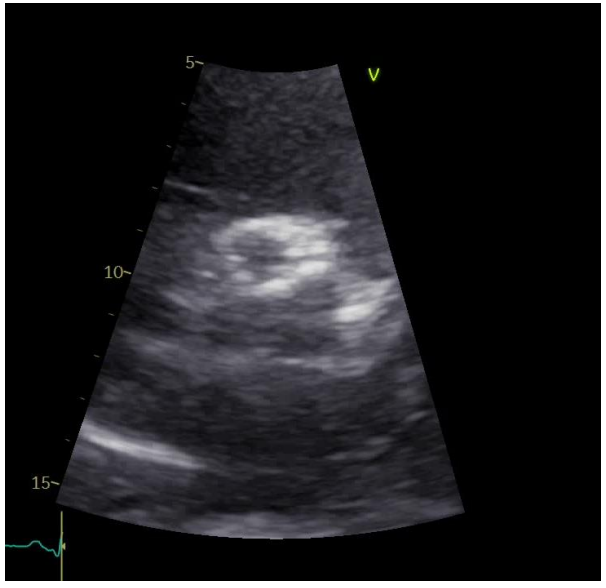
AVA = 0.8 cm²

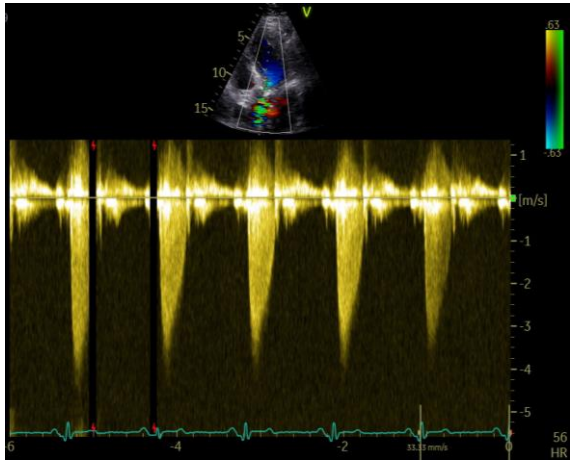
Case: severe AS and severe secondary MR

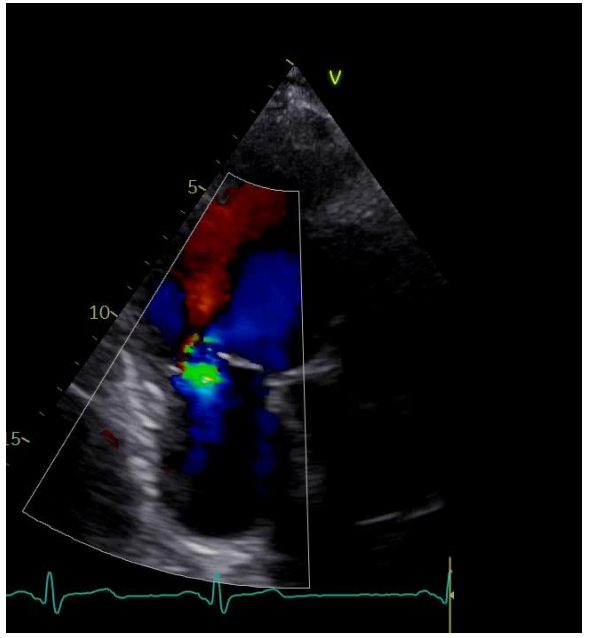


LVEF: 57%
LAVI: 40 ml/m2
AV:
max gradient 60 mmHg,
mean gradient 35 mmHg
AVA 0.9 cm2
DVI 0.25
SVI 30 ml/m2









Case:

Severe AS + Left main stenosis (+multivessel disease) + moderate-severe secondary MR

Procedure Type: CABG + AVR

PERIOPERATIVE OUTCOME	ESTIMATE %
Operative Mortality	2.79%
Morbidity & Mortality	10.6%
Stroke	2.54%
Renal Failure	1.66%
Reoperation	4.28%
Prolonged Ventilation	5.78%
Deep Sternal Wound Infection	0.105%
Long Hospital Stay (>14 days)	4.46%
Short Hospital Stay (<6 days)*	31.3%

Procedure Type: AV Replace + MV Repair + CABG

PERIOPERATIVE OUTCOME	ESTIMATE %
Operative Mortality	4.25%
Morbidity & Mortality	15.6%
Stroke	1.51%
Renal Failure	5.15%
Reoperation	5.31%
Prolonged Ventilation	11.7%
Deep Sternal Wound Infection	NA
Long Hospital Stay (>14 days)	14.7%
Short Hospital Stay (<6 days)*	14.9%

STEP 2: if there is indication for intervention for one severe VHD , should we treat the combined lesion?

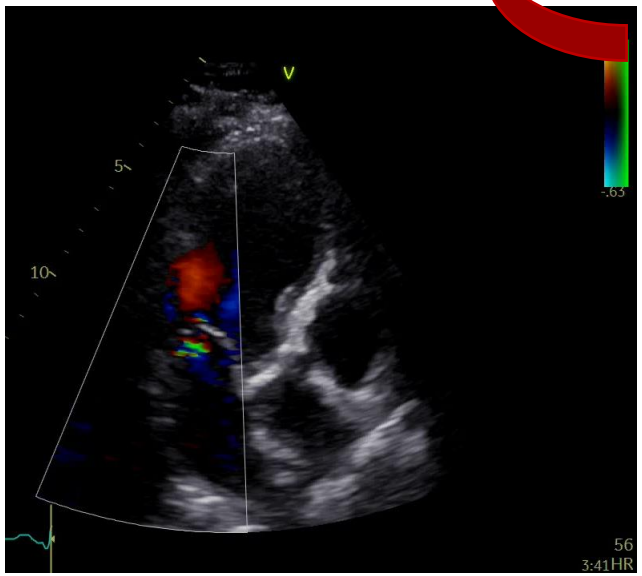
- **Depends on severity**: use all tools to assess true severity in this setting
- **Depends on the aetiology (and anatomy)**
- **Depends on the operative risk**

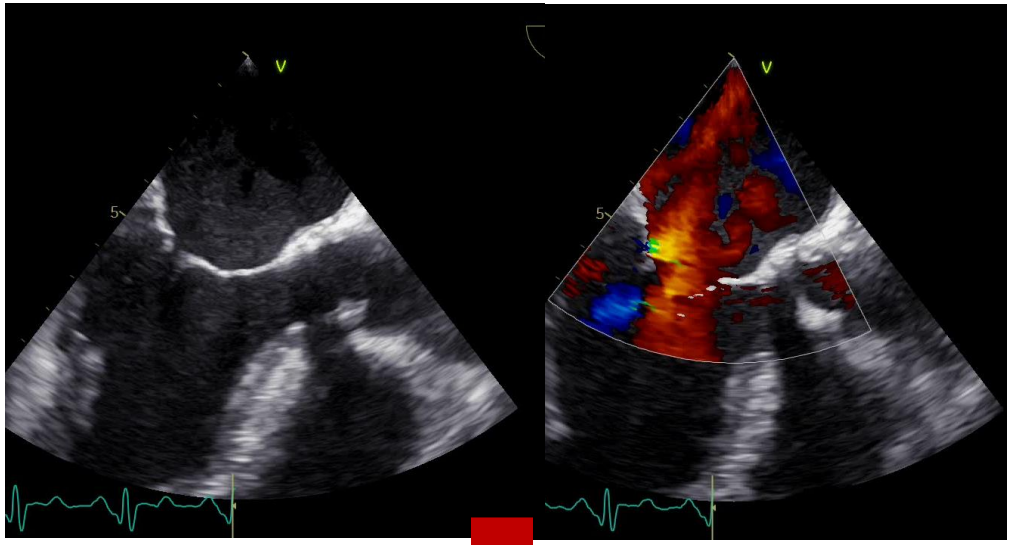
Transcatheter procedures have preferably a staged approach starting from the downstream valve (aortic, mitral, tricuspid) and a stepwise re-evaluation of the upstream valve after each treatment

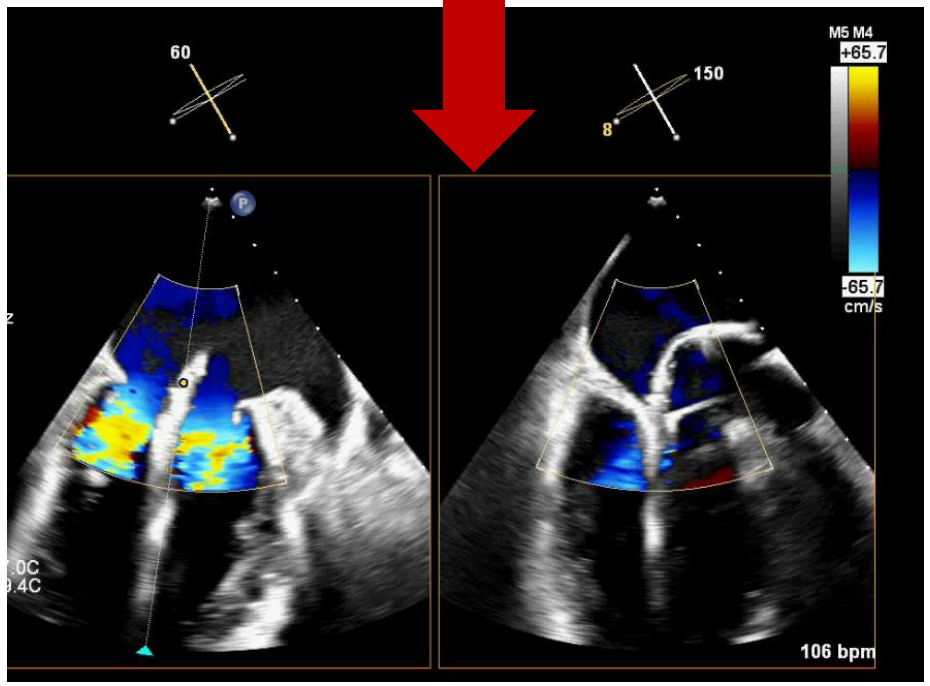
Table 21. **AS/MR Mixed Valve Disease**

Severe AS	Severe MR	Surgical Risk	Procedure
SAVR candidate	Primary MR Repairable valve	Low intermediate	SAVR Surgical mitral valve repair
SAVR candidate	Primary MR Valve not repairable	Low intermediate	SAVR Surgical mitral valve replacement
TAVI candidate	Primary Repairable valve	High prohibitive	TAVI Mitral TEER*
SAVR candidate TAVI candidate	Secondary MR	Low intermediate	SAVR Surgical mitral valve repair/mitral valve replacement or TAVI Mitral TEER*
TAVI candidate	Secondary MR	High prohibitive	TAVI Mitral TEER*

AS and MR







Identification of MR etiology and anatomical considerations

- LV either small (also LVOT) and hypertrophic OR dilated and with impaired function
- Left atrial dilatation / annulus dilatation/AF
- Annular (MAC) and leaflet calcifications
- Primary MR

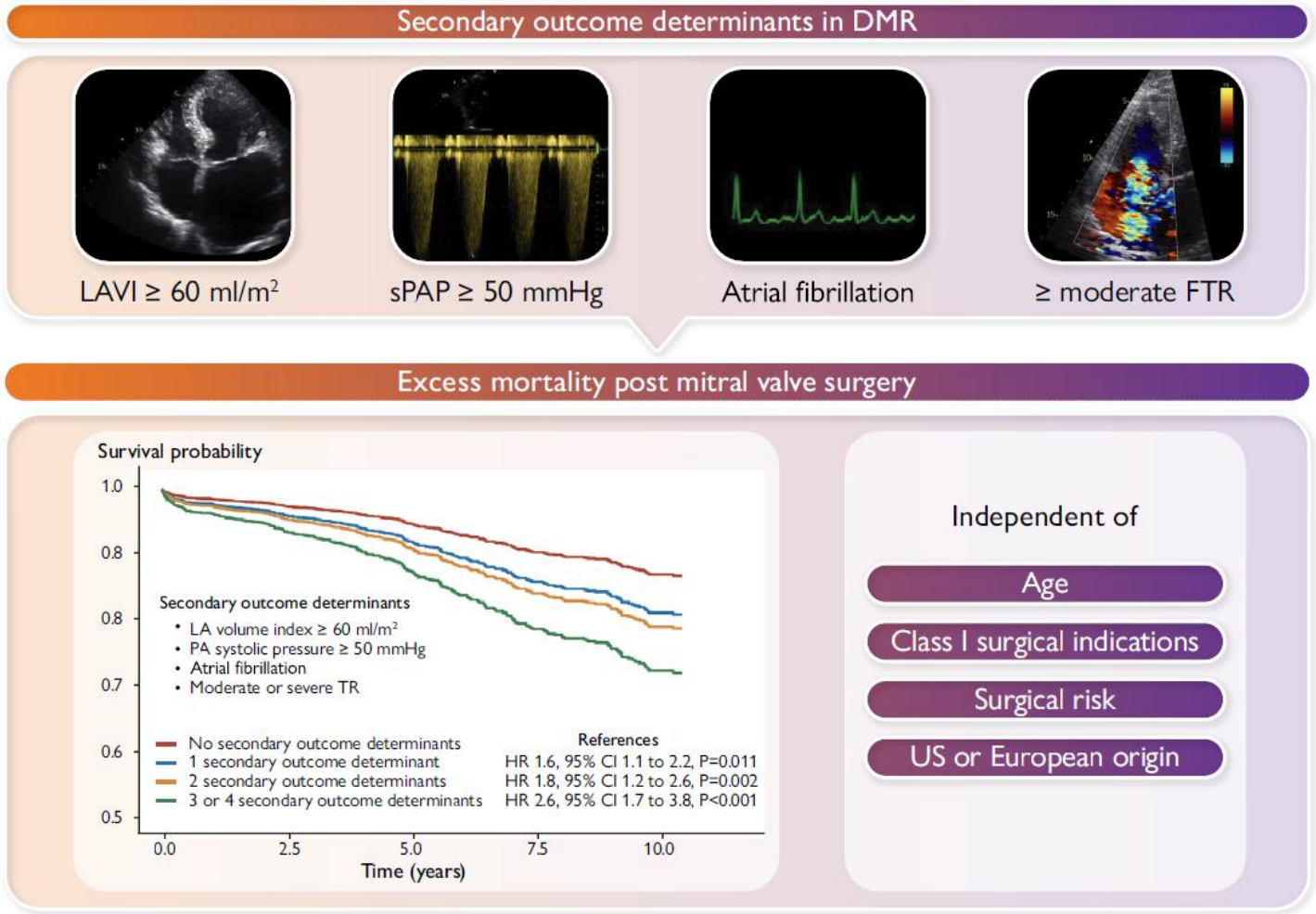
MR and TR: prognostic value

ESC European Society of Cardiology
European Heart Journal (2023) **44**, 871–881
https://doi.org/10.1093/eurheartj/ehad004

CLINICAL RESEARCH
Valvular heart disease

Factors influencing post-surgical survival in degenerative mitral regurgitation

TR progression in 25% of the cases



Recommendations on indications for intervention in tricuspid regurgitation

New

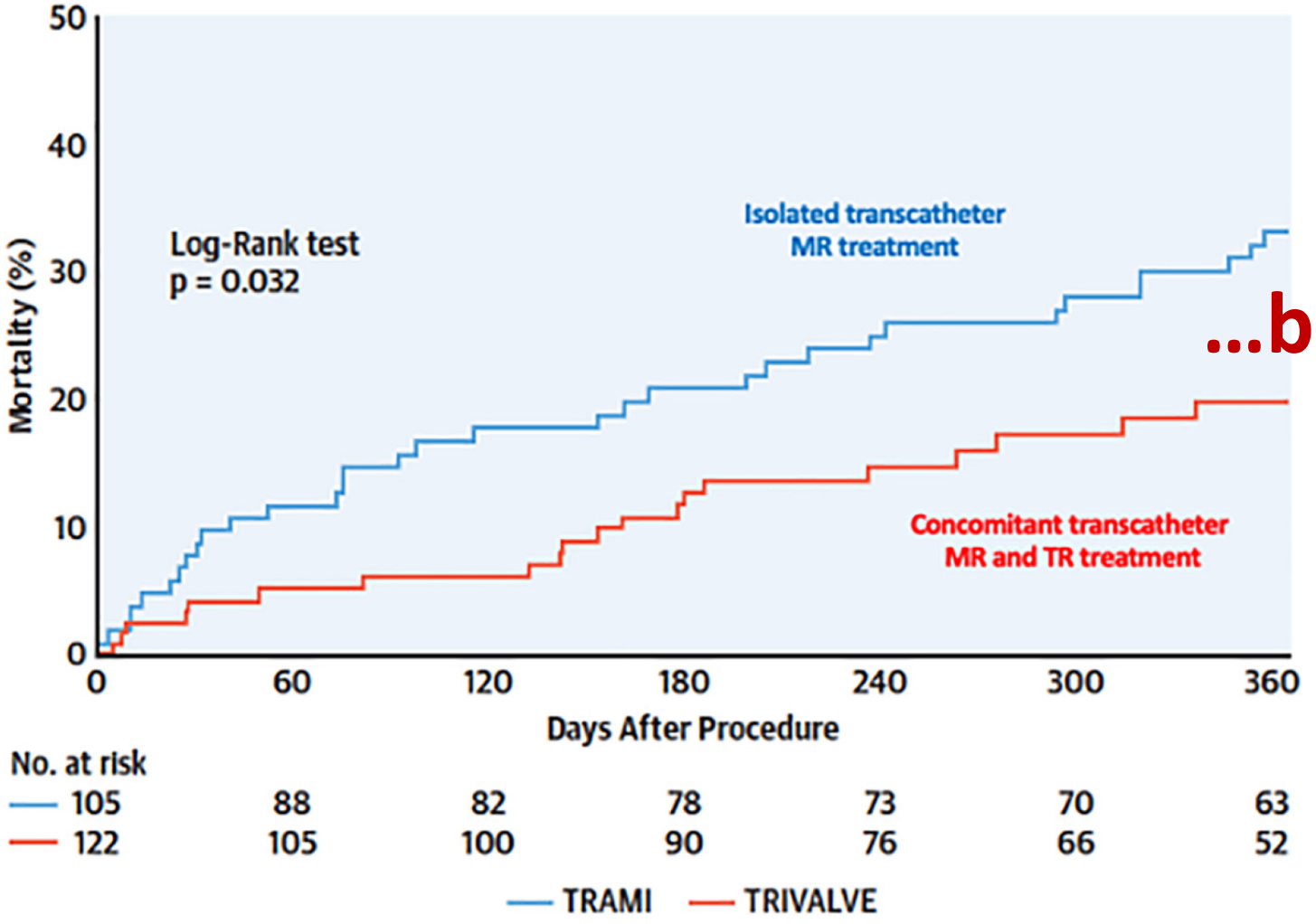
Recommendations	Class	Level
Patients with tricuspid regurgitation and left-sided valvular heart disease requiring surgery		
Concomitant TV surgery is recommended in patients with severe primary or secondary TR.	I	B
Concomitant TV repair should be considered in patients with moderate primary or secondary TR, to avoid progression of TR and RV remodelling.	IIa	B
Concomitant TV repair may be considered in selected patients with mild secondary TR and tricuspid annulus dilatation (≥40 mm or >21 mm/m^2), to avoid progression of TR and RV remodelling.	IIb	B

Patients with TR and left-sided valvular heart disease requiring surgery

Table S5 **Factors to be considered during Heart Team discussion regarding concomitant tricuspid valve surgery in patients undergoing left-sided valve sur**

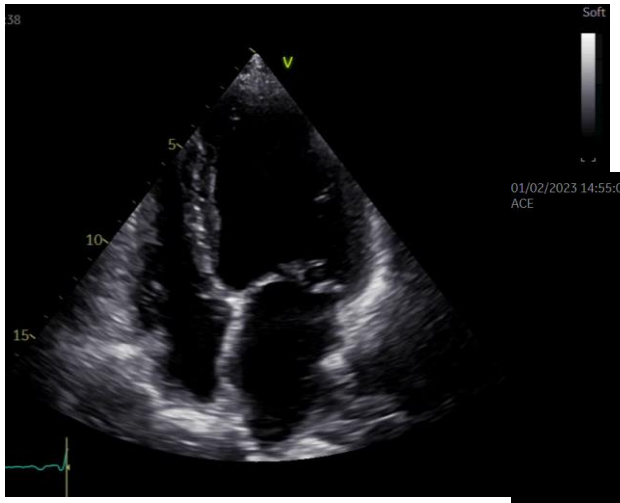
Factors favouring concomitant TV surgery	Factors not favouring concomitant TV surgery
TR moderate or more	TR mild
Tricuspid annular dilatation	No tricuspid annular dilatation
Chronic AF	First-degree atrioventricular block, pre-existing left bundle branch block
Significant RA dilatation	Normal RA dimension
RV dilatation or (non-severe) dysfunction	Normal RV function and diameter
Presence of (non-severe) TV leaflet tethering	Absence of TV leaflet tethering
Pulmonary hypertension SPAP ≥50 mmHg	Normal pulmonary pressures
Reversible renal and liver dysfunction	No other comorbidities

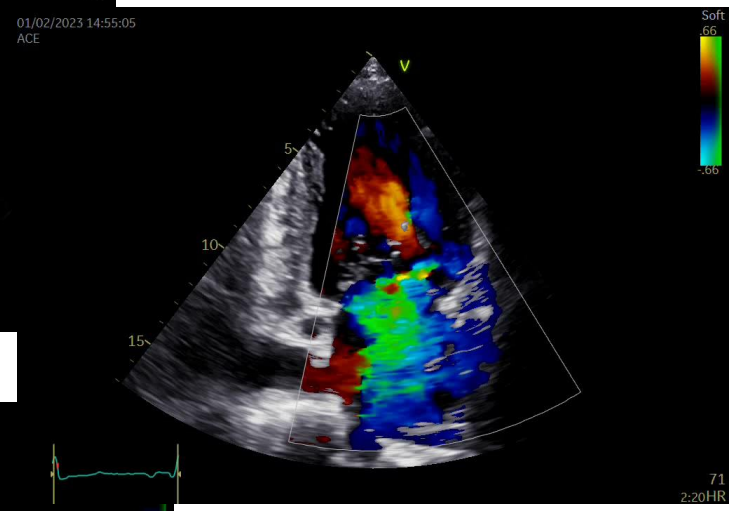
TR in patients with MR undergoing TEER

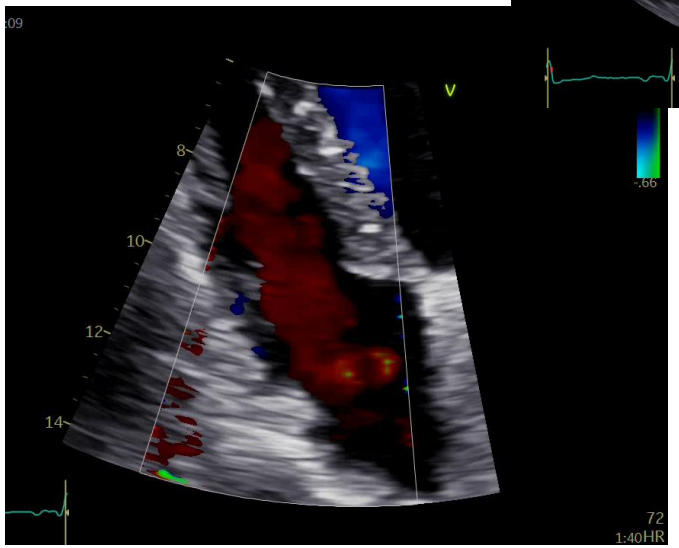


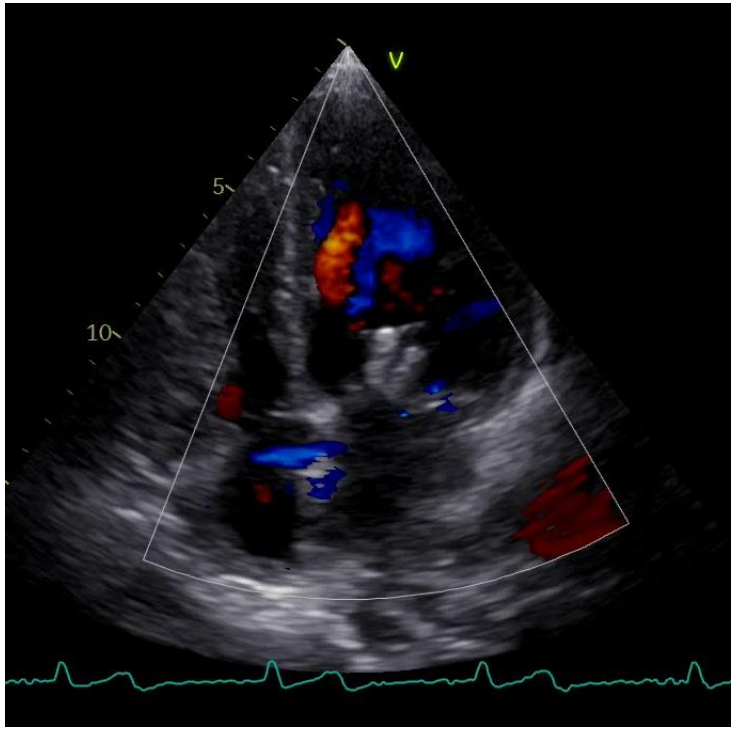
…but MR etiology counts!!

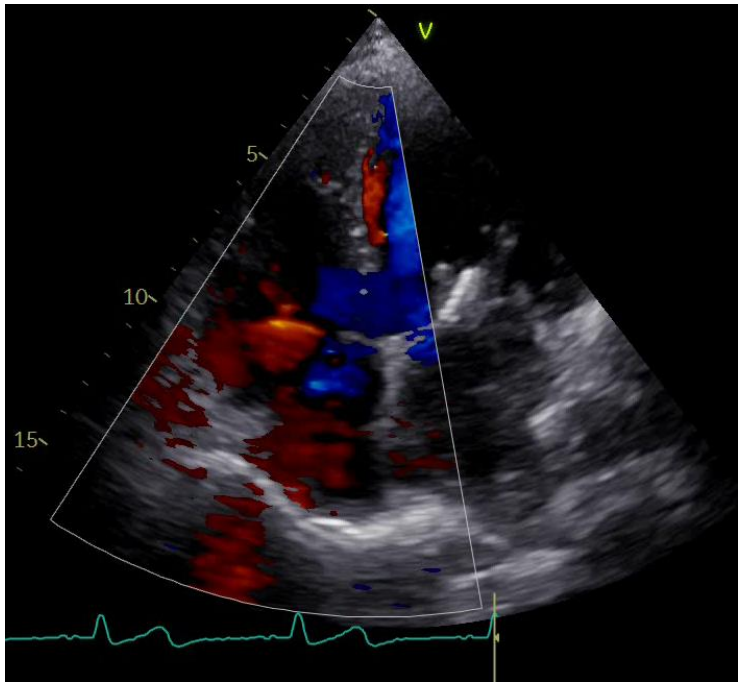
Case 1


Soft
5
10
15

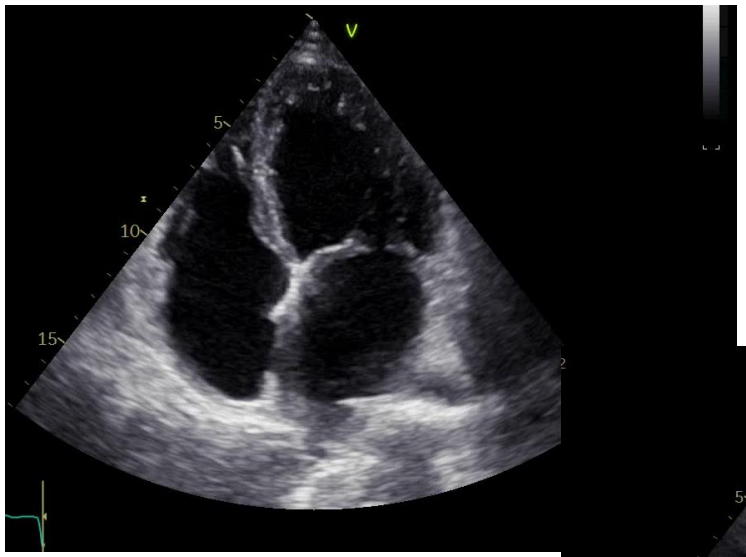

01/02/2023 14:55:05
ACE
Soft
.66
.66
5
10
15
71
2:20HR

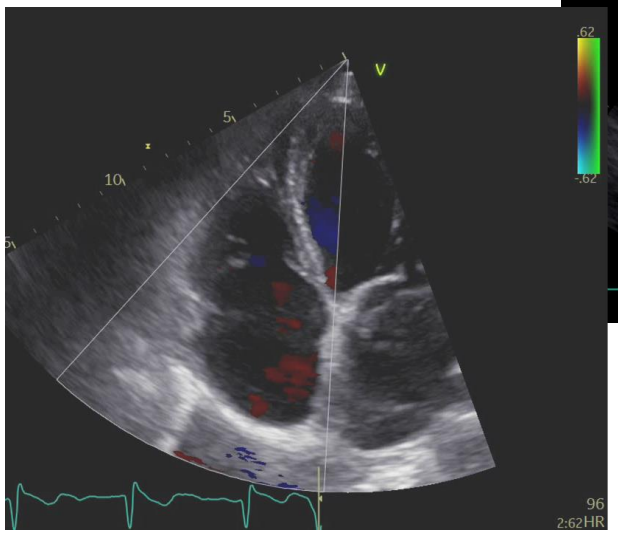

8
10
12
14
72
1:40HR

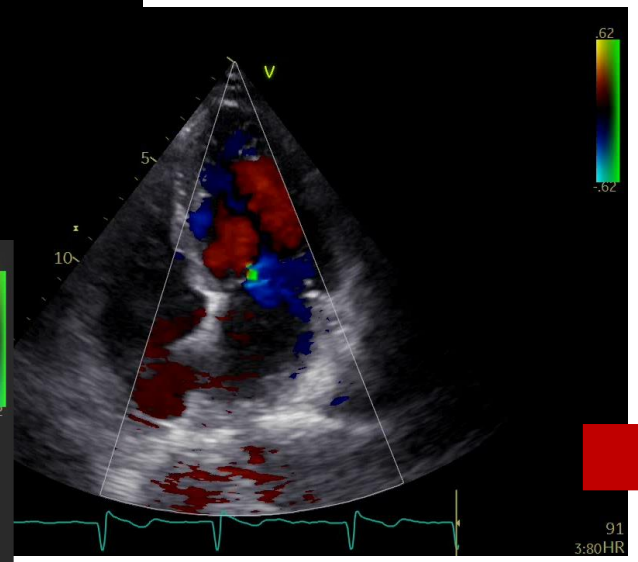

5
10

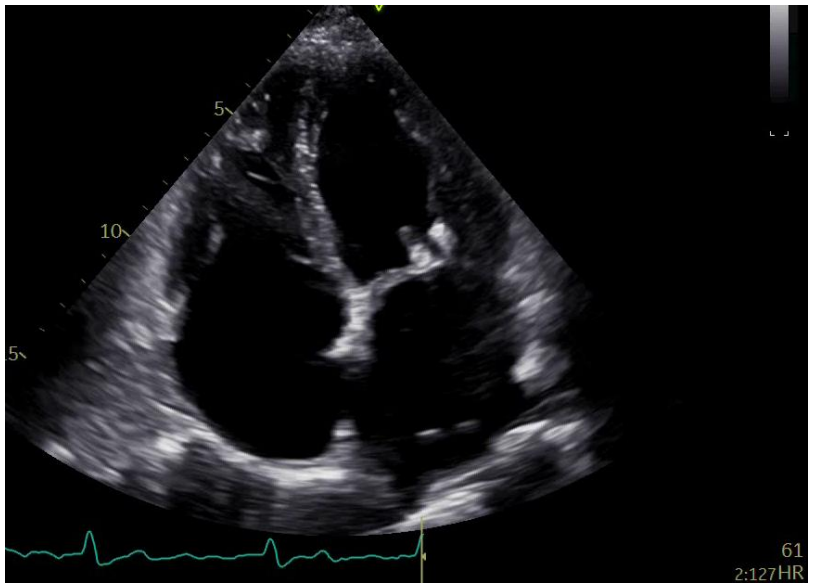

5
10
15

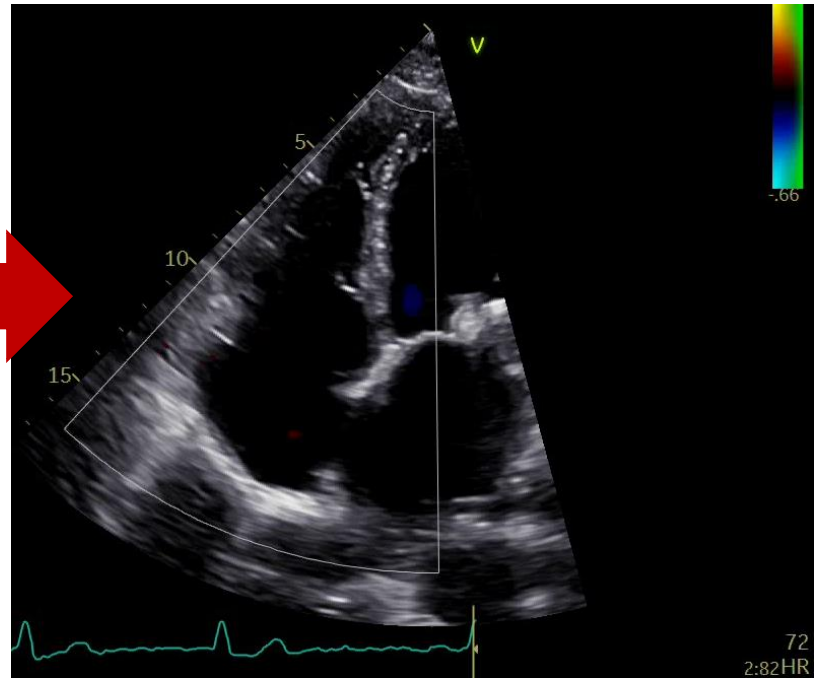
Case 2

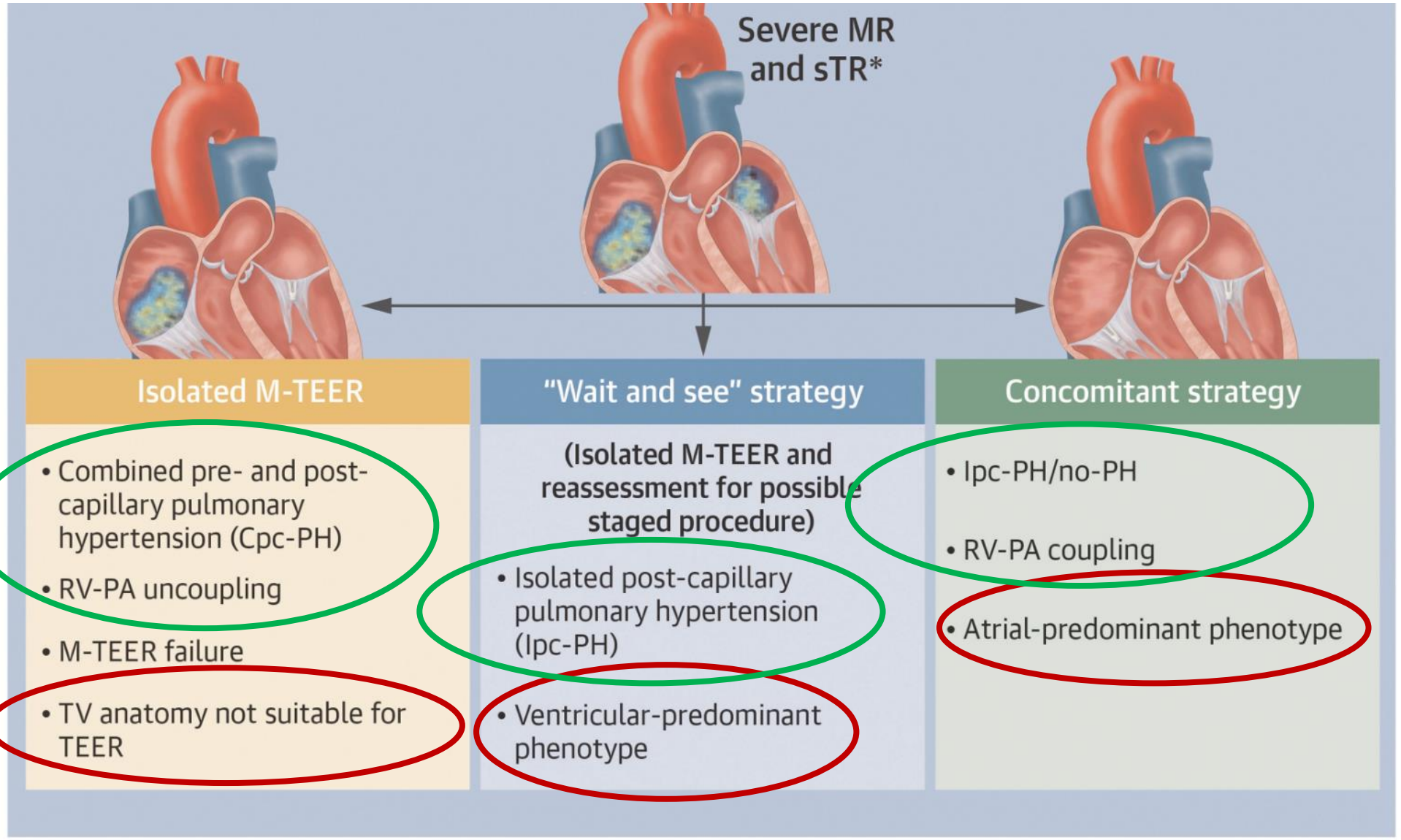












ECHO

RHC

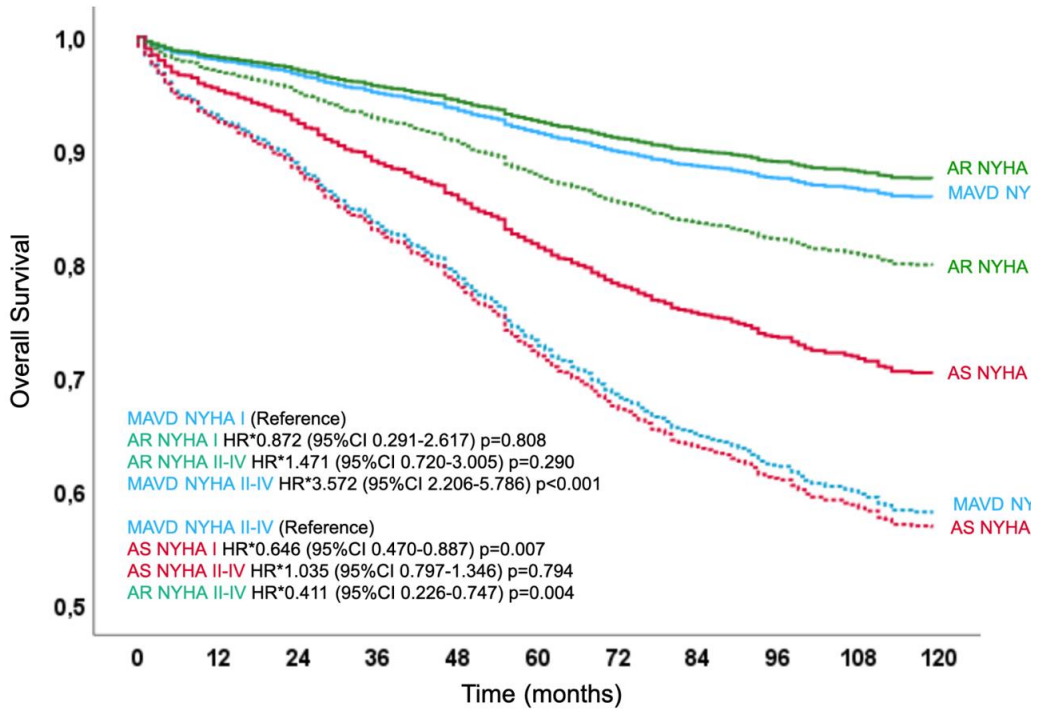
Sisinni A, et al. J Am Coll Cardiol Intv. 2023;16(2):127-139.

STEP 3: both concomitant VHD are moderate

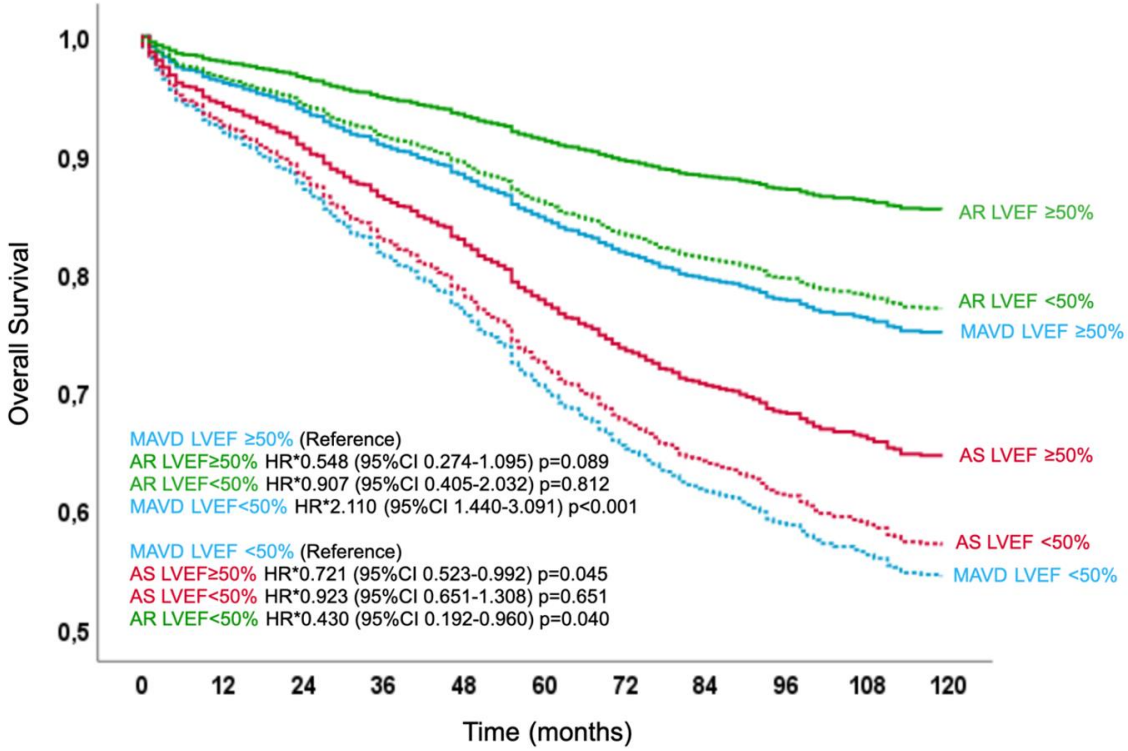
- **Be sure they are both MODERATE using MMI tools**
- **Typical for Mixed aortic or mixed mitral valve disease; no evidence for others combination of VHD**

Recommendation Table 12 — Recommendations on indications for intervention in patients with mixed moderate aortic stenosis and moderate aortic regurgitation (see also Supplementary data online, *Evidence Table 24*)

Recommendations	Class[a]	Level[b]
Intervention is recommended in symptomatic patients with mixed moderate AV stenosis[c] and moderate regurgitation, and a mean gradient ≥40 mmHg or V_{max} ≥4.0 m/s.[790–793]	I	B
Intervention is recommended in asymptomatic patients with mixed moderate AV stenosis[c] and moderate regurgitation with V_{max} ≥4.0 m/s, and LVEF <50% not attributable to other cardiac disease.[791]	I	C



MAVD NYHA I	224	214	207	195	174	140	120	98	78	68	49
MAVD NYHA II-IV	303	264	239	219	190	166	134	102	83	72	53
AR NYHA I	169	164	160	153	145	131	106	92	82	72	60
AR NYHA II-IV	244	215	201	186	169	153	125	98	83	73	68
AS NYHA I	357	324	310	287	278	262	251	231	207	191	170
AS NYHA II-IV	629	558	523	485	451	403	366	332	277	234	200

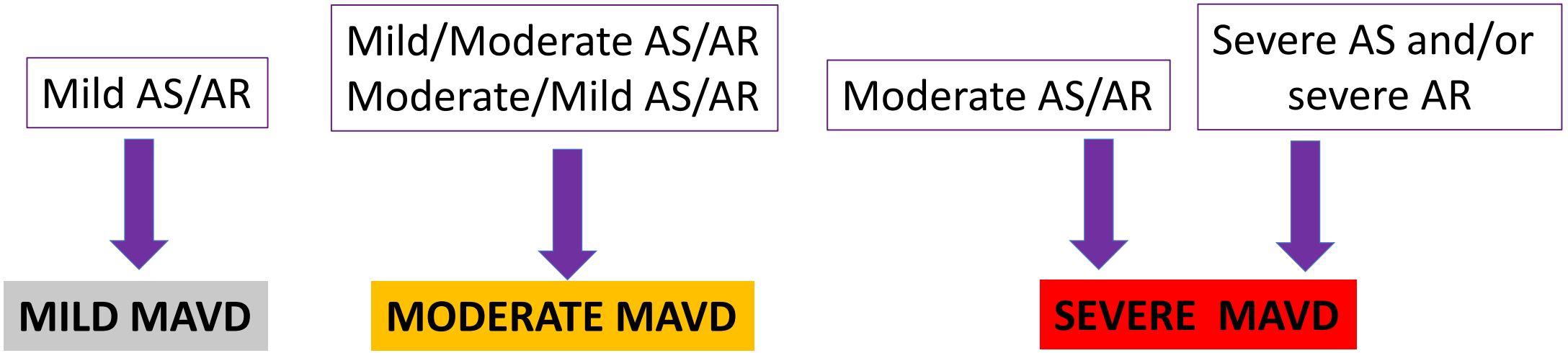


MAVD LVEF ≥50%	378	347	333	313	274	231	192	150	118	106	74
MAVD LVEF <50%	149	131	113	101	90	75	62	50	43	34	28
AR LVEF ≥50%	290	266	255	242	228	208	168	141	127	115	100
AR LVEF <50%	123	113	106	97	86	76	63	49	38	30	28
AS LVEF ≥50%	743	688	652	606	579	534	498	456	391	352	310
AS LVEF <50%	243	194	181	166	150	131	119	107	93	73	60

True Moderate Mixed Aortic Valve disease

Lopez Santi et al, Eur Heart J 2025 in press

ACCORDING TO AS AND AR EVALUATION, DEFINE AND GRADE MAVD



Prognosis modifiers: NYHA class, LVEF, age, more severe AS and/or AR at baseline, larger LV mass index, more pronounced LV concentric remodelling and advanced LV diastolic dysfunction.

Heart 2019;**105**:1515–1522

Conclusions

- **MVD is common and is associated with more unfavourable cardiac remodelling and worse prognosis as compared to single VHD.**

- **Management of these patients is very challenging from diagnosis, risk-stratification and therapeutic decision making and the scientific evidence for MVD remains limited.**

- **Specific expertise is crucial and the final decision is up to the Heart Team!**