# Management of Aortic Regurgitation

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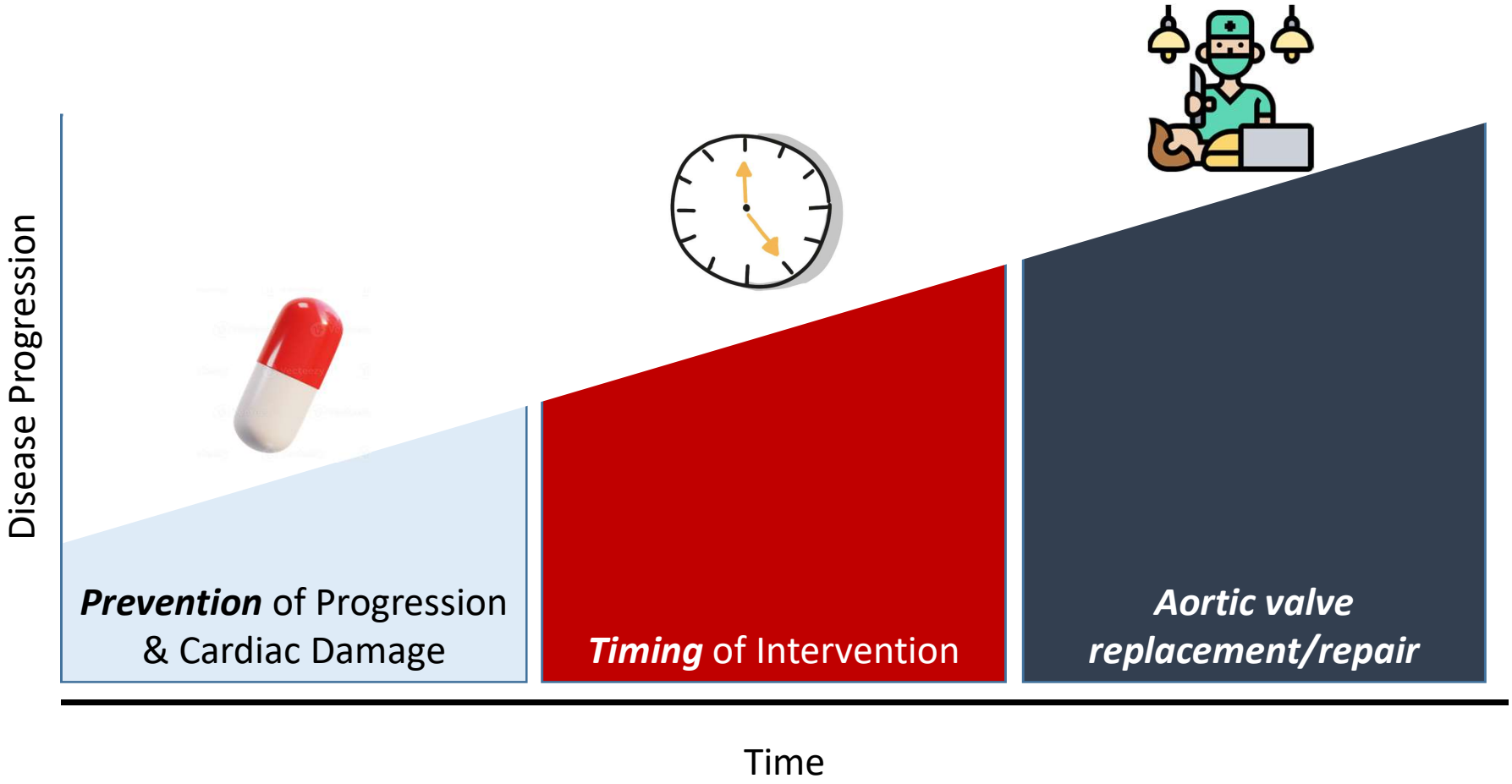
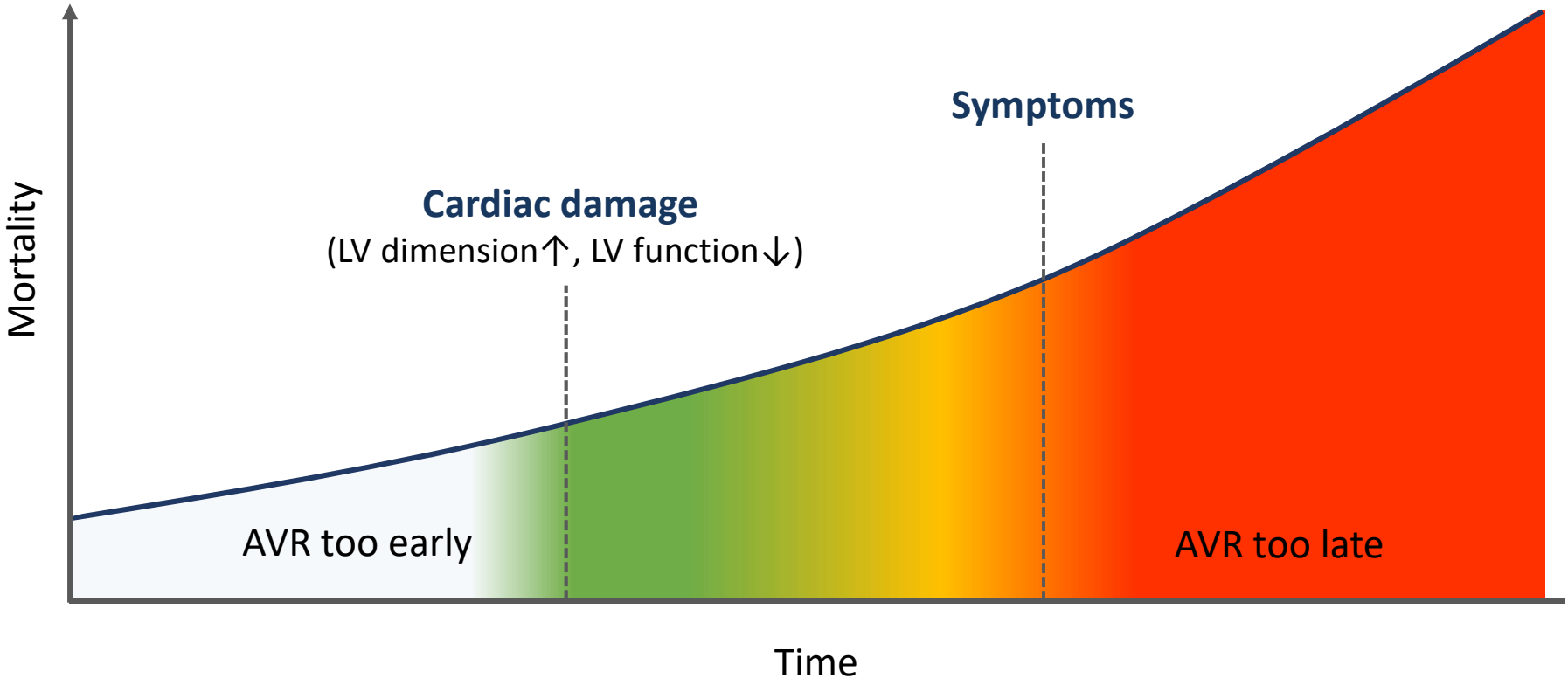
Fokus Herz Bern, 16. Mai 2025

# Management of Patients with Aortic Regurgitation



# Progression of Chronic Aortic Regurgitation

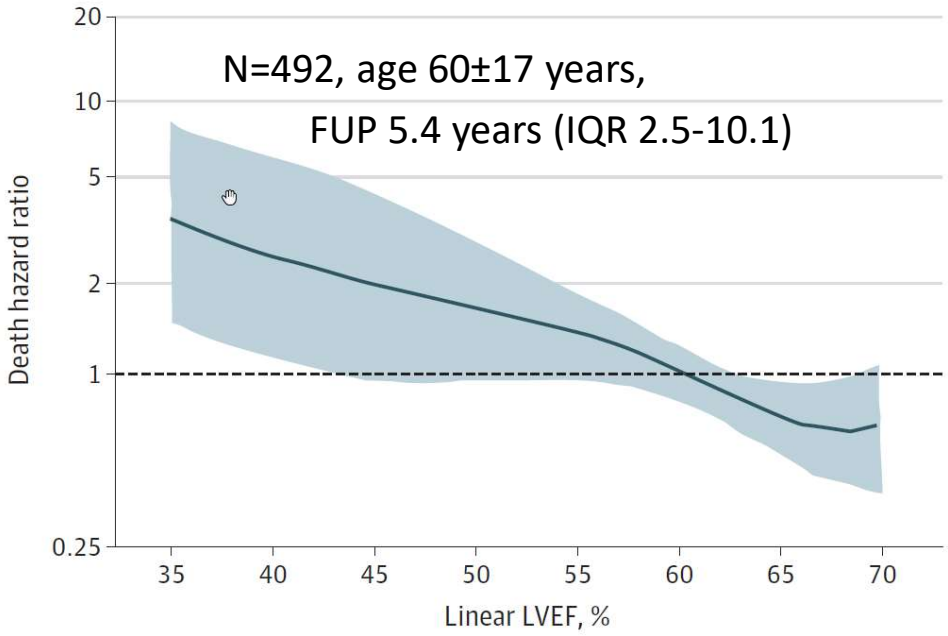


# Guideline Recommendations for AVR in Asymptomatic Aortic Regurgitation

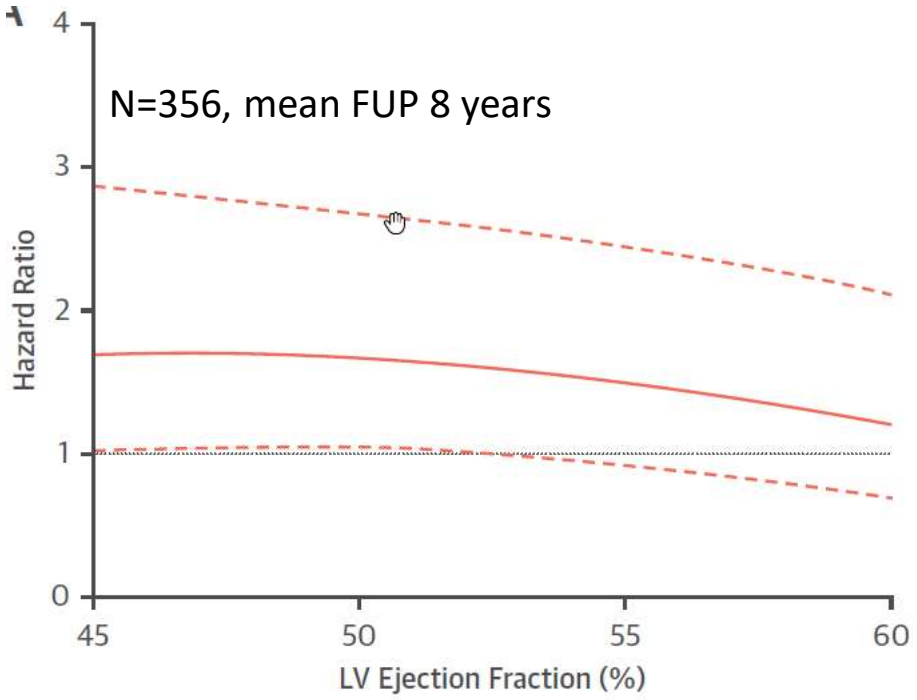
| ESC/EACTS 2021 | | | AHA/ACC 2020 | | |
|---|---|---|---|---|---|
| Recommendations | COR | LOE | Recommendations | COR | LOE |
| **LVESD >50 mm or LVESD >25 mm/m$^2$ or resting LVEF ≤50%** | **I** | **B** | **LVEF ≤55%** | **I** | **B** |
| **LVESD >20 mm/m$^2$ or resting LVEF ≤55%, if surgery is at low risk** | **IIb** | **C** | **LVESD >50 mm or indexed LVESD >25 mm/m$^2$ (LVEF >55%)** | **IIa** | **B** |
| | | | **Progressive decline in LVEF on at least 3 serial studies to LVEF 55% to 60% or a progressive increase in LV dilation to LVEDD >65 mm** | **IIb** | **B** |

# Mortality of AR according to LVEF

**Spline curves from observational studies indicate ↑ risk of death with LVEF <55-60%**




Yang LT et al, JAMA Cardiol 2021;6(2):189-198



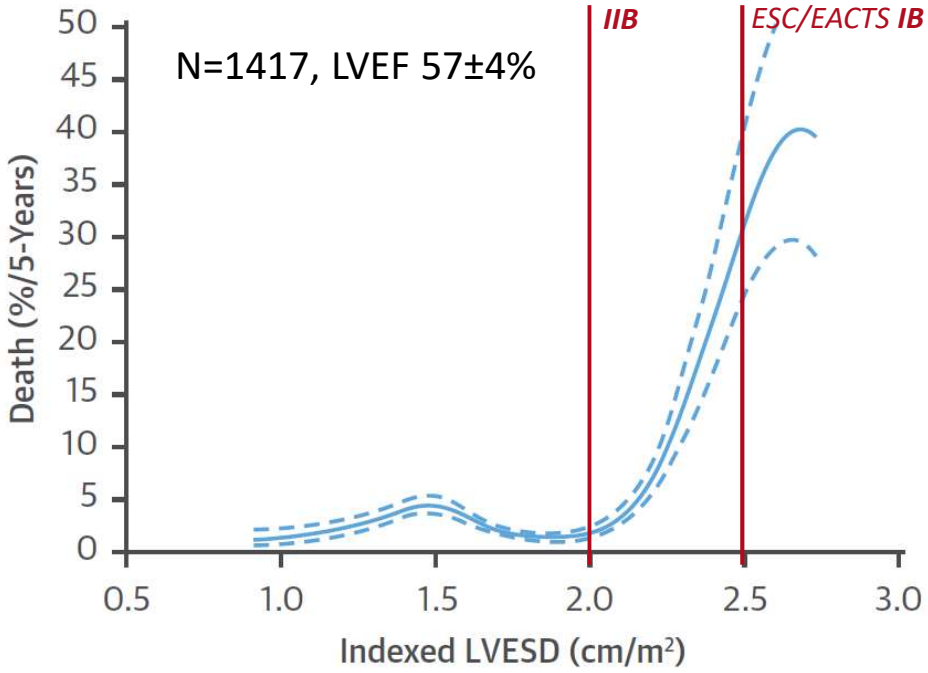

De Meester C et al, JIMG 2019;12:2126-38

Determinants of timing of intervention in patients with chronic AR

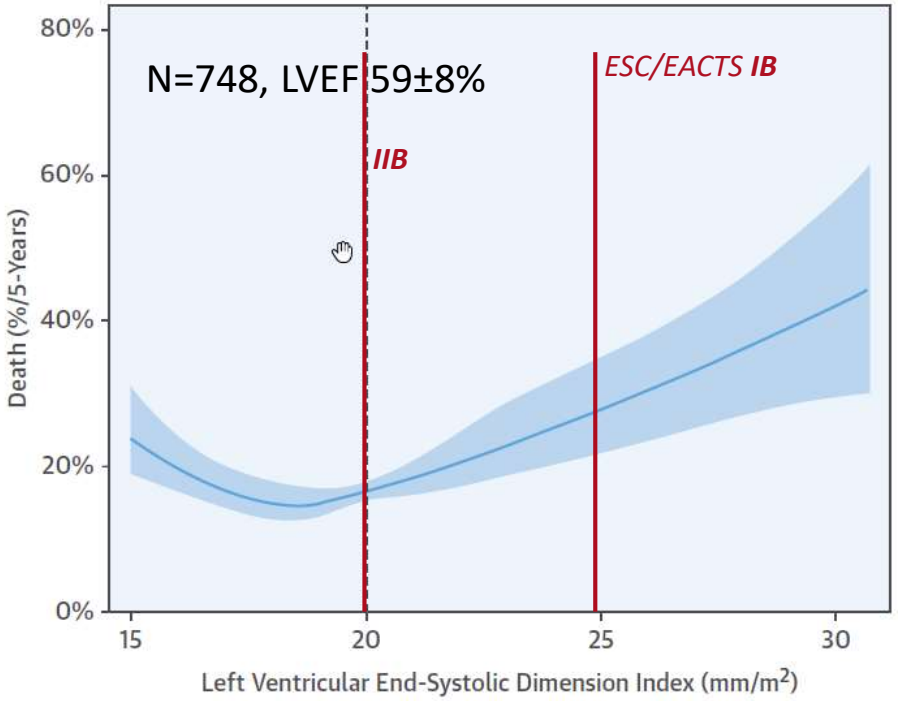
Left ventricular function- LVEF | Left ventricular dimension - LVESD

# Mortality of AR according to LV Dimension

**LVESDi > LVESD > LVEDD**




Mentias A e tal, JACC 2016;68:2144-53

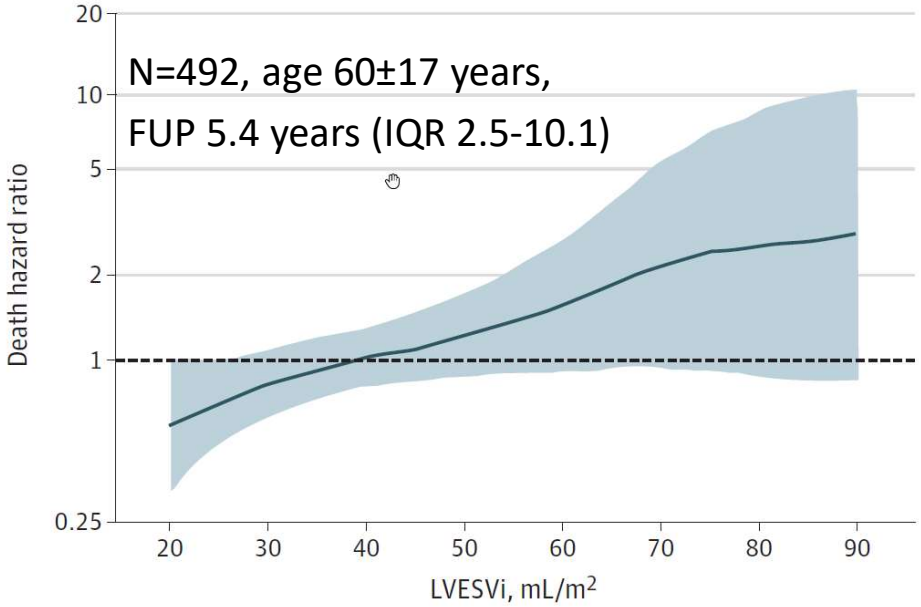



Yang LT, JACC 2019:73:1741-1752

# Transition from LV linear dimensions to volumes

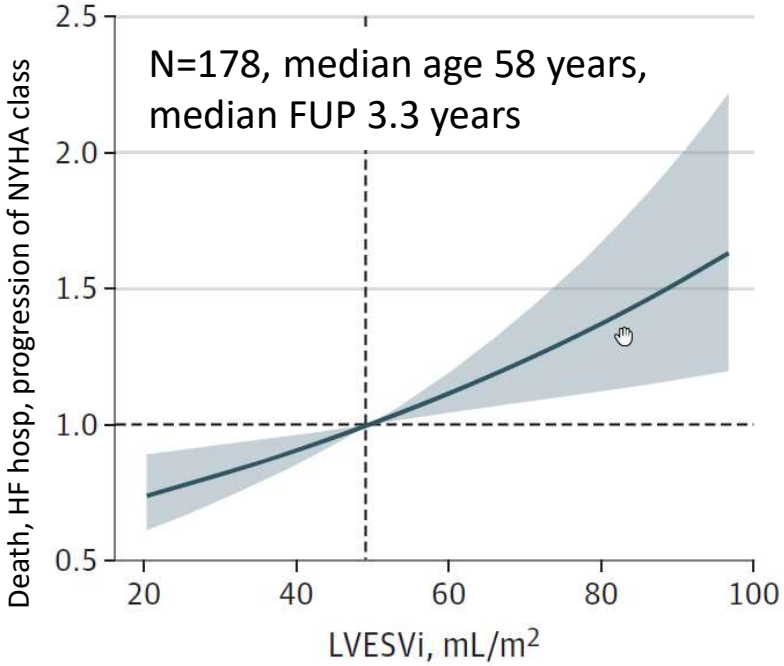
**LVESDi → LVESVi** | **Risk of death increases with LVESVi >40-45 mL/m²**

***2-D TTE (disk-summation methods)***




Yang LT et al, JAMA Cardiol 2021;6(2):189-198

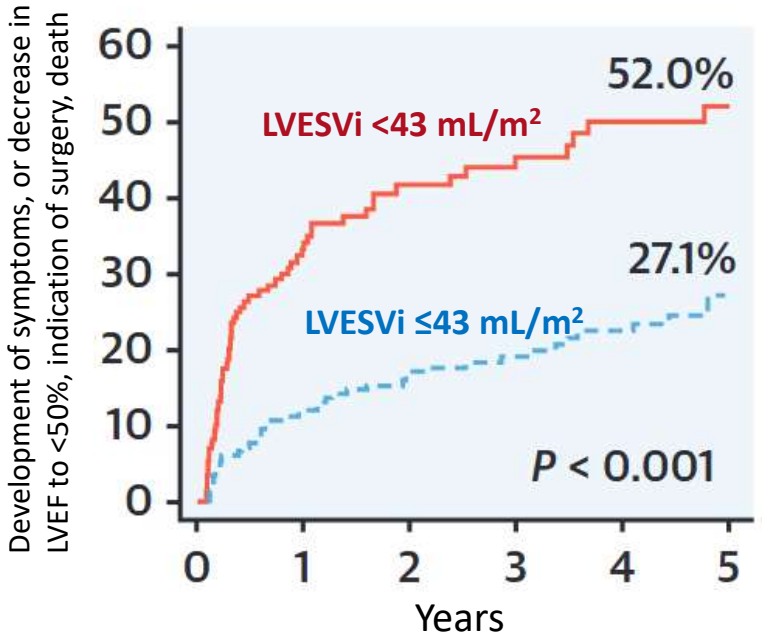
***Cardiac MRI***




Hashimoto G et al, JAMA Cardiol 2022;7(9):924-933

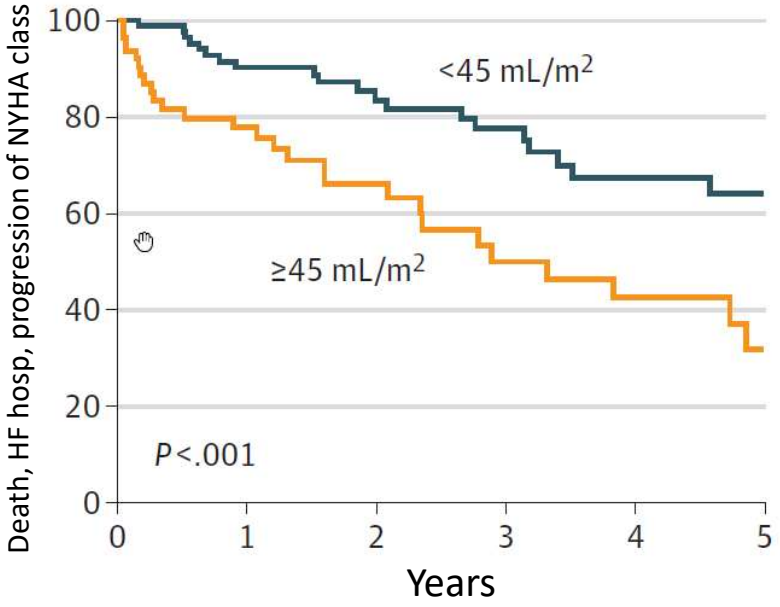
# Outcomes of AR according to LV volumes assessed by CMR

*458 patients, age 60 years, FUP 2.4 years*



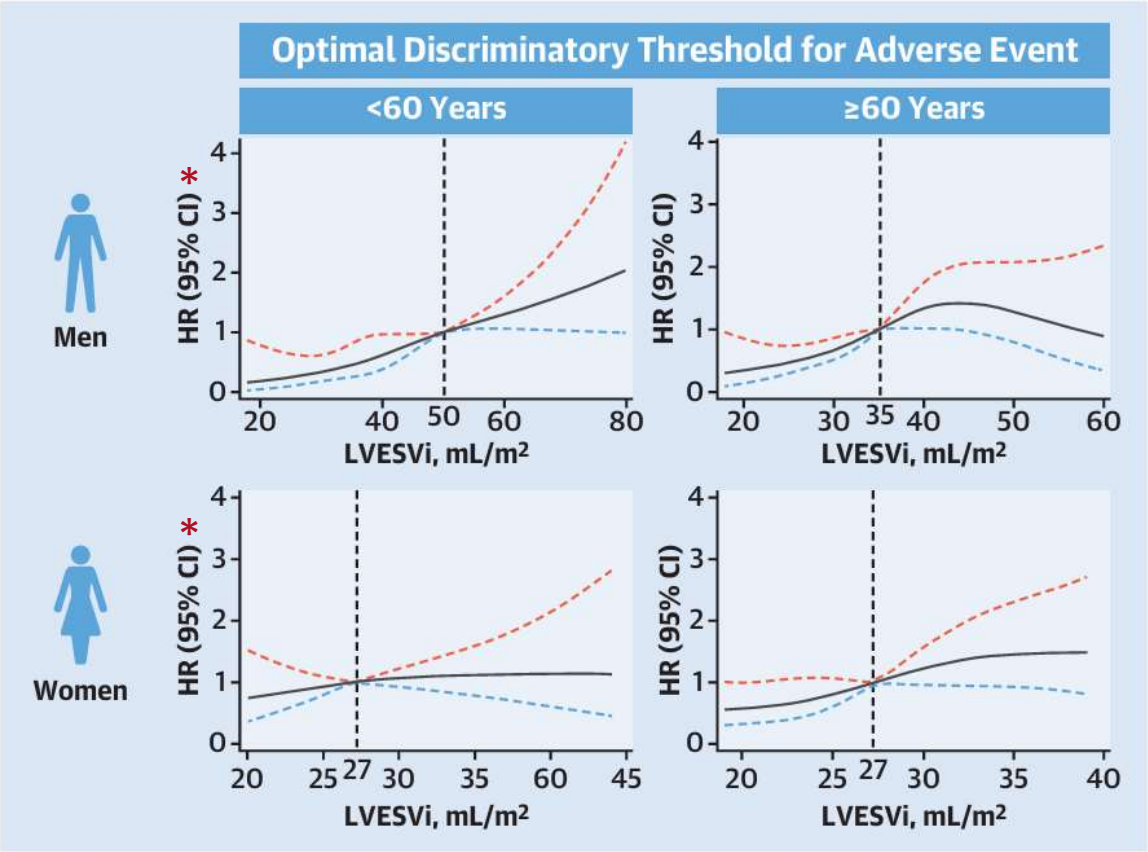

Malahfji M et al, JACC 2023;81:1885-1898

*178 patients, age 58 years, FUP 3.3 years*




Hashimoto G et al, JAMA Cardiol 2022;7(9):924-933

# Impact of Age and Sex on LV Remodeling




Serial echocardiographic echocardiographic assessment of 525 patients with FUP of 2 years (IQR 1-3.6)

→ **Lower LVESVi threshold in older as compared to younger men**

→ **Lower LVESVi threshold in women as compared to men**

**Do we need age- and sex-based thresholds for intervention?**

*Mortality, HF hospitalization, or urgent AVR

Akintoye E at al, JACC 2023;81(15):1474-1487

# Timing of AVR in Asymptomatic AR

**Too early..** ... **...too late**

| | | |
|---|---|---|
| LVESDi ≤20 mm/m2<br>LVESVi <40 mL/m2<br>LVEF >60% | **More sensitive markers for borderline scenarios** | LVESDi >25 mm/m2<br>LVESVi >45 mL/m2<br>LVEF ≤55% |

1. **Progressive LV enlargement**
2. **Myocardial Strain (GLS)**
3. **Cardiac MRI**
4. **Biomarkers**

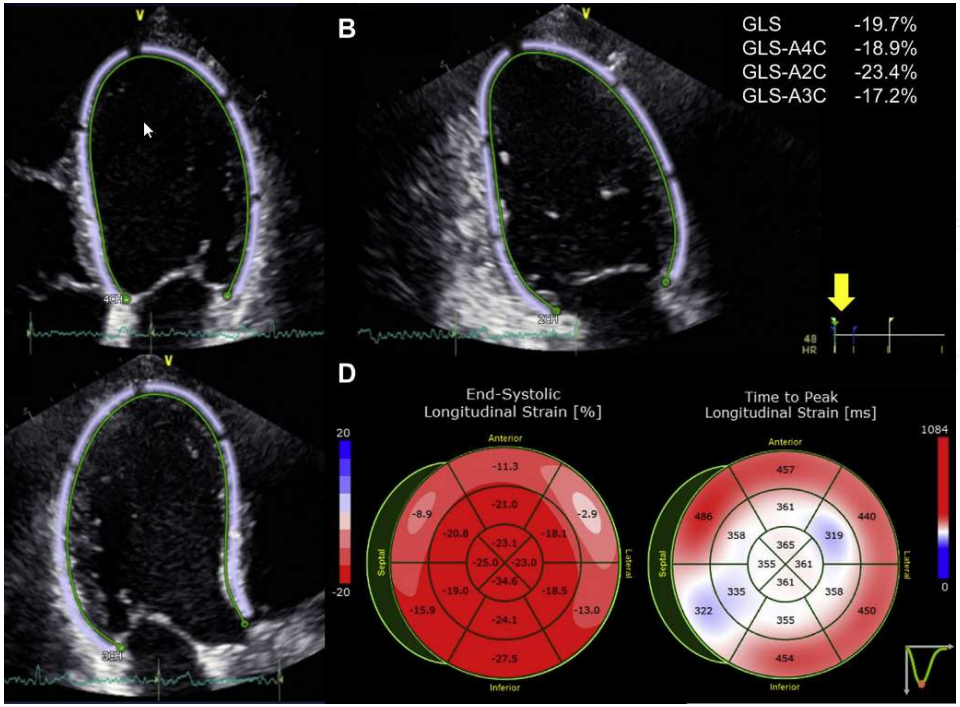
Adapted from Ranard LS et al, JACC 2023;82(20):1953-1966

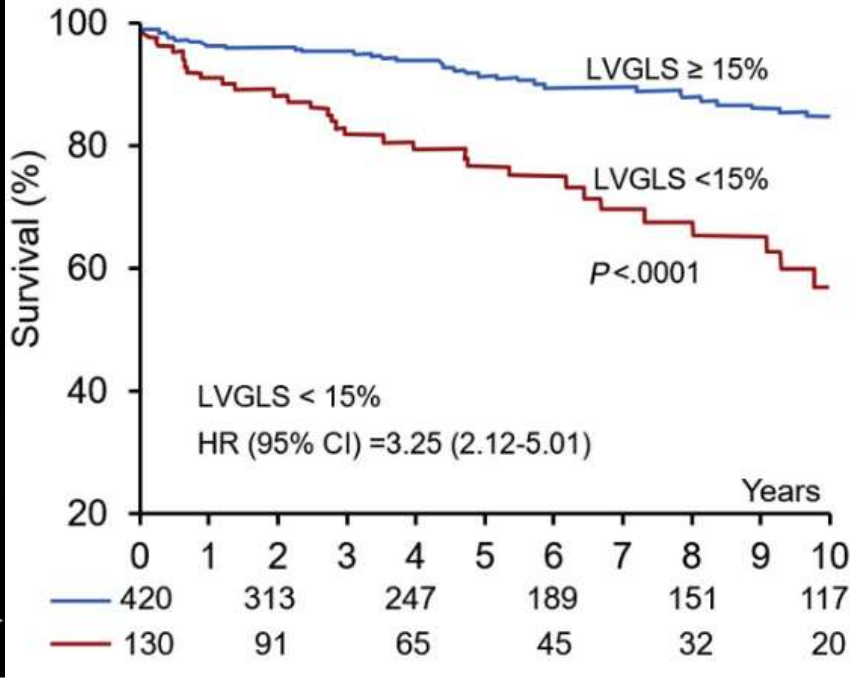
## 1. Progressive LV Enlargement

- **Accurate serial assessment of the extent of LV remodeling**
- **CMR/CT may provide more reproducible assessment of LV size and function**

# 2. Sensitive markers for subclinical myocardial dysfunction

| TTE | Global longitudinal strain | 550 patients (age 60±17 years, LVEF 60±7%) with FUP 4.8 years (IQR 1.5-9.9) |
|---|---|---|



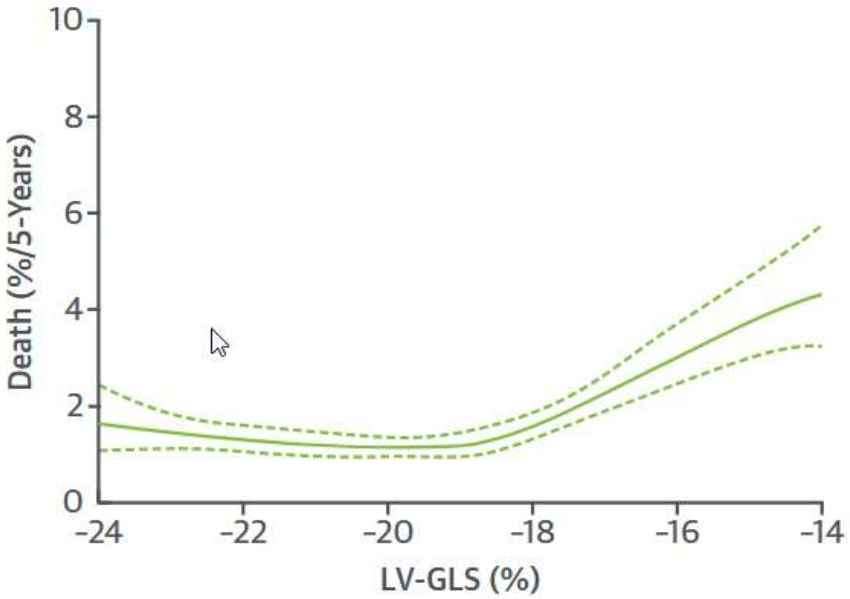




Yang LT et al, JASE 2022;35:692-702)

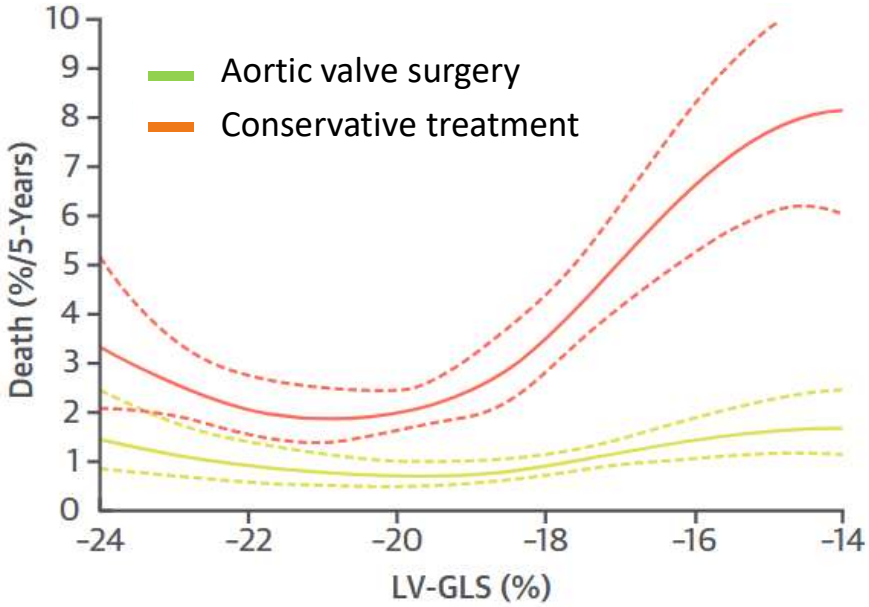
# 2. Global longitudinal strain and and risk of death in AR

1093 patients (age 53±16 years, LVEF 57±4%) with FUP 6.8±3.0 years

**Risk of death increases as LV-GLS worsens beyond -19%...**



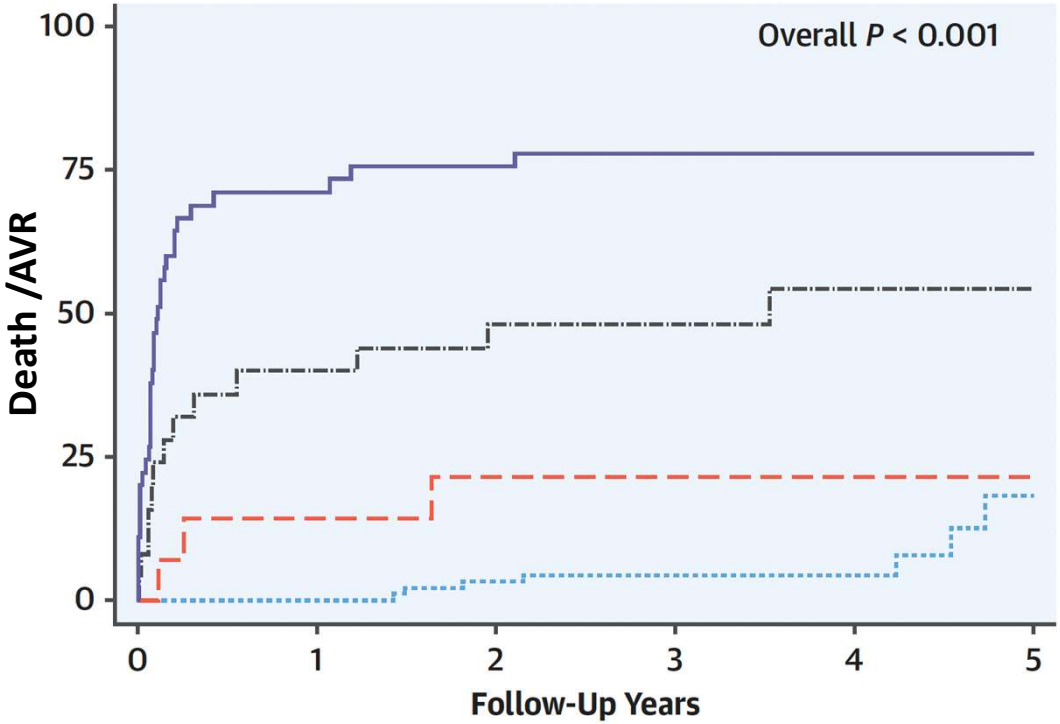

***...unless* patients undergo aortic valve surgery**




Alashi A et al, JIMG 2018;11:673-682

# 3. CMR | Diffuse interstitial fibrosis | Extracellular Volume (ECV)

177 patients with chronic AR, age 58 years (IQR 47-68) with FUP of 2.5 years (IQR 1.1-3.6)




iECV ≥24 mL/m² & AR RF ≥30%

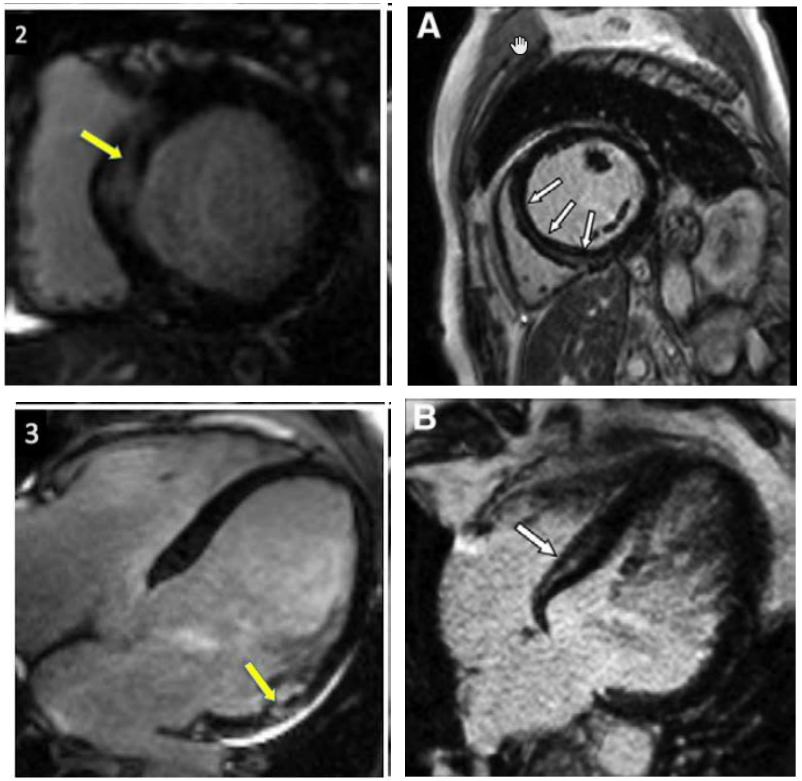
iECV <24 mL/m² & AR RF ≥30%

iECV ≥24 mL/m² & AR RF <30%

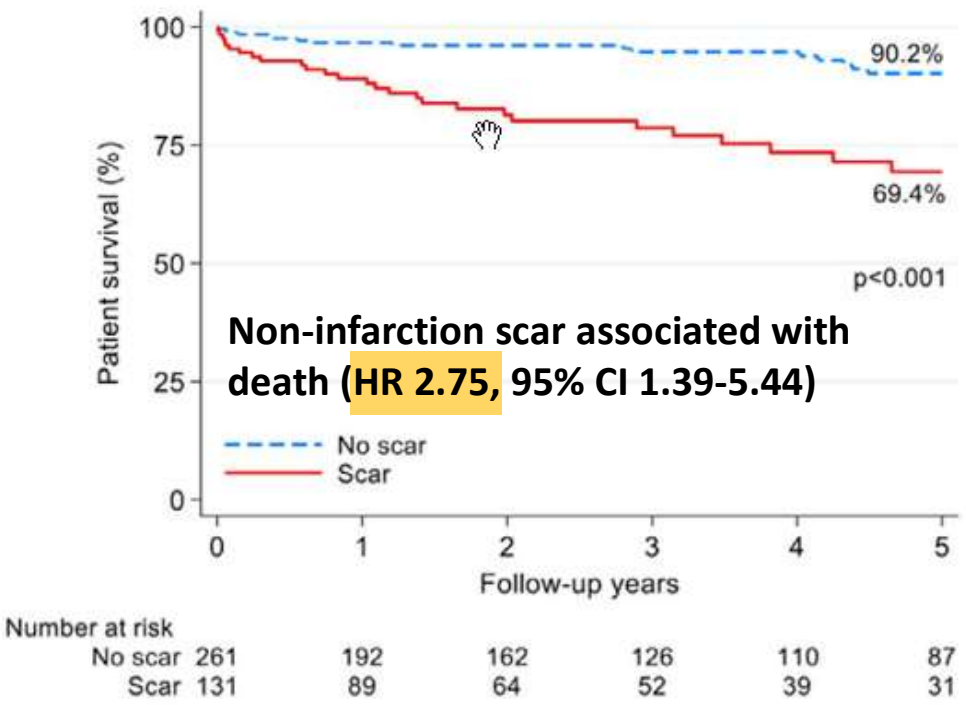
iECV <24 mL/m² & AR RF <30%

Senapati A, JIMG 2021;14(11):2170-2182

# 3. CMR | Focal fibrosis | Late gadolinium enhancement



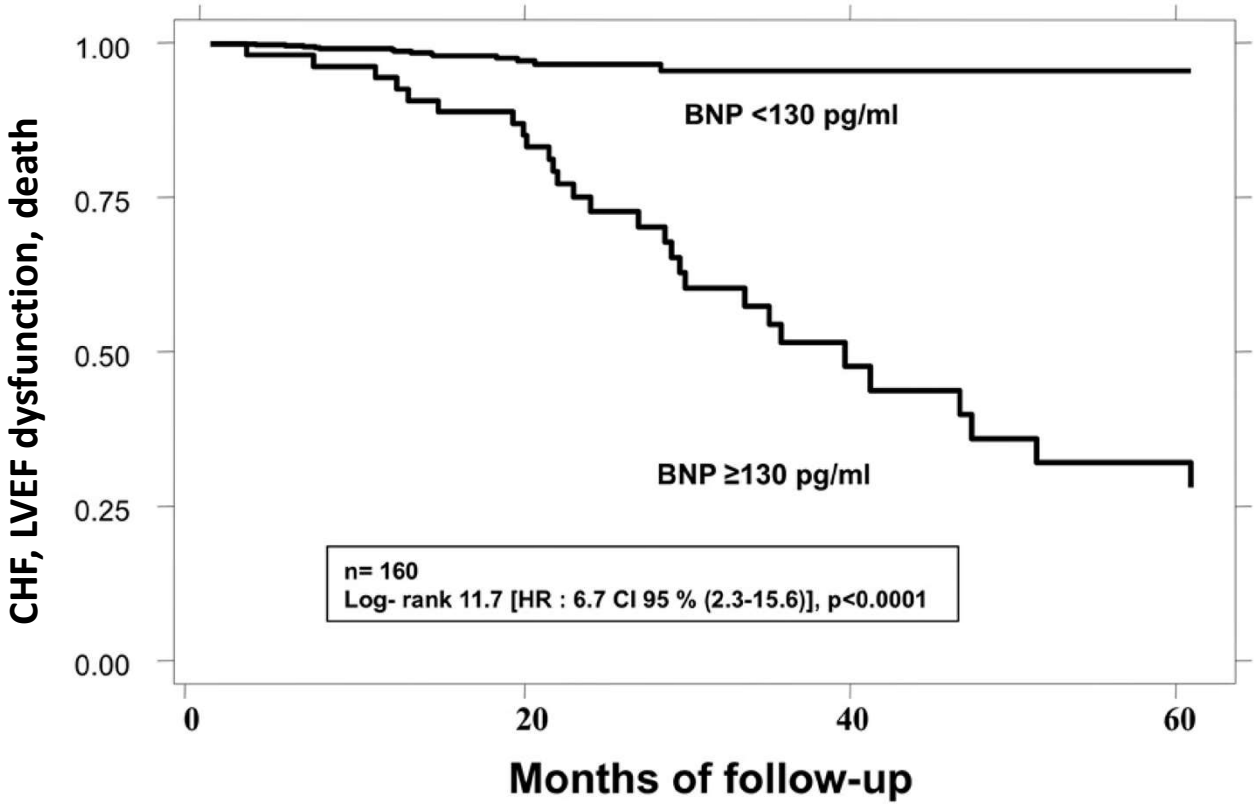

392 patients (age 62 years, IQR 51-71) ≥moderate AR




**Non-infarction scar associated with death (HR 2.75, 95% CI 1.39-5.44)**

Lee JKT, Circulation 2018; Malahfji M et al, JAHA 2020;9:e018731

# 4. BNP in asymptomatic patients with severe AR




294 patients, LVEF >55%

BNP ≥130 pg/mL categorizes a subgroup of patients at higher risk.

Pizarro R, JACC 2011;58:1705-714

# Integrative approach for AR patients in the borderline range

**Asymptomatic severe AR**

LVSDi 20-25 mm/m$^2$

LVSVi 40-45 mL

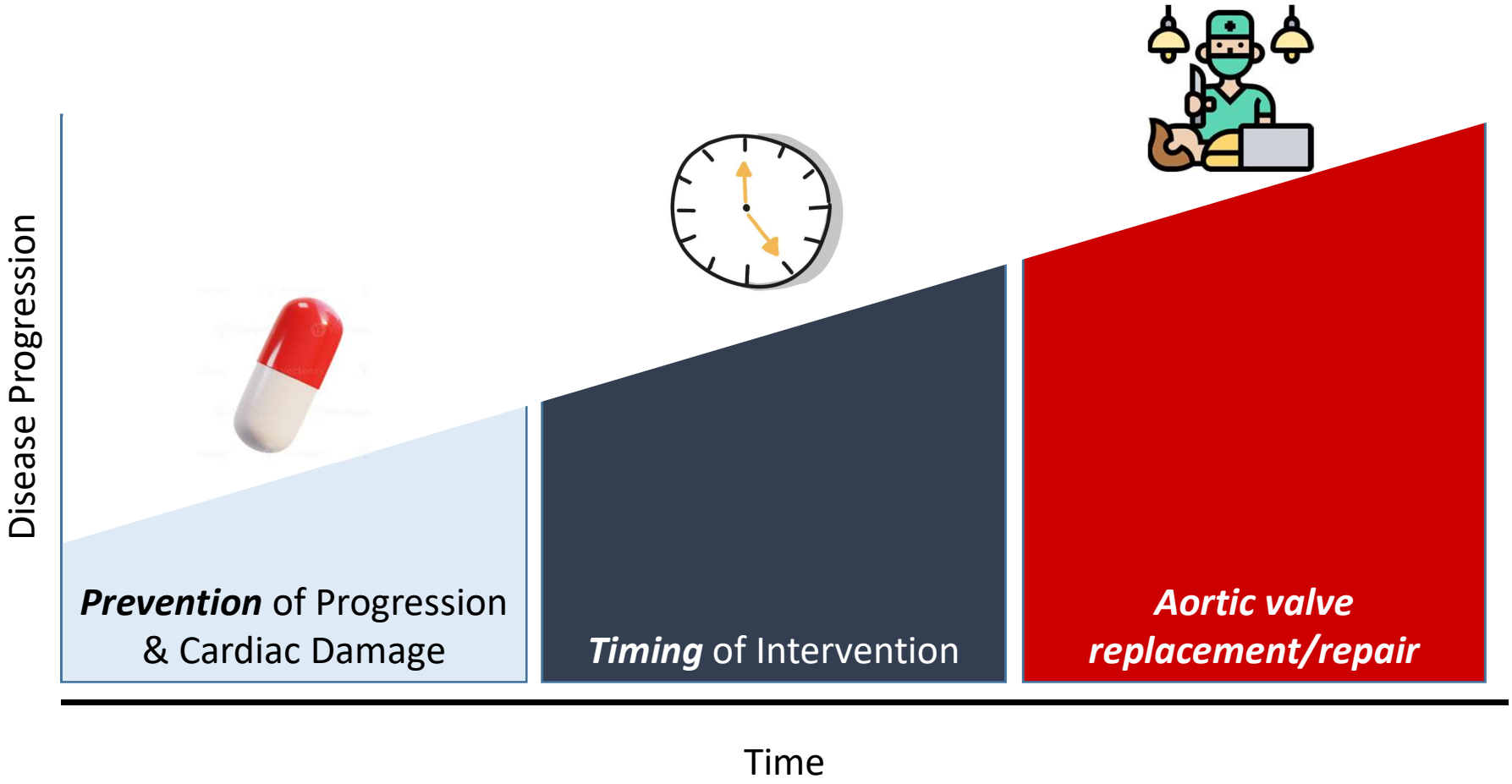
LVEF 55-60%

1. **No comorbidities increasing risk of surgery?**
2. **Progressive LV enlargement?**
3. **Echo: GLS worse than -15% to -19%**
4. **MRI: ECV ≥24 mL/m2 or regional fibrosis**
5. **BNP >130 pg/mL**

yes → **Early intervention**

no → **Watchful waiting**

# Management of Patients with Aortic Regurgitation

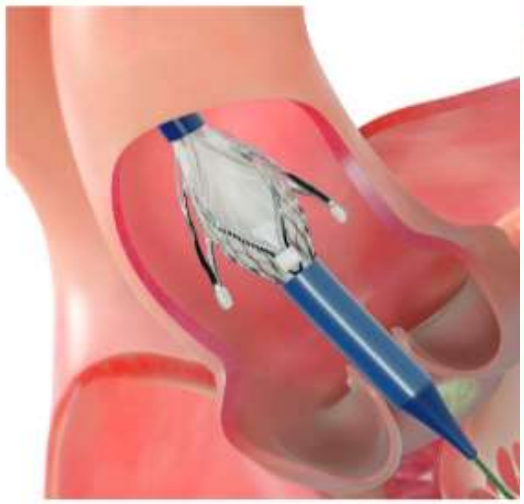


# Treatment of Aortic Regurgitation: SAVR/r

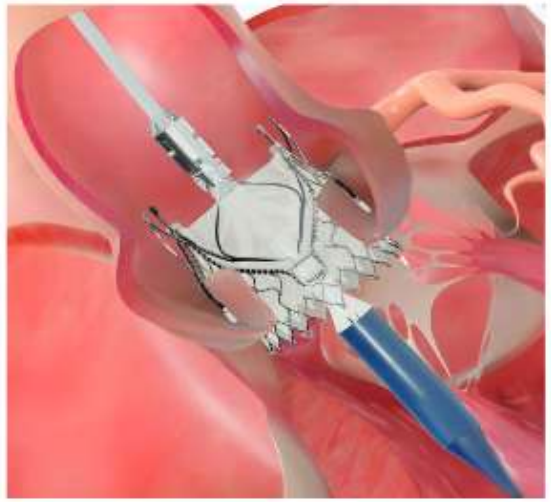
| | Acute | Chronic |
|---|---|---|
| **Valve** | Infectious endocarditis<br>Failure of bioprosthesis* | Degeneration of native valve*<br>Failure of bioprosthesis*<br>Rheumatic Heart Disease |
| **Aorta** | Aortic dissection Type A | Aortic aneurysm secondary to HTN or Marfan syndrome<br>Aortitis (Takayasu, Syphilis, Lupus) |
| **Combined** | | Bicuspid aortic valve disease* |

**may be a candidate for TAVI*

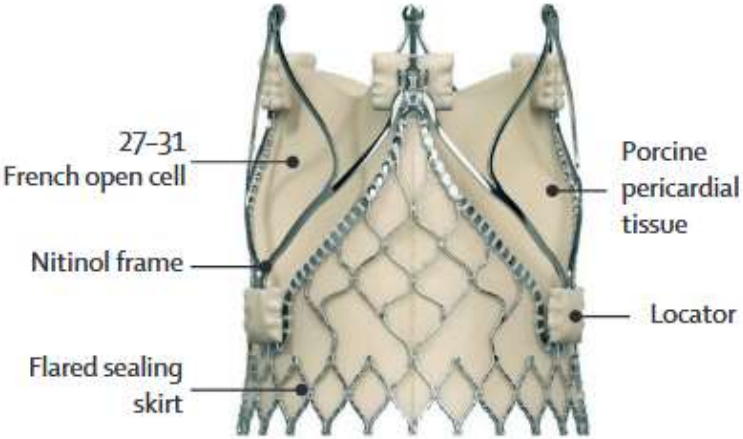
# TAVI for Pure Native Aortic Regurgitation



Alignment and positioning

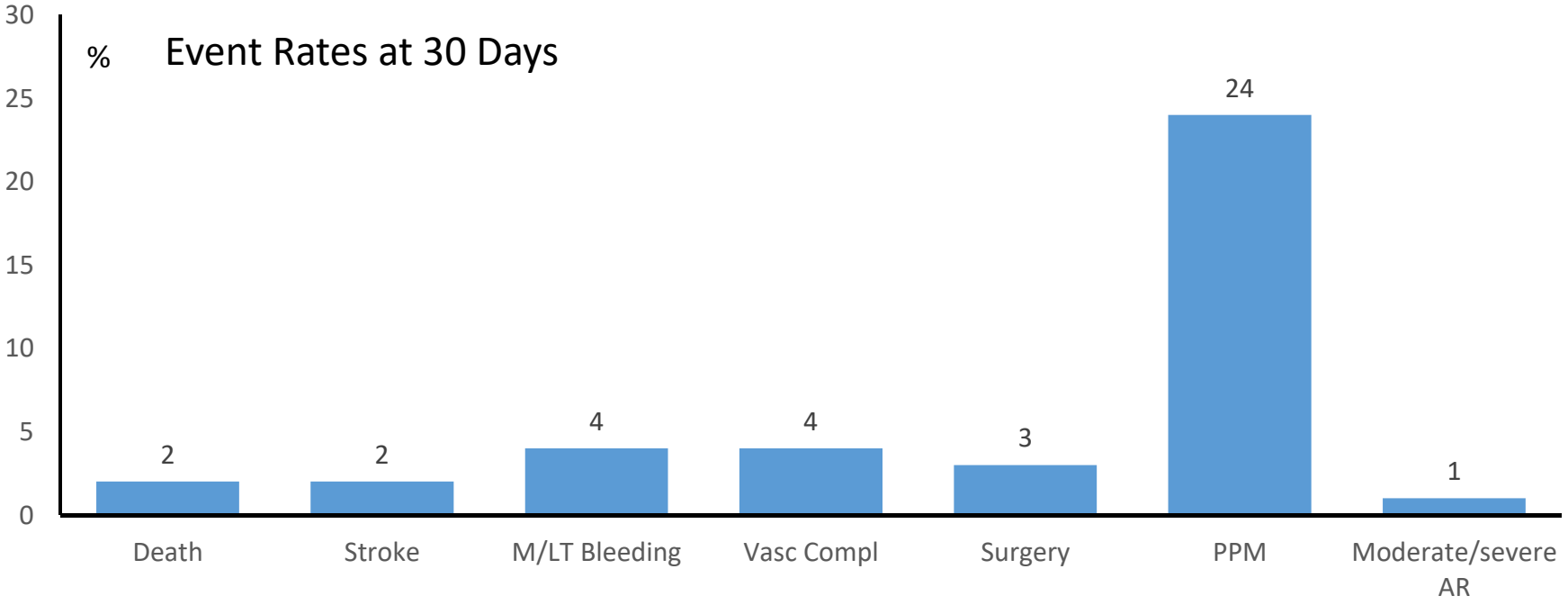


Anchoring and sealing



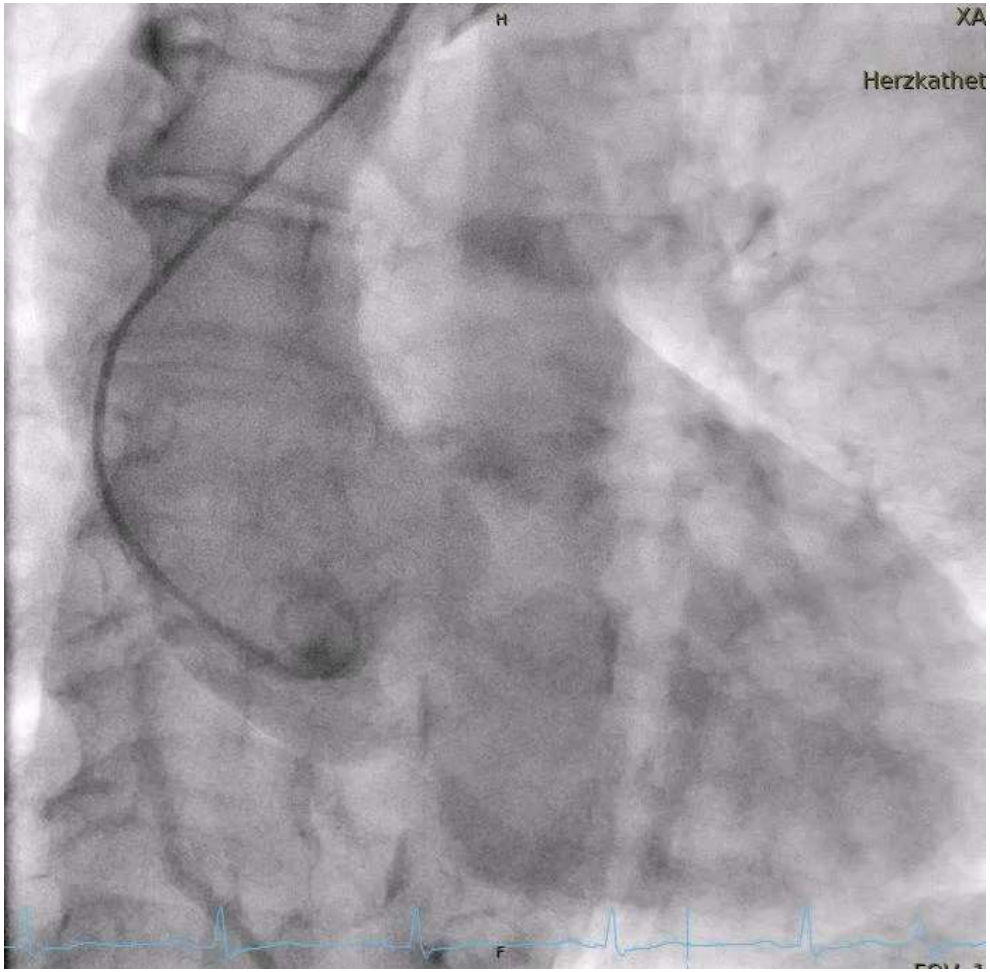
# ALIGN AR: TAVI for Aortic Regurgitation

N=180, mean age 75.5 years

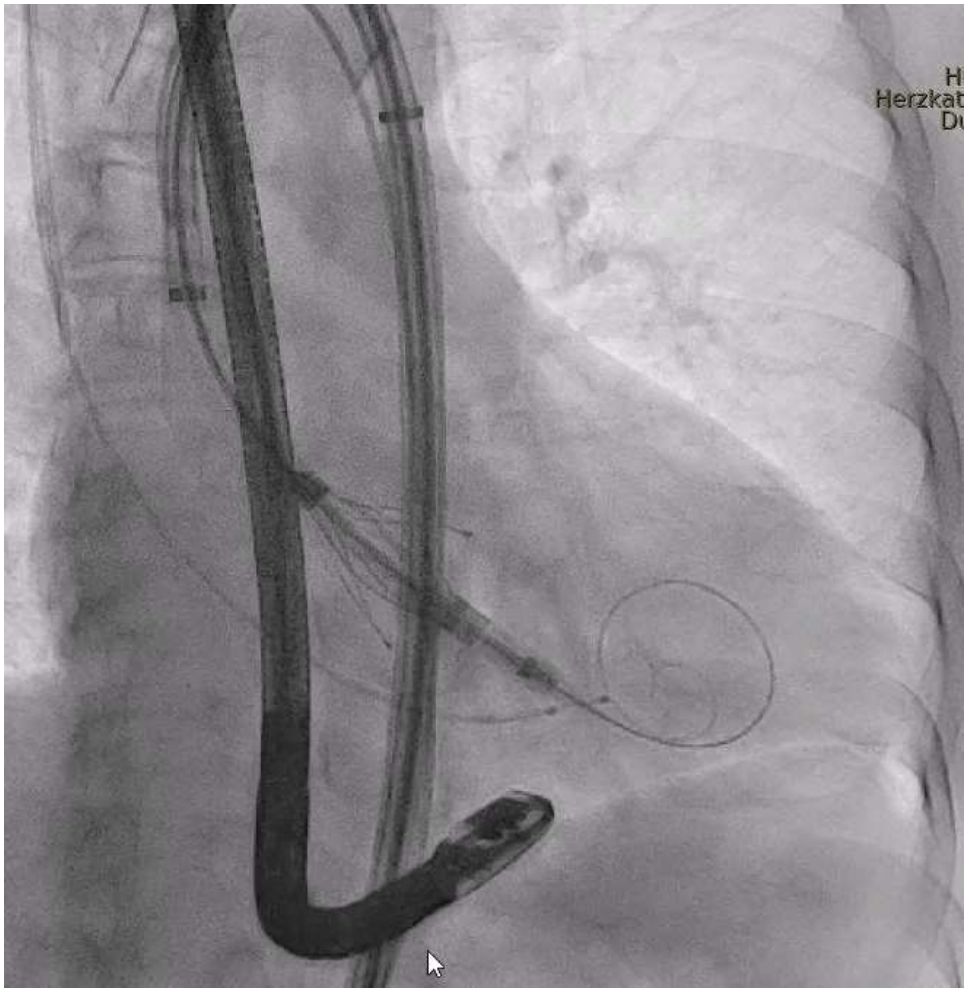



Vahl TP et al, Lancet 2024;403(10435):1451-1459

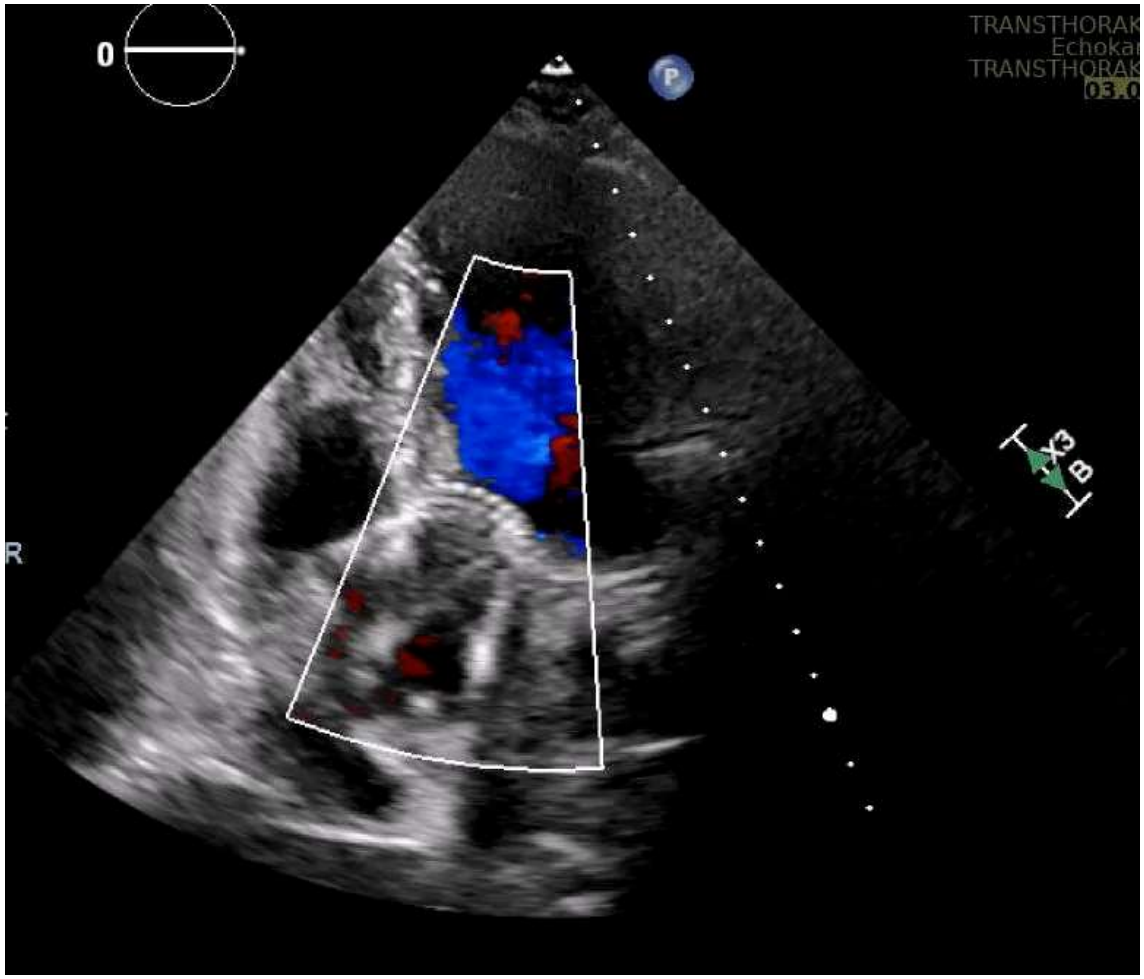
# 74 year-old F with severe AR



# Jena Trilogy Valve



# Postprocedural echocardiography



# ARTIST Trial: TAVI versus SAVR in AR

**Patients with severe AR**
N=1016

| **TAVR** | **SAVR** |
|---|---|
| N=508 | **N=508** |

**Primary Endpoint:**
**ALL-cause mortality, stroke, unplanned cardiac rehospitalization at 12 months**

Clinicaltrials.gov Identifier NCT06608823

## Summary

- In patients with aortic regurgitation, **timing of intervention** is key.
- Asymptomatic AR patients with **LVESD >50 mm** or **LVEF ≤50%** have a Class I LOE B indication for intervention.
- An **integrated approach** is recommended in asymptomatic patients in the borderline range.
- **SAVR/r** is the **gold standard** for AR; dedicated transcatheter heart valves introduce **TAVI** as an alternative to SAVR in **selected high-risk patients** with AR**.**