

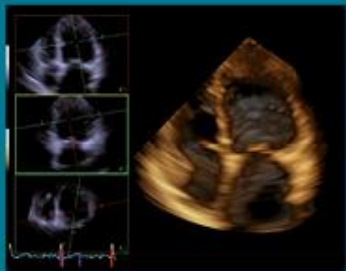
EuroValve

October 24-25, 2014

Challenging the Guidelines: Aortic Stenosis

Julien Magne, PhD
CHU Limoges, France





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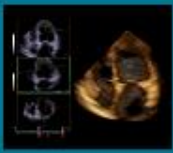
October 24-25, 2014

Faculty disclosure

Julien Magne

I have **no financial relationships** to disclose.





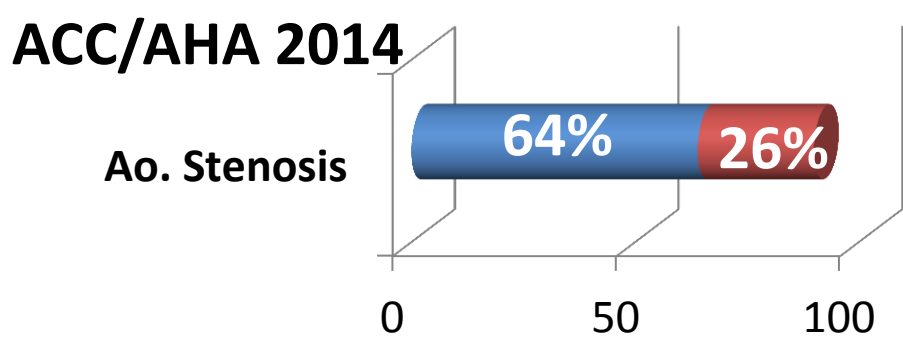
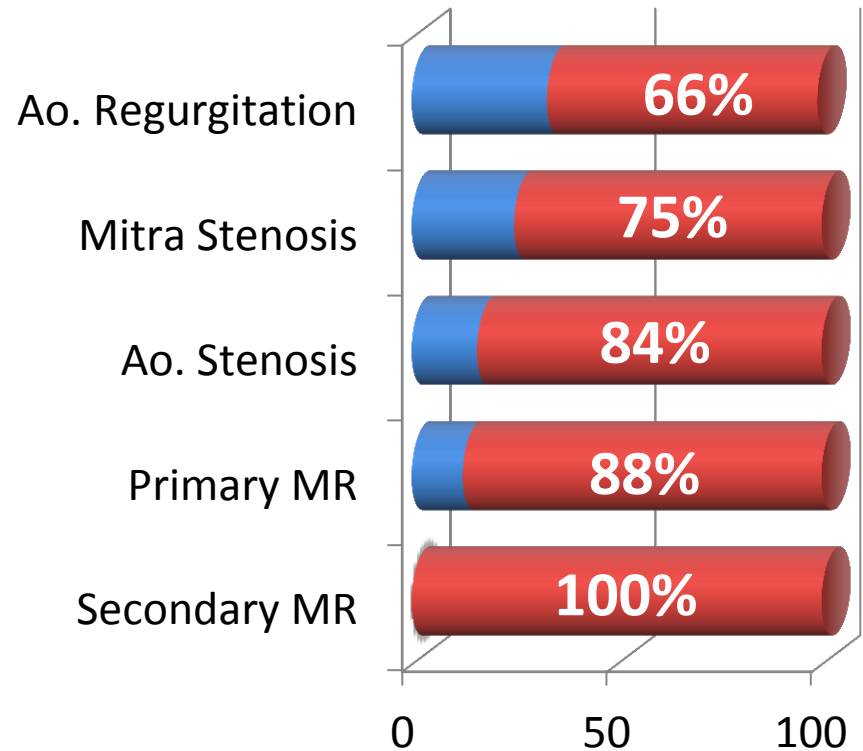
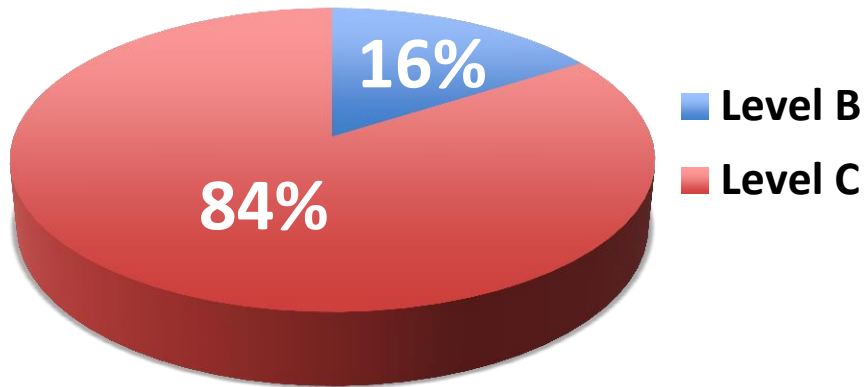
EuroValve

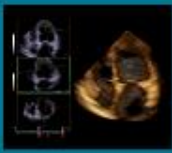


Level of Evidence in Valvular Heart Disease ESC Guidelines

Evidence-based Medicine: Level of Evidence in 2012 ESC Guidelines

Indication for Surgery

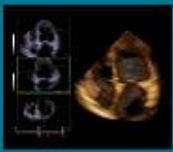




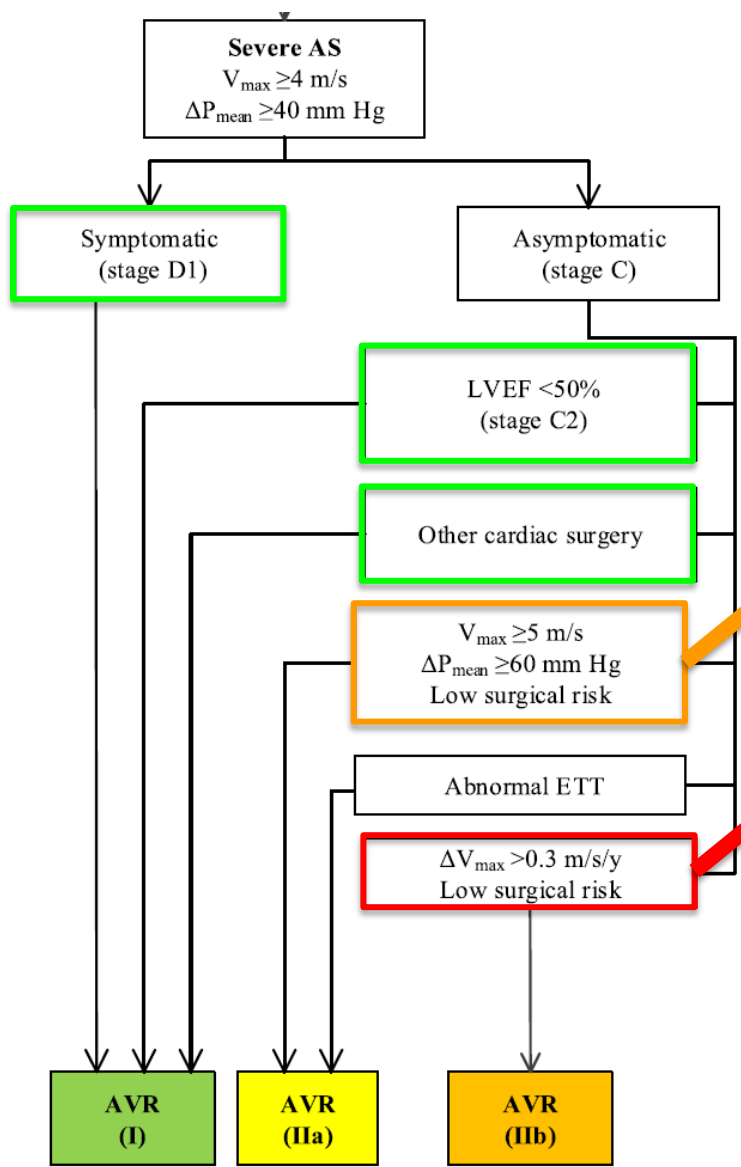
ACC/AHA 2014 Guidelines Stages of Progression of VHD

Stage	Definition	Description
A	At risk	Patients with risk factors for development of VHD
B	Progressive	Patients with progressive VHD (mild-to-moderate severity and asymptomatic)
C	Asymptomatic severe	Asymptomatic patients who have the criteria for severe VHD: C1: Asymptomatic patients with severe VHD in whom the left or right ventricle remains compensated C2: Asymptomatic patients with severe VHD with decompensation of the left or right ventricle
D	Symptomatic severe	Patients who have developed symptoms as a result of VHD

Stage	Definition	Valve Anatomy	Valve Hemodynamics	Hemodynamic Consequences	Symptoms
A	At risk of AS	<ul style="list-style-type: none"> Bicuspid aortic valve (or other congenital valve anomaly) Aortic valve sclerosis 	<ul style="list-style-type: none"> Aortic $V_{\max} < 2$ m/s 	<ul style="list-style-type: none"> None 	<ul style="list-style-type: none"> None
B	Progressive AS	<ul style="list-style-type: none"> Mild-to-moderate leaflet calcification of a bicuspid or trileaflet valve with some reduction in systolic motion or Rheumatic valve changes with commissural fusion 	<ul style="list-style-type: none"> Mild AS: Aortic V_{\max} 2.0–2.9 m/s or mean $\Delta P < 20$ mm Hg Moderate AS: Aortic V_{\max} 3.0–3.9 m/s or mean ΔP 20–39 mm Hg 	<ul style="list-style-type: none"> Early LV diastolic dysfunction may be present Normal LVEF 	<ul style="list-style-type: none"> None
C: Asymptomatic severe AS					
D: Symptomatic severe AS					
D1	Symptomatic severe high-gradient AS	<ul style="list-style-type: none"> Severe leaflet calcification or congenital stenosis with severely reduced leaflet opening 	<ul style="list-style-type: none"> Aortic $V_{\max} \geq 4$ m/s or mean $\Delta P \geq 40$ mm Hg AVA typically ≤ 1.0 cm² (or AVAi ≤ 0.6 cm²/m²) but may be larger with mixed AS/AR 	<ul style="list-style-type: none"> LV diastolic dysfunction LV hypertrophy Pulmonary hypertension may be present 	<ul style="list-style-type: none"> Exertional dyspnea or decreased exercise tolerance Exertional angina Exertional syncope or presyncope
D2	Symptomatic severe low-flow/low-gradient AS with reduced LVEF	<ul style="list-style-type: none"> Severe leaflet calcification with severely reduced leaflet motion 	<ul style="list-style-type: none"> AVA ≤ 1.0 cm² with resting aortic $V_{\max} < 4$ m/s or mean $\Delta P < 40$ mm Hg Dobutamine stress echocardiography shows AVA ≤ 1.0 cm² with $V_{\max} \geq 4$ m/s at any flow rate 	<ul style="list-style-type: none"> LV diastolic dysfunction LV hypertrophy LVEF $< 50\%$ 	<ul style="list-style-type: none"> HF Angina Syncope or presyncope
D3	Symptomatic severe low-gradient AS with normal LVEF or paradoxical low-flow severe AS	<ul style="list-style-type: none"> Severe leaflet calcification with severely reduced leaflet motion 	<ul style="list-style-type: none"> AVA ≤ 1.0 cm² with aortic $V_{\max} < 4$ m/s or mean $\Delta P < 40$ mm Hg Indexed AVA ≤ 0.6 cm²/m² and Stroke volume index < 35 mL/m² Measured when patient is normotensive (systolic BP < 140 mm Hg) 	<ul style="list-style-type: none"> Increased LV relative wall thickness Small LV chamber with low stroke volume Restrictive diastolic filling LVEF $\geq 50\%$ 	<ul style="list-style-type: none"> HF Angina Syncope or presyncope

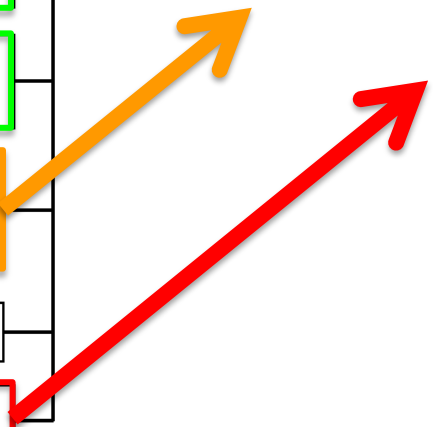


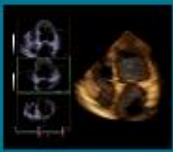
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Asymptomatic severe AS, normal LVEF:

- Very severe AS >5.5m/s
 - Progression in transvalvular peak velocity ≥0.3m/s/year
- IIa, C**





EuroValve

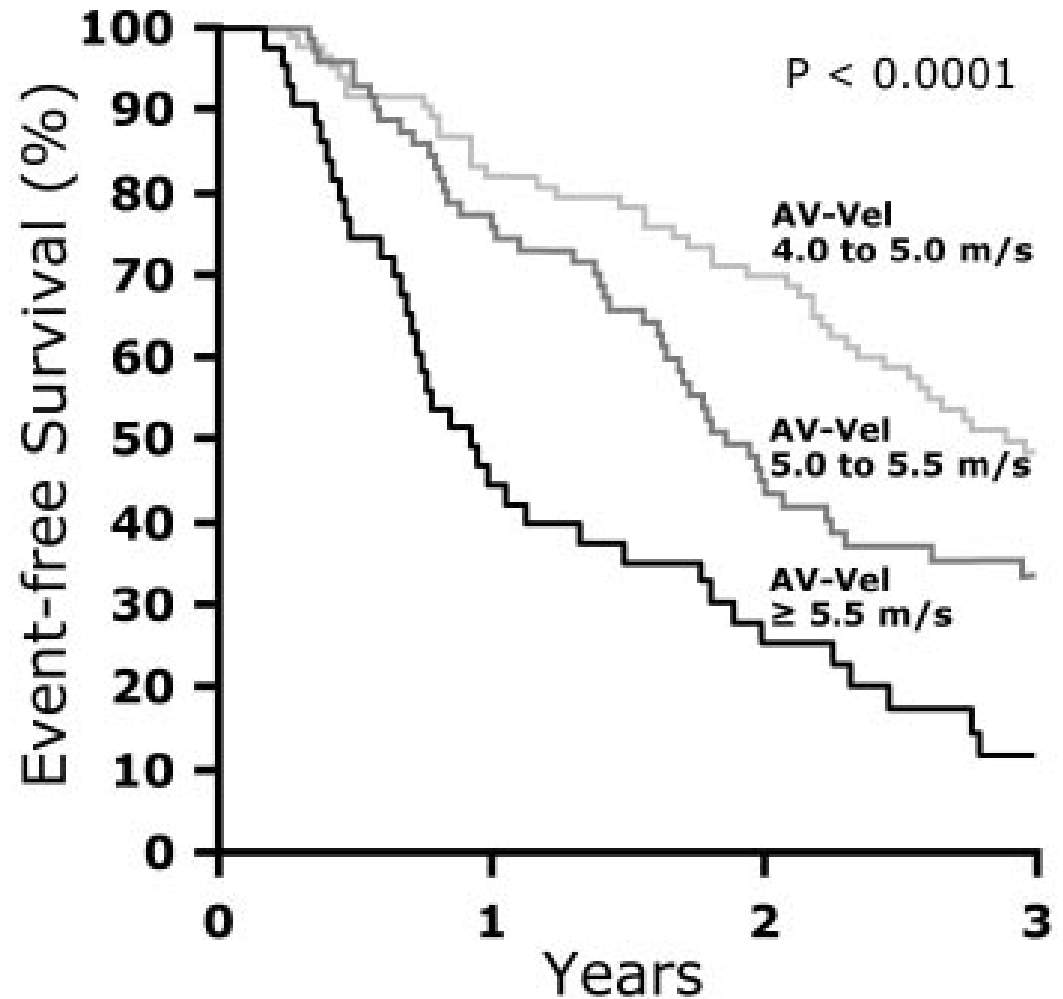
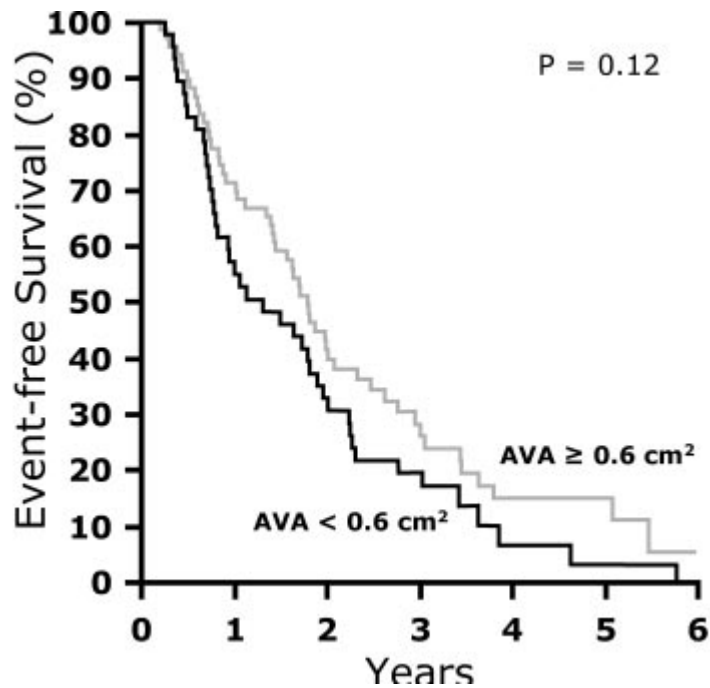


Indication for AVR: Very Severe AS

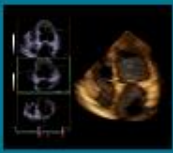
n=116

44 patients with AV velocity
>5.5m/s

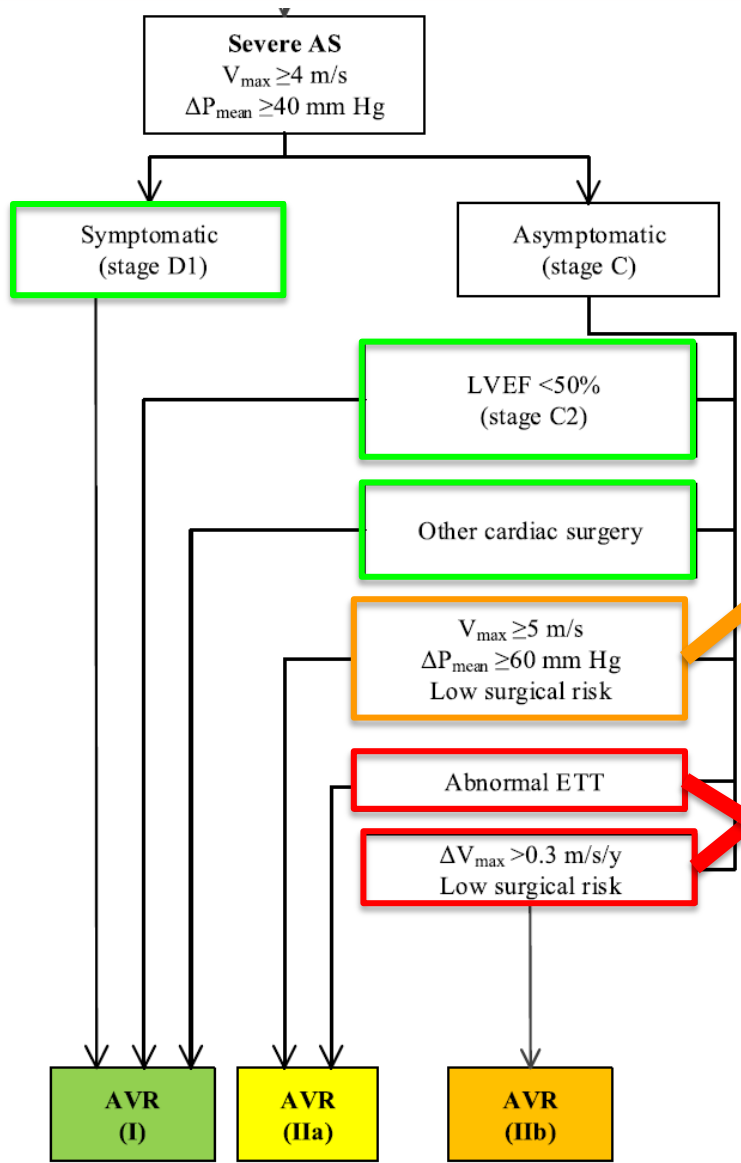
96 events: 90 AVR



Rosenhek et al., Circulation, 2010



EuroValve



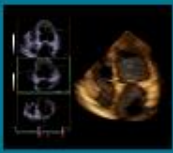
Asymptomatic severe AS, normal LVEF:

- Very severe AS >5.5m/s
- Progression in transvalvular peak velocity $\geq 0.3\text{m/s/year}$
IIa, C

Asymptomatic severe AS, normal LVEF:

- Abnormal exercise test showing symptoms on exercise clearly related to AS
I, C

- Fall in SBP
IIa, C

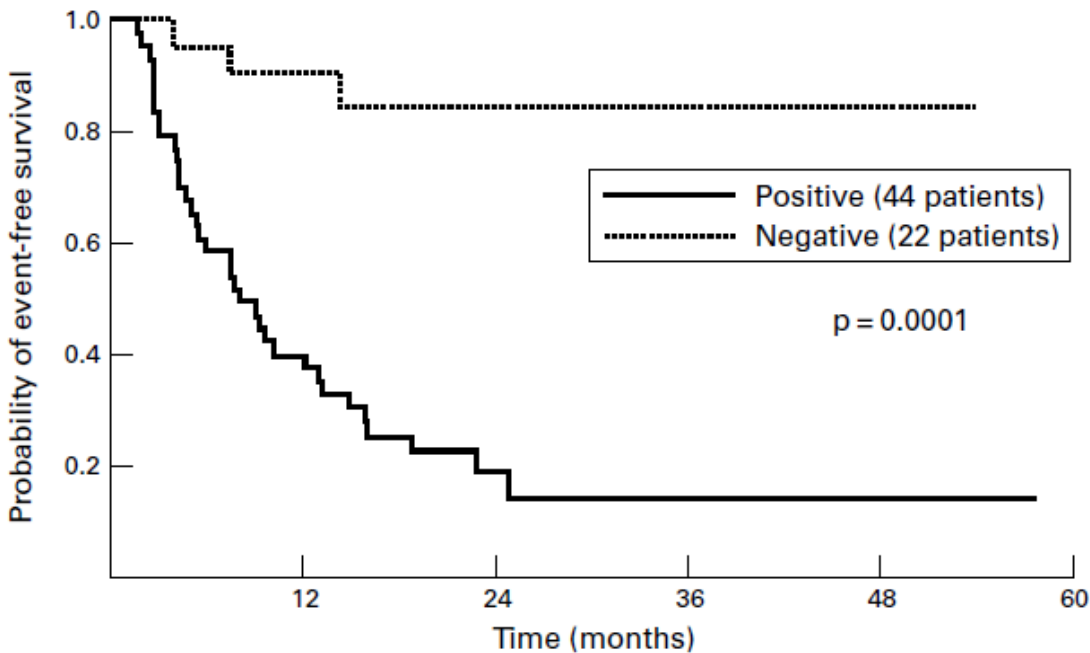


Prognostic value of abnormal exercise test

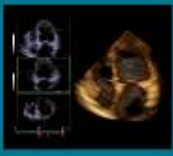
**Abnormal exercise test:
chest pain, complex
ventricular arrhythmia, no
changes in SBP >20mmHg,
ST depression >2mm**



**ACC/AHA
SBP increase <20mmHG
Exercise tolerance < age-
and sex-expected**



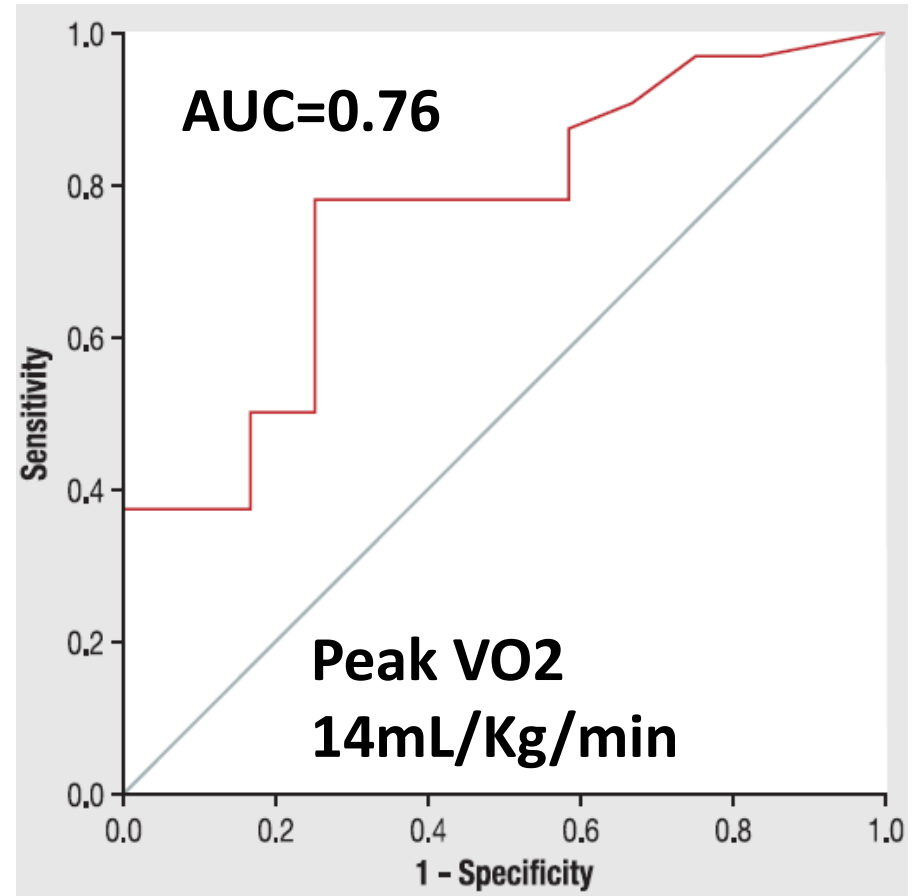
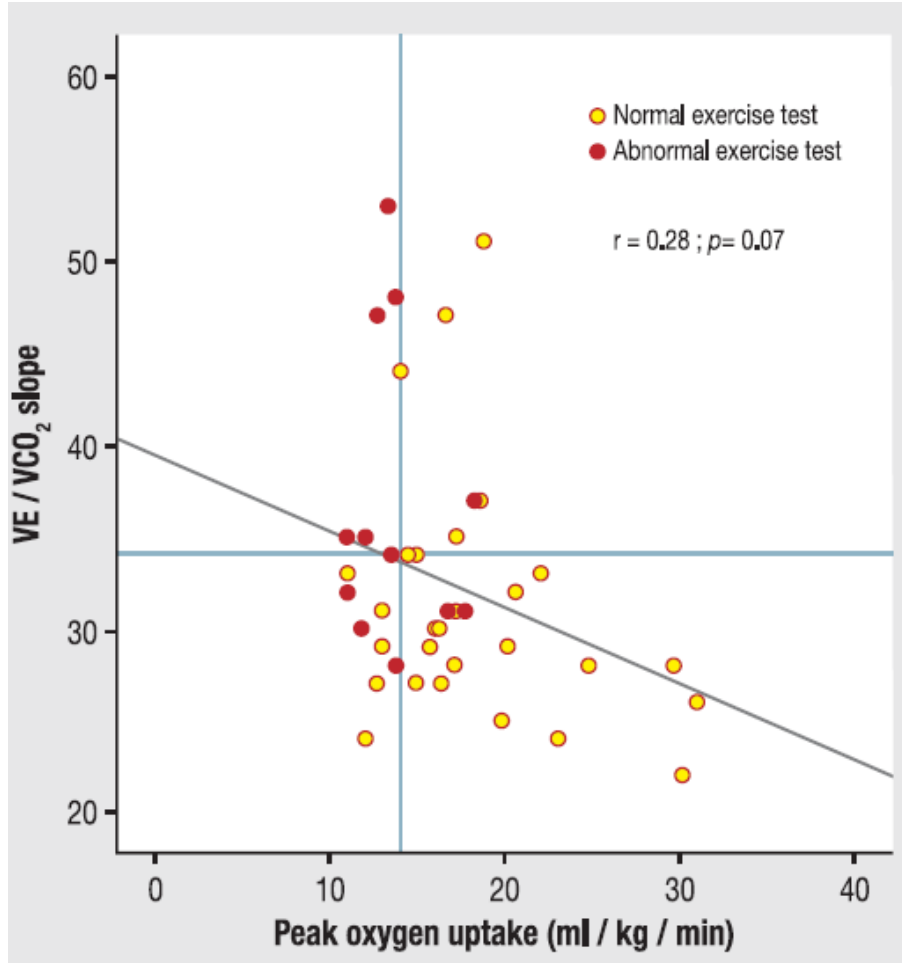
Amato et al. Heart, 2001



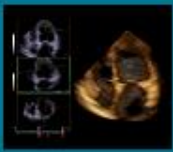
EuroValve



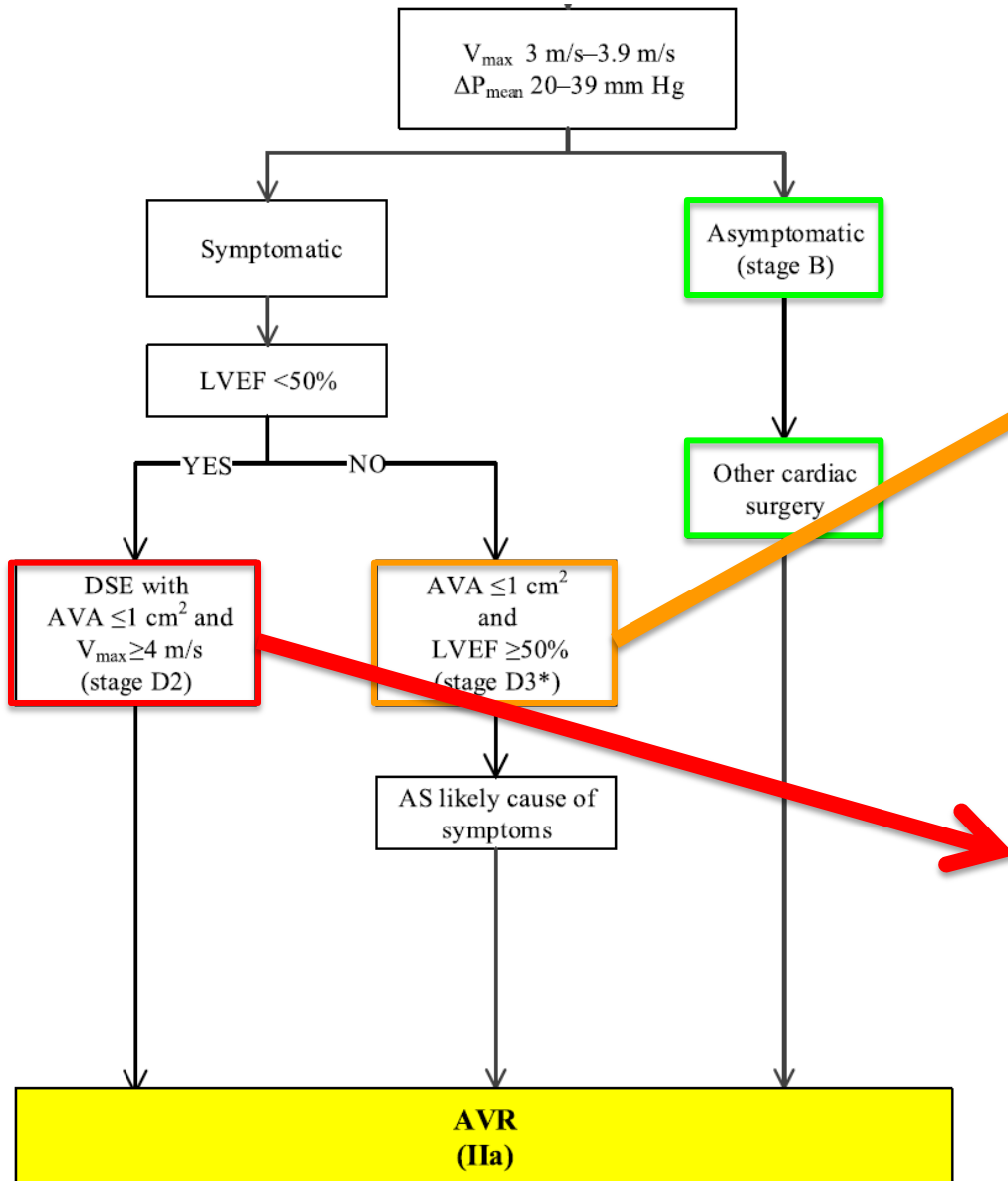
Abnormal Exercise Test: Pilot study



Levy et al. Arch CV Disease, 2014

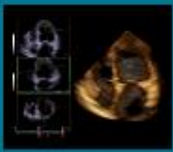


EuroValve



**Low Flow / Low gradient
preserved LVEF, after careful
confirmation of severe AS
IIa, C**

**Low Flow / Low gradient
Reduced LVEF:
Flow reserve: IIa, C
No Flow reserve: IIb, C**

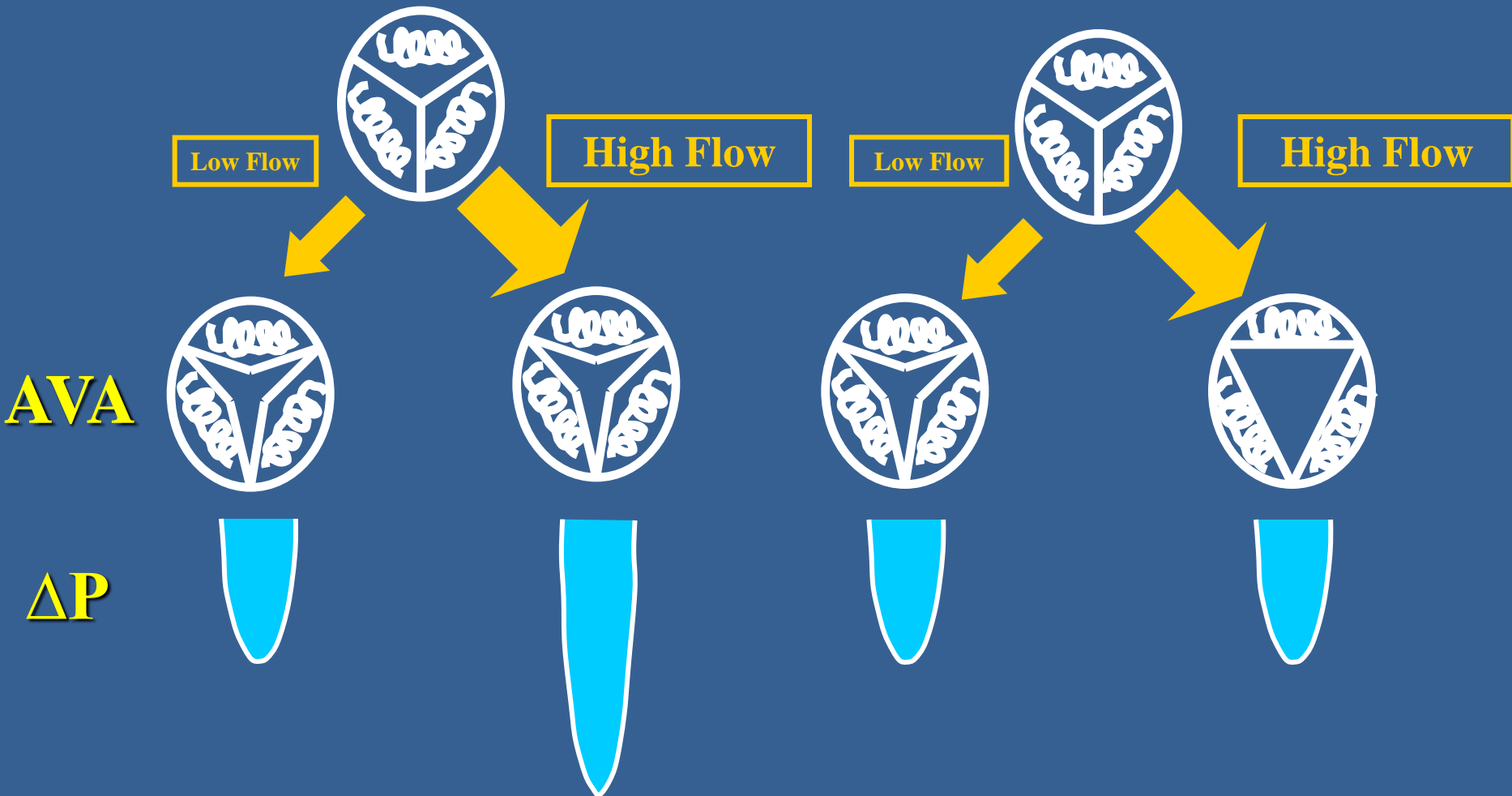


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True Severe AS

Pseudo Severe AS



$\Delta P < 30-40$
 $AVA \leq 1.0$



Dobutamine Stress Echo

$\uparrow SV \geq 20\%$

$\uparrow SV < 20\%$

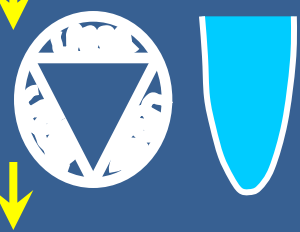
Flow Reserve

No Flow Reserve

$\Delta P > 30-40$
 $AVA \leq 1.0$



$\Delta P \leq 30-40$
 $AVA > 1.0$



$\Delta P < 30-40$
 $AVA \leq 1.0$



True Severe AS

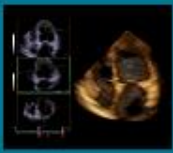
Pseudo Severe AS

Indeterminate

AVR ± CABG
TAVI

MEDICAL

AVR? MEDICAL?



EuroValve

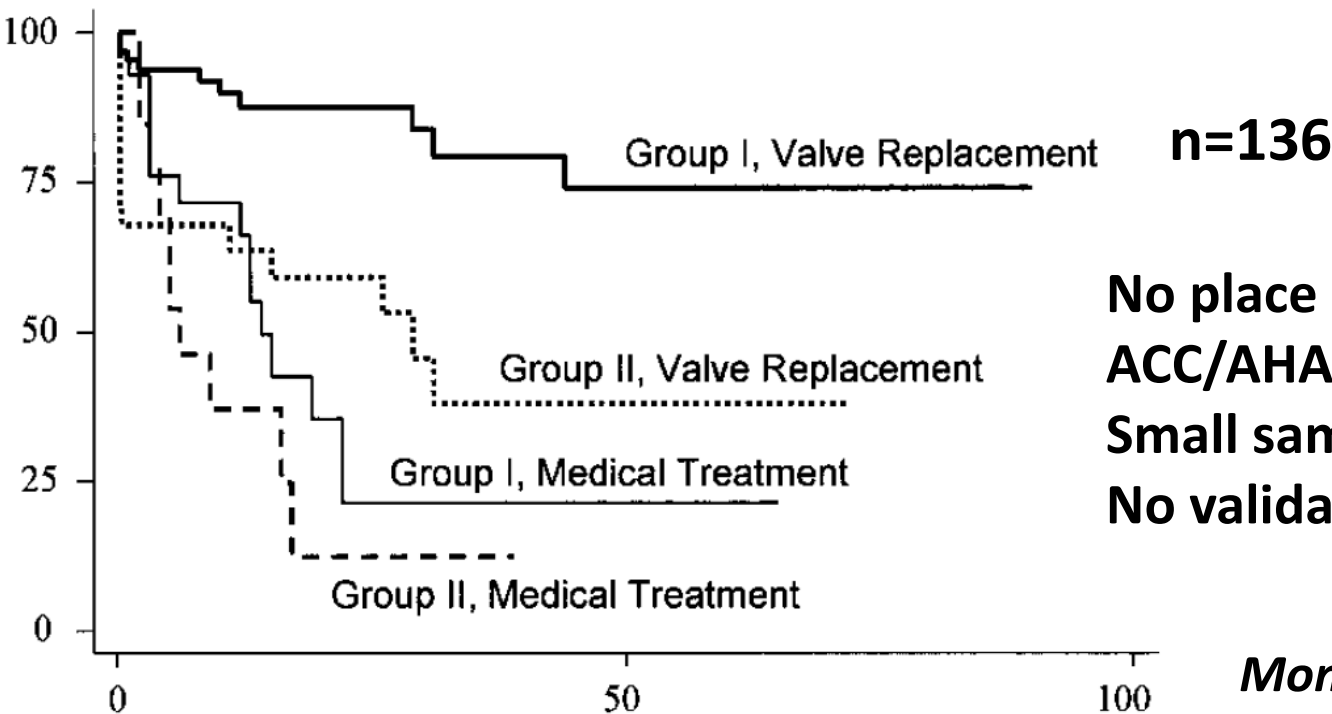


LV Flow Reserve in ESC 2012 Guidelines

AVR should be considered in symptomatic patients with severe AS, low flow, low gradient with reduced EF, and evidence of flow reserve.^f

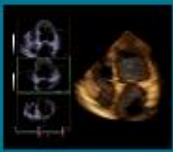
IIa	C
IIb	C

AVR may be considered in symptomatic patients with severe AS low flow, low gradient, and LV dysfunction without flow reserve.^f

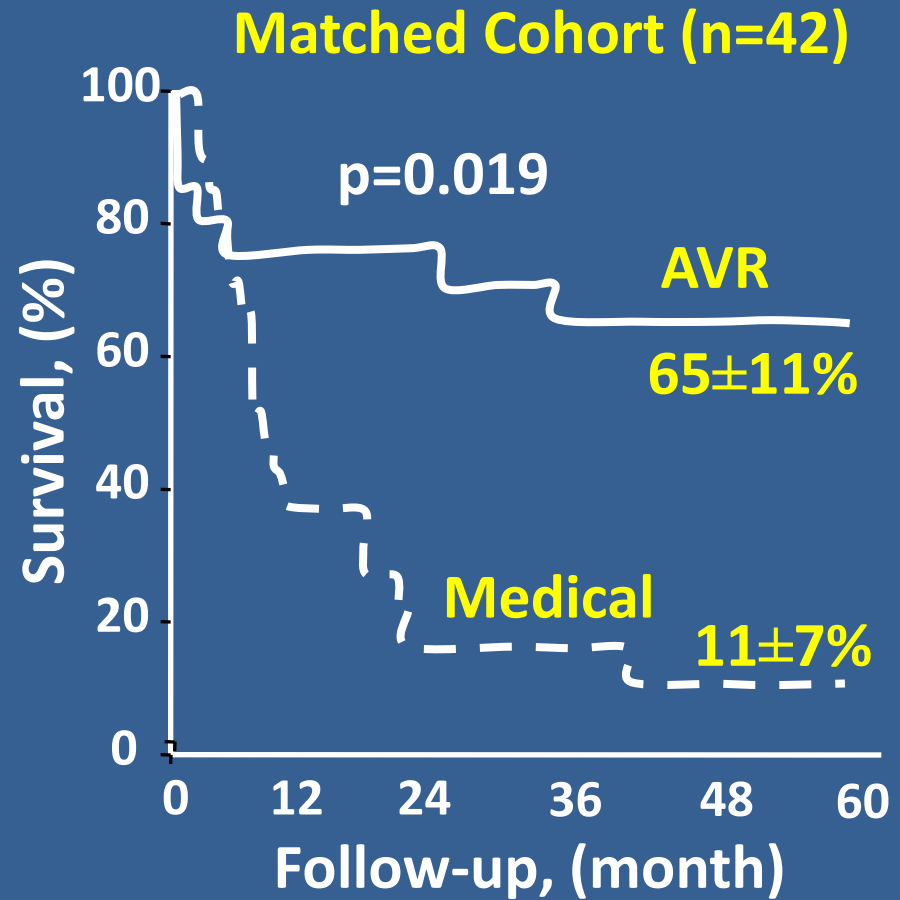
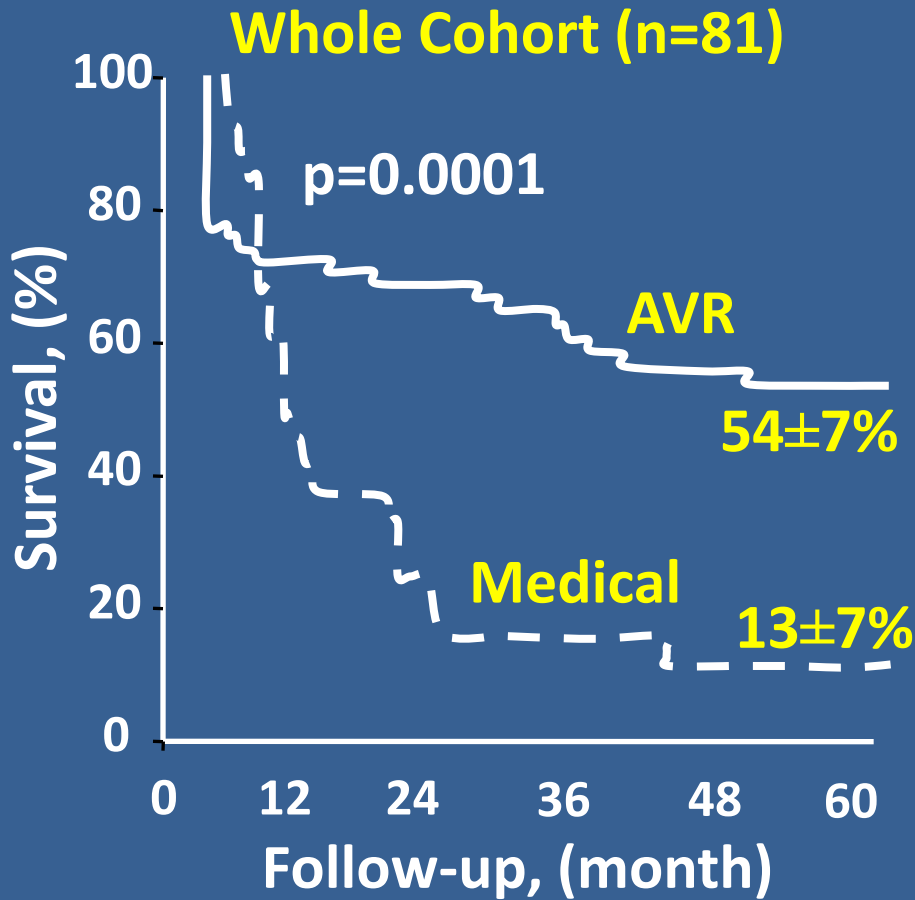


**No place for flow reserve in ACC/AHA 2014 guidelines:
Small sample size ?
No validation by other groups?**

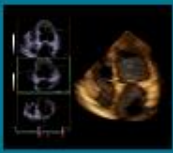
Monin et al. Circ, 2003



EuroValve



⇒ Operative Mortality: 22%



BNP and exercise stress echo in AS

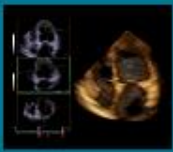
ESC 2012 Guidelines

“AVR may be considered in severe AS, normal LVEF, no exercise test abnormalities, if surgical risk is low and in the presence of:

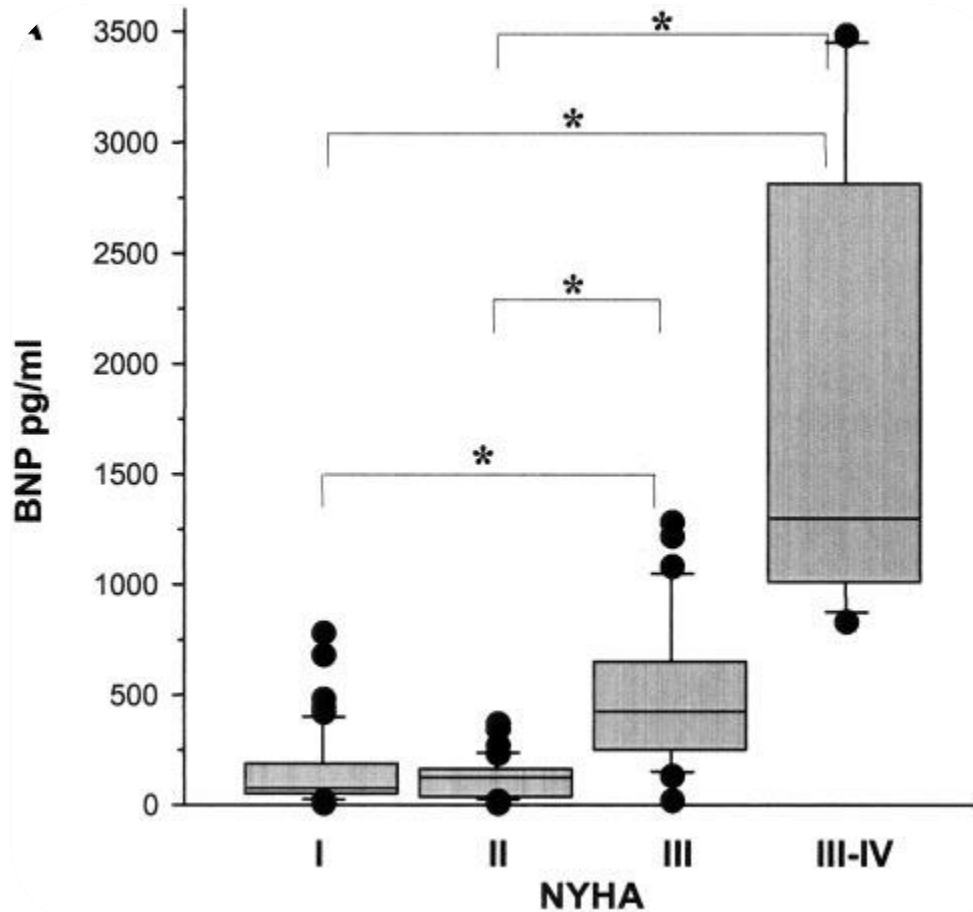
- **Markedly elevated BNP by repeated measurements**
- **Increase in MPG >20mmHG during exercise”**

ACC/AHA 2014 Guidelines

No place for BNP or exercise stress echo.

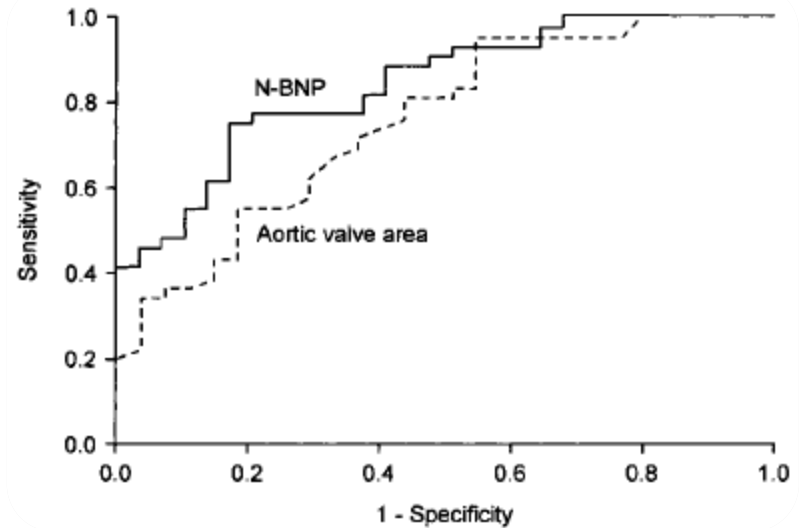


BNP level in AS



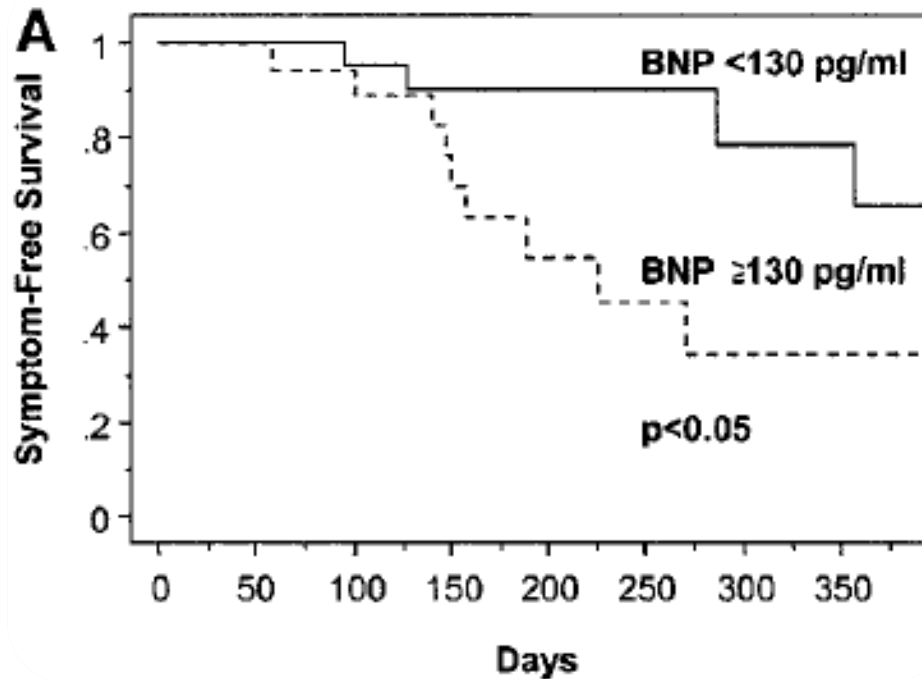
Bergler-Klein et al. Circulation 2004

BNP level is well associated with the symptomatic status



Gerber et al. Circulation 2003

BNP level and Symptoms in AS



- BNP is more powerful than AS severity parameters to identify symptoms
- BNP level may predict the occurrence of symptoms:

	Baseline		P	Follow-Up		P
	Patients Developing Symptoms (n=14)	Patients Remaining Asymptomatic (n=29)		Patients Developing Symptoms (n=14)	Patients Remaining Asymptomatic (n=29)	
BNP, pg/mL	188 (56–420)	64 (27–161)	<0.001	486 (83–738)	64 (43–115)	<0.01
NtBNP, pmol/L	131 (50–202)	31 (19–56)	<0.001	136 (37–739)	32 (18–67)	<0.01
BNP, pg/mL	131 (20–505)	31 (18–28)	<0.001	138 (31–138)	35 (18–81)	<0.01
BNP, pg/mL	188 (20–450)	64 (51–101)	<0.001	488 (82–138)	64 (43–112)	<0.01

BNP for Risk Stratification in Asymptomatic AS

Risk Score for Predicting Outcome in Patients With Asymptomatic Aortic Stenosis

Jean-Luc Monin, MD, PhD; Patrizio Lancellotti, MD, PhD; Mehran Monchi, MD; Pascal Lim, MD; Emmanuel Weiss, MD; Luc Piérard, MD, PhD; Pascal Guéret, MD

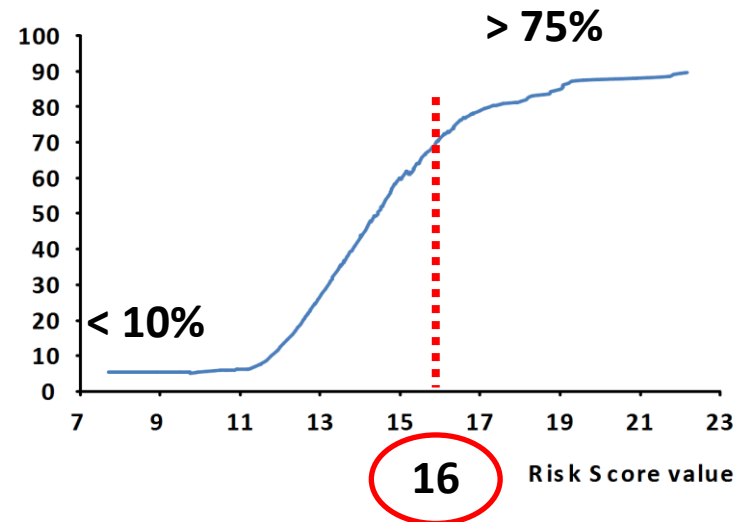
Emmanuel Weiss, MD; Luc Piérard, MD, PhD; Pascal Guéret, MD

Jean-Luc Monin, MD, PhD; Patrizio Lancellotti, MD, PhD; Mehran Monchi, MD; Pascal Lim, MD; Emmanuel Weiss, MD; Luc Piérard, MD, PhD; Pascal Guéret, MD

- 107 pts followed in Créteil
- Risk score according to independent variables
- Validation in Liège (107 pts)

$$\text{Score} = (\text{Peak velocity} \times 2) + (\text{nat log BNP} \times 1.5) + 1.5 \text{ (if female)}$$

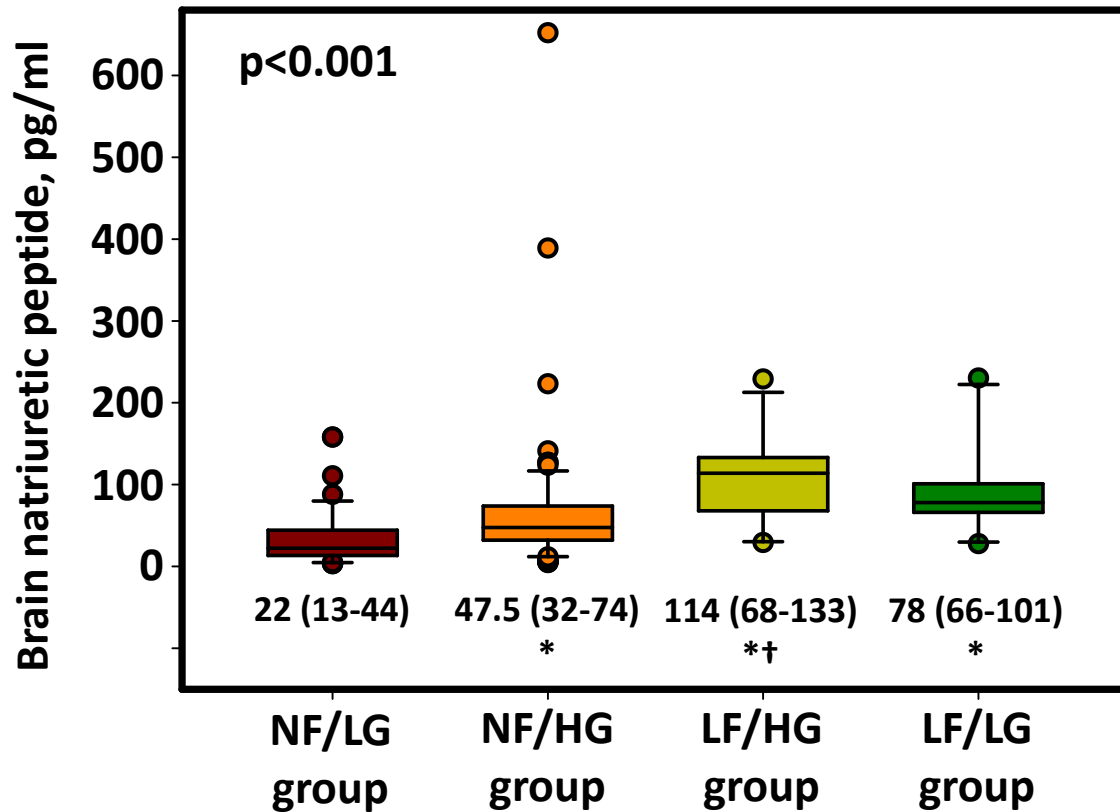
Observed 24-month event rates (%)



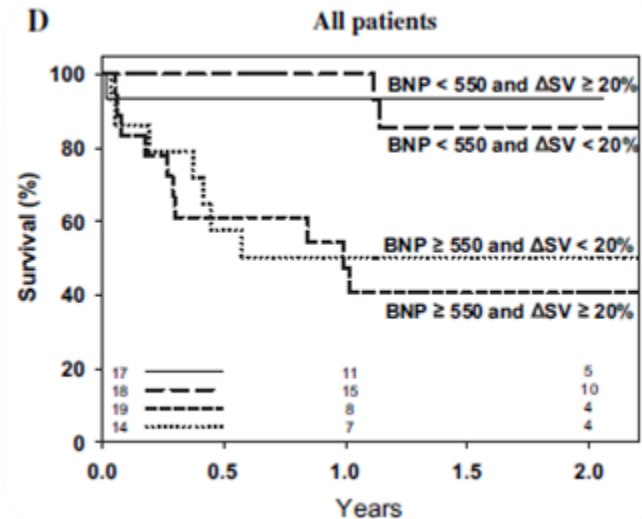
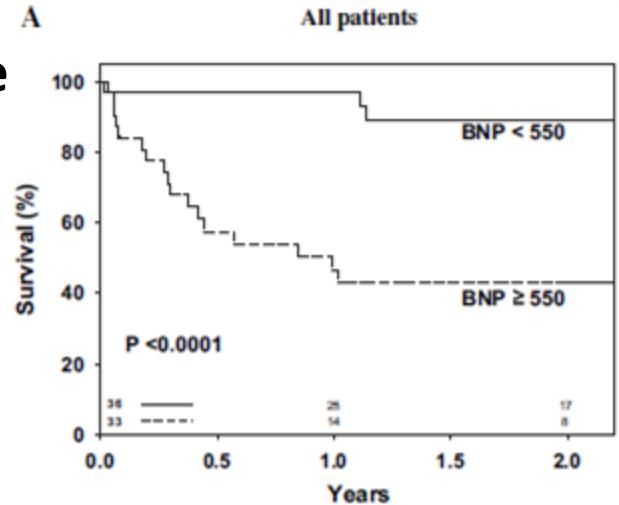
BNP level in LF/LG AS

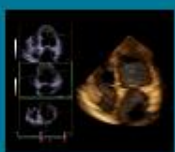
BNP is significantly elevated in LF AS, even in paradoxical LF/LG AS

BNP level >550pg/mL strong predictor of outcome in LF/LG AS

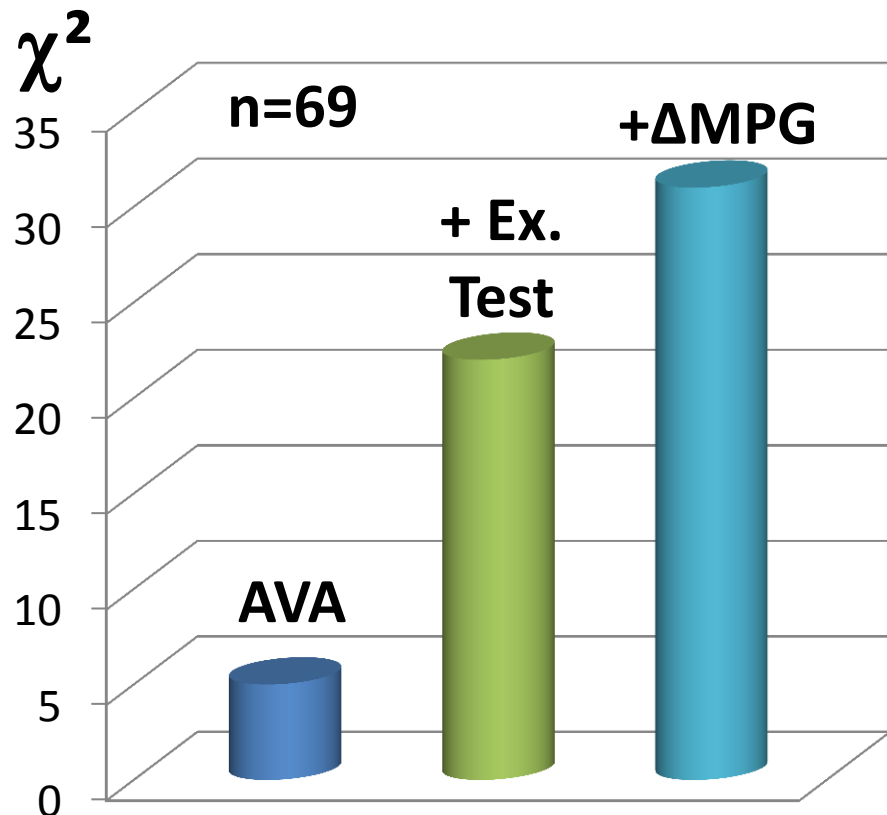


TOPAS study

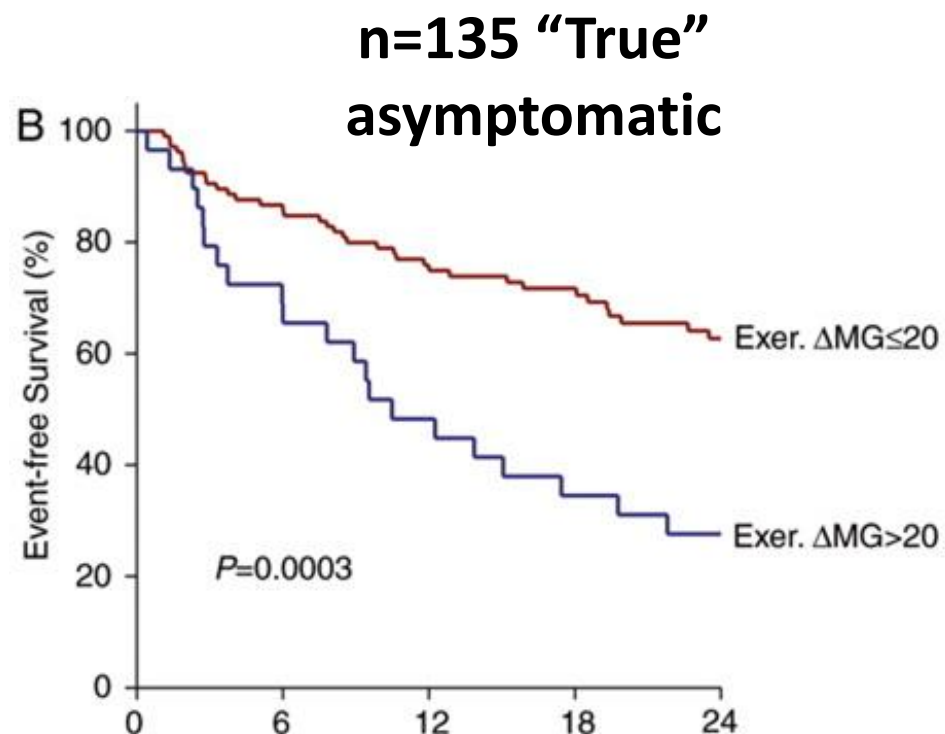




Prognostic Impact of Exercise Echo in AS



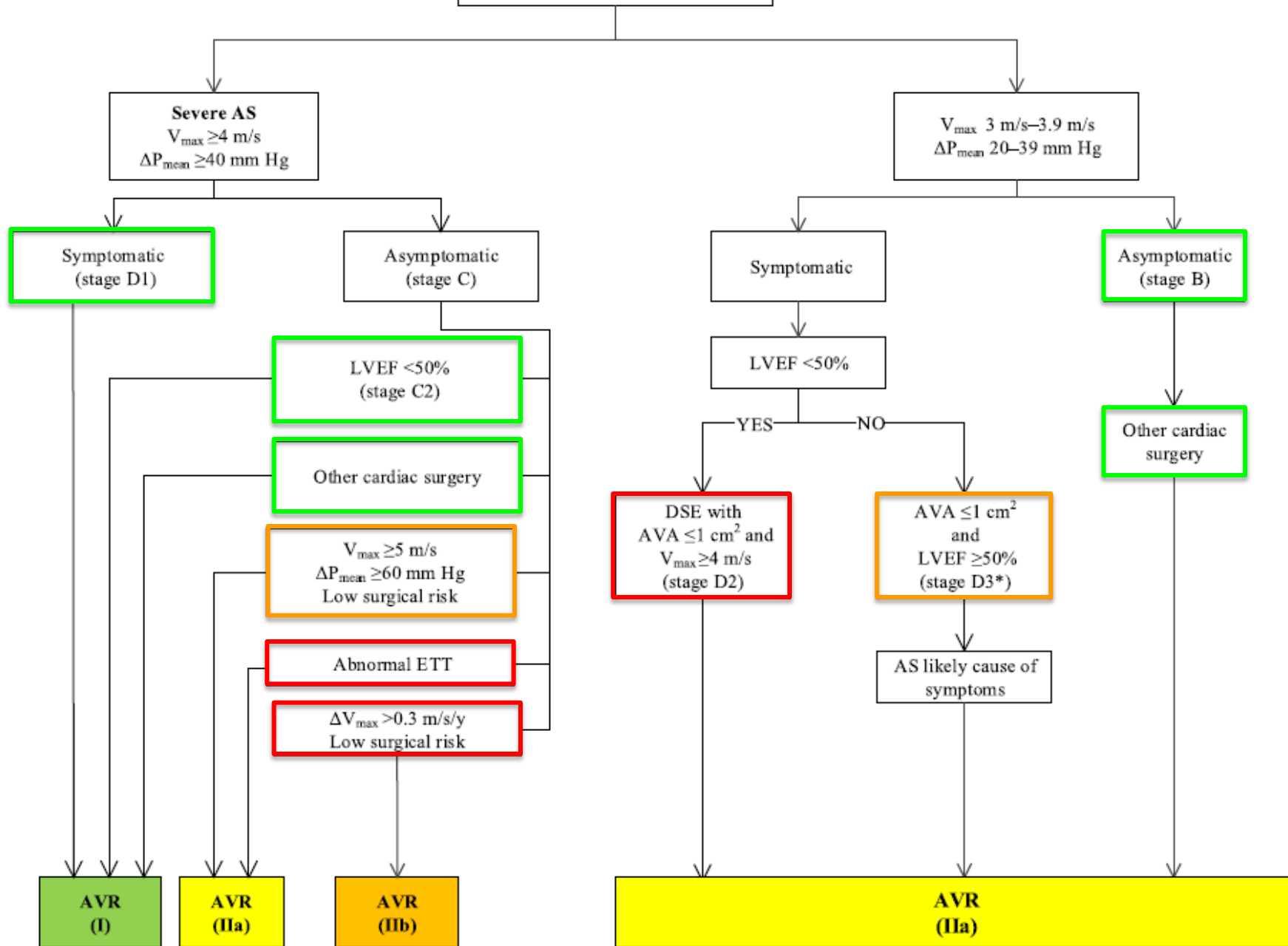
38% of abnormal exercise test
(78 of pts with event)



Ex. MPG +20mmHg:
HR=2

Lancellotti et al. Circulation 2005
Maréchaux et al. Eur Heart J, 2009

**Abnormal Aortic Valve With
Reduced Systolic Opening**



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18th Annual Meeting of the European Association of Cardiovascular Imaging, a registered branch of the ESC, in cooperation with the Austrian Working Group of Echocardiography.



VIENNA AUSTRIA 3-6 DECEMBER

www.escardio.org/EACVI



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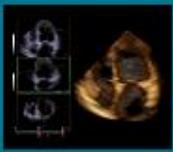
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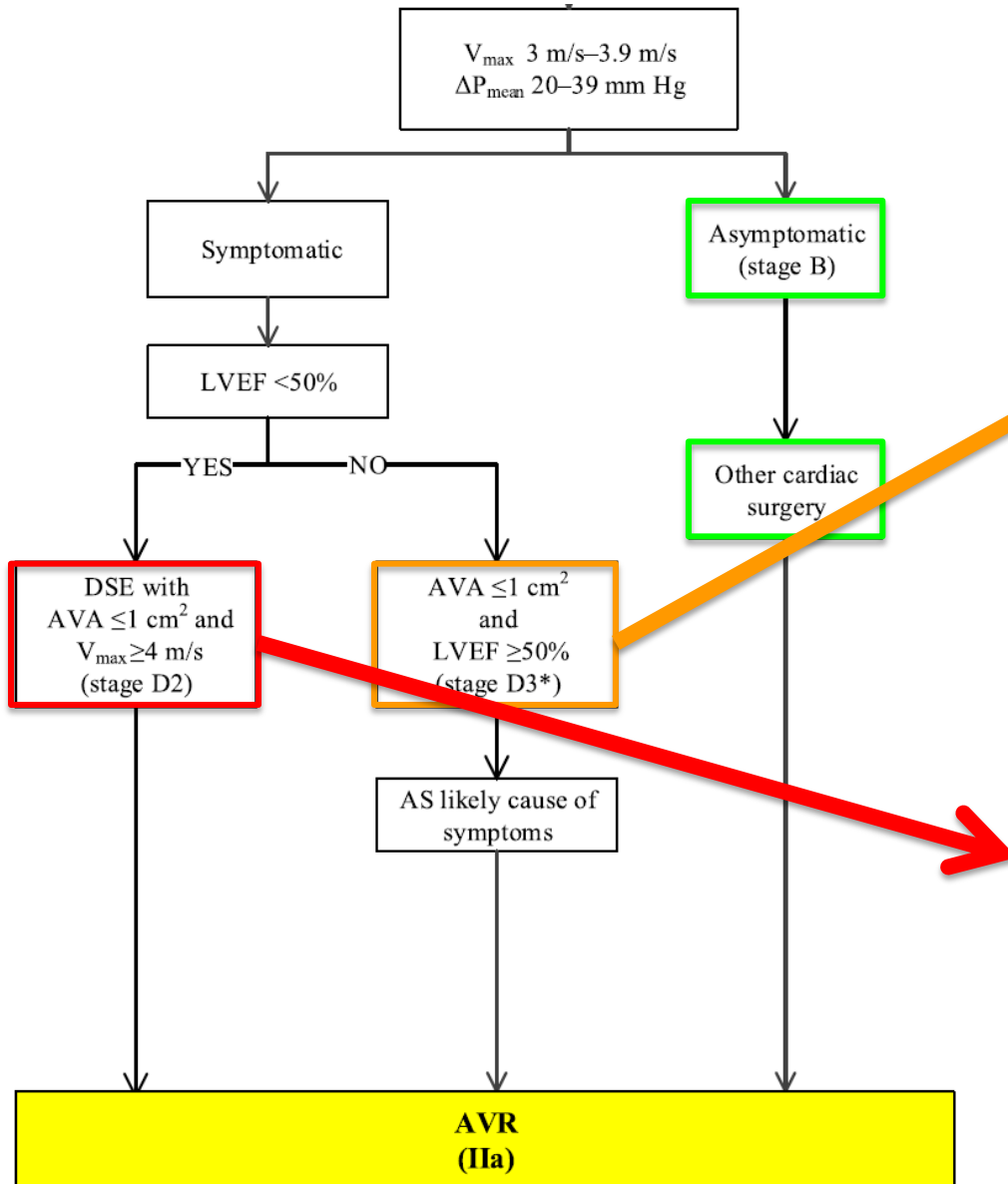


Available on iOS and Android



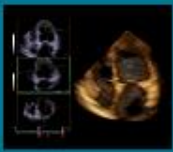


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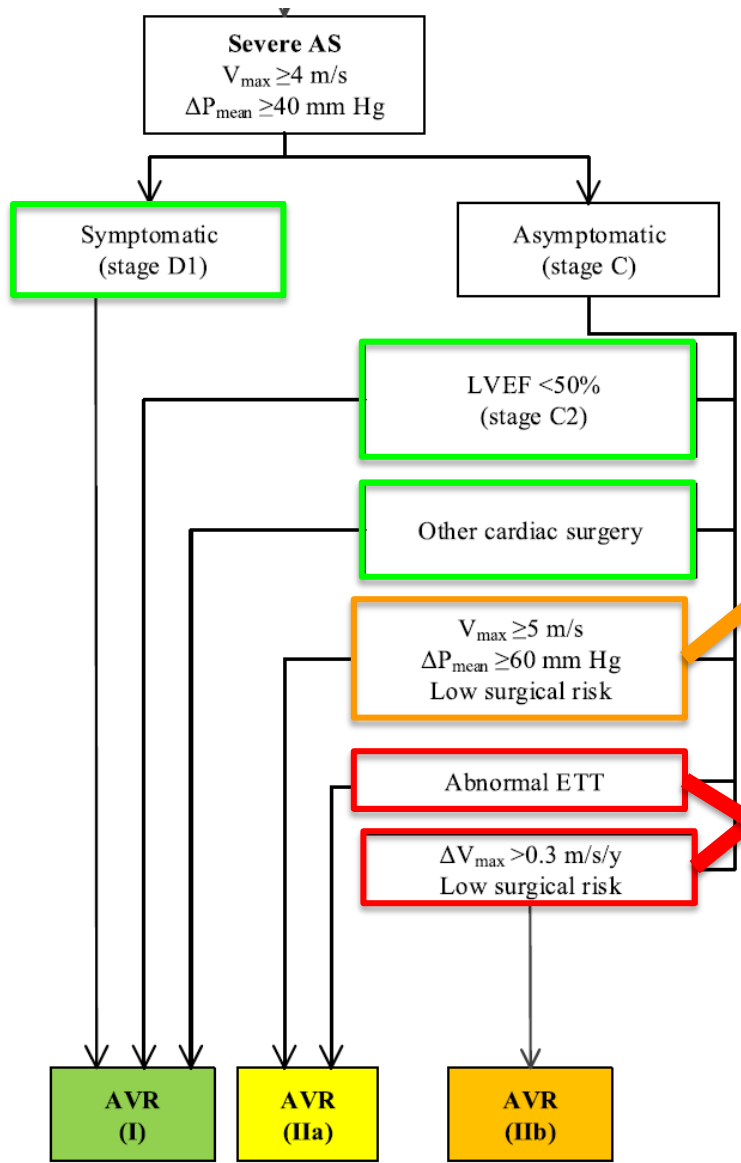


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preserved LVEF, after careful
confirmation of severe AS
IIa, C**

**Low Flow / Low gradient
Reduced LVEF:
Flow reserve: IIa, C
No Flow reserve: IIb, C**



EuroValve



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IIa, C

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I, C

- Fall in SBP
IIa, C