

Low-Gradient Severe AS

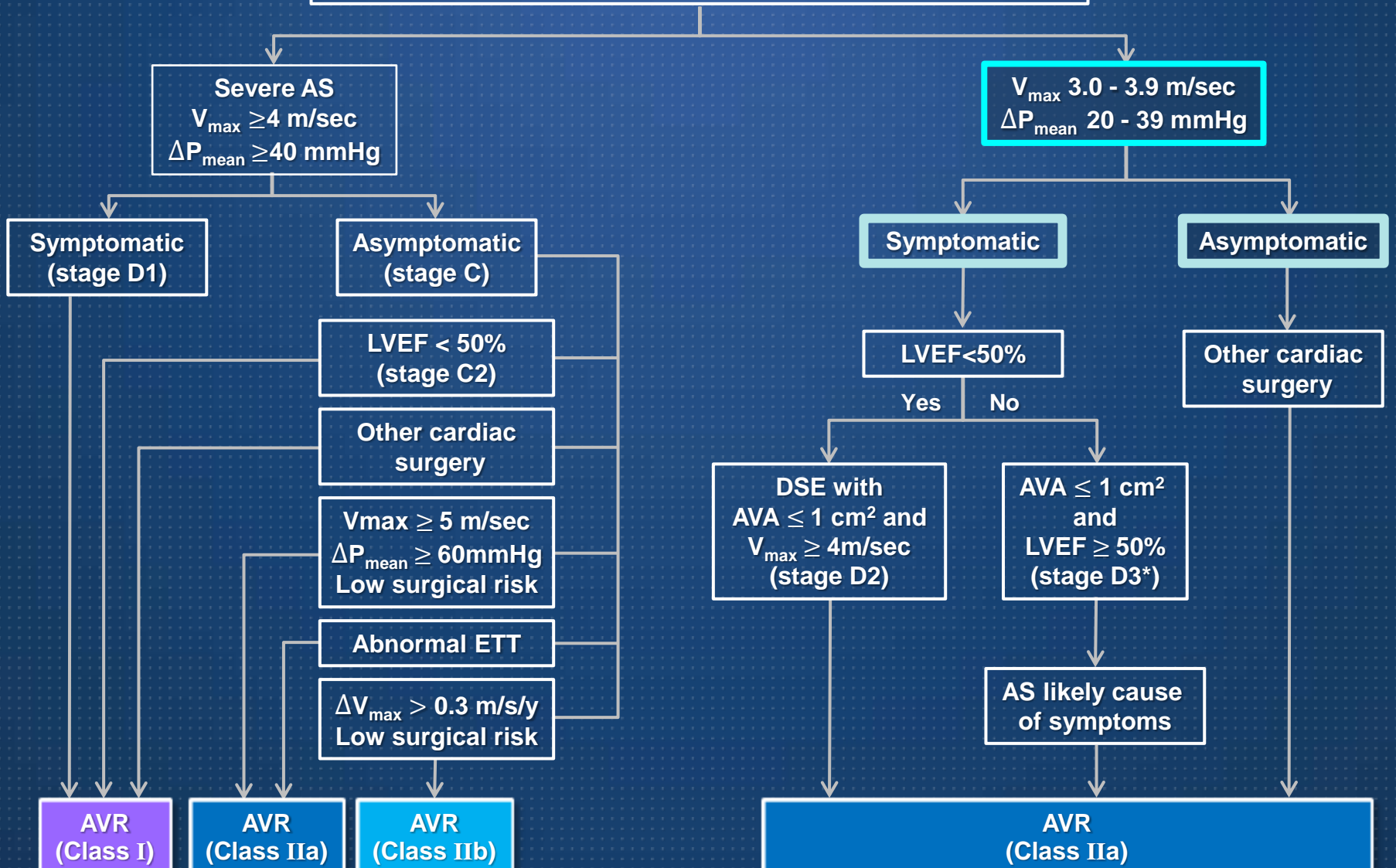
Early AVR or Watchful Waiting

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2014 AHA/ACC Guideline: Aortic Stenosis

Abnormal AV with Reduced Systolic Opening



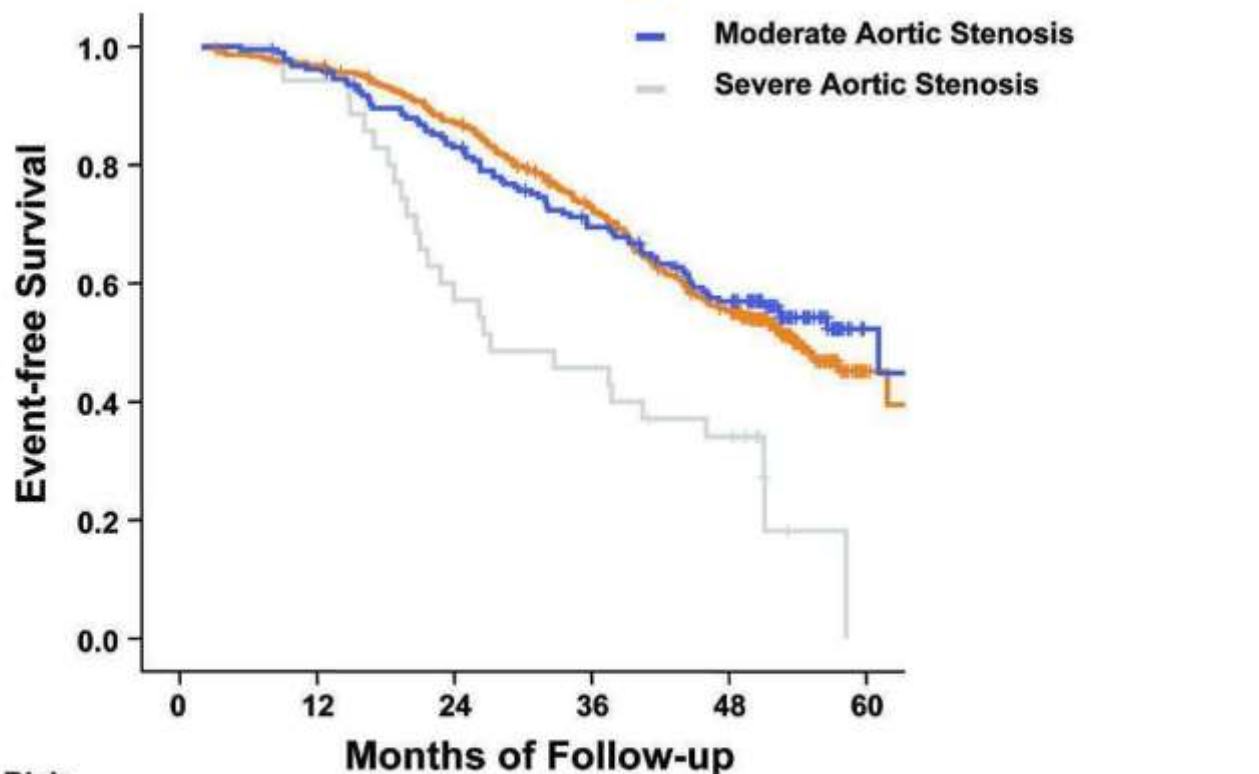
Outcome of Asymptomatic Patients with Low-Gradient “Severe” Aortic Stenosis

- In 619 asymptomatic patients (SEAS study), AV events* occurred in **48.5% pts with low-gradient “severe” AS (AVA < 1.0 cm² and mean gradient ≤ 40 mmHg)** versus **44.6% with moderate AS (AVA: 1.0-1.5 cm²)** during 46 months of follow-up (P= 0.37)
- Outcome of low-gradient “severe” AS and normal ejection fraction similar to that of moderate AS

AV events*: CV death, AVR and CHF

Outcome in Low-Gradient "Severe" AS

Aortic Valve Events

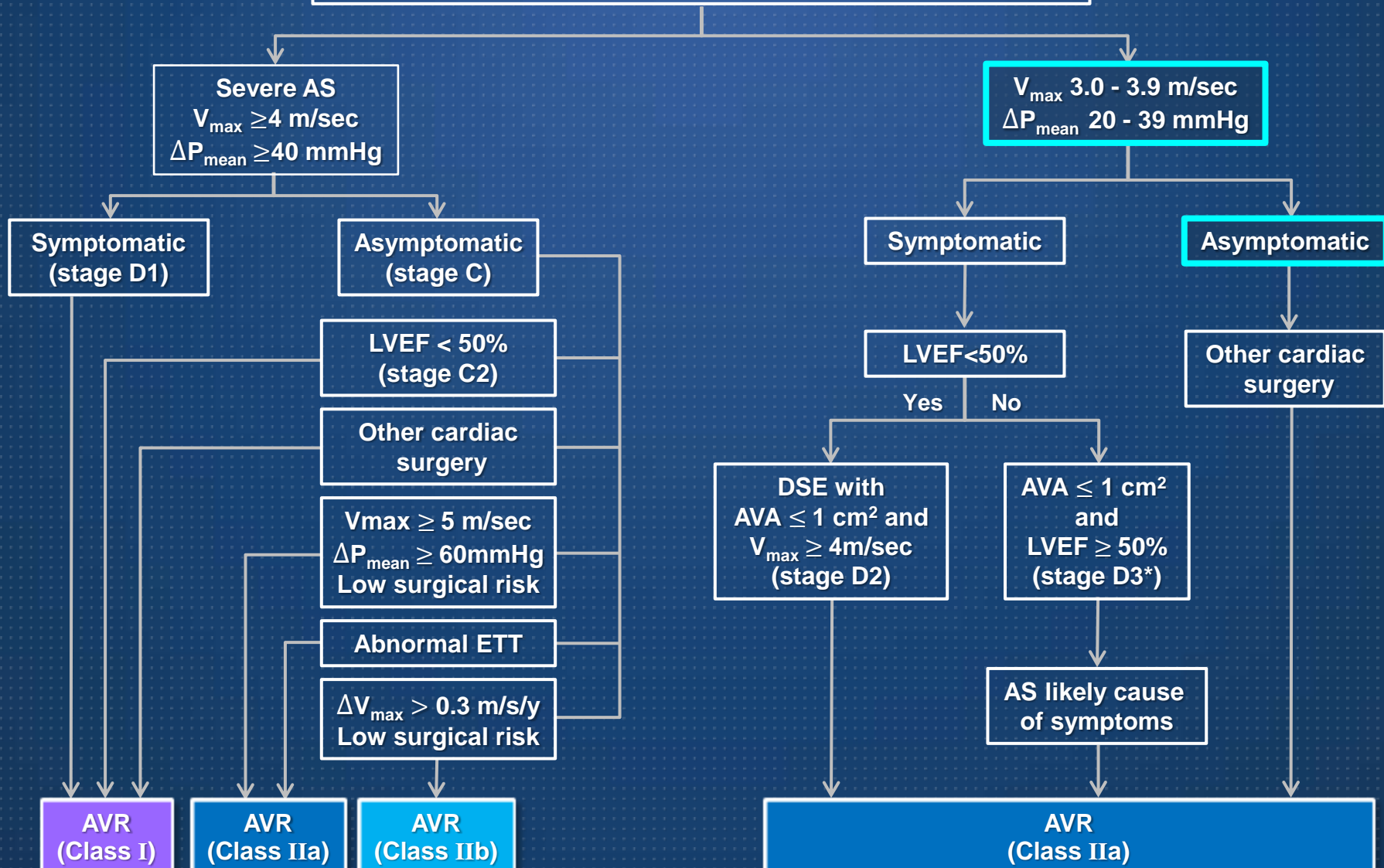


No. at Risk

LGSAS	435	420	376	310	232	17
Moderate AS	184	176	151	126	99	10
Severe AS	35	33	21	16	11	0

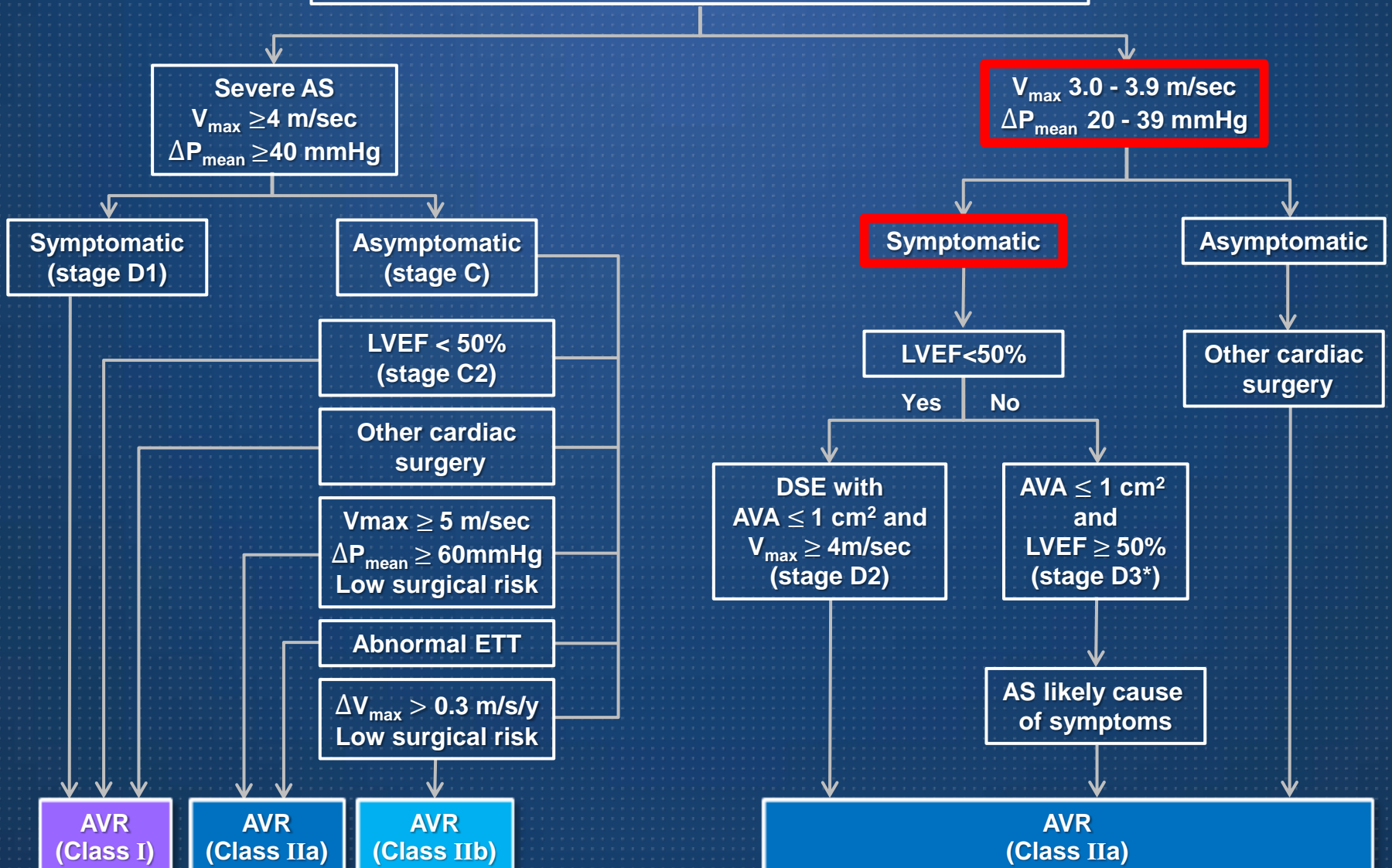
2014 AHA/ACC Guideline: Aortic Stenosis

Abnormal AV with Reduced Systolic Opening

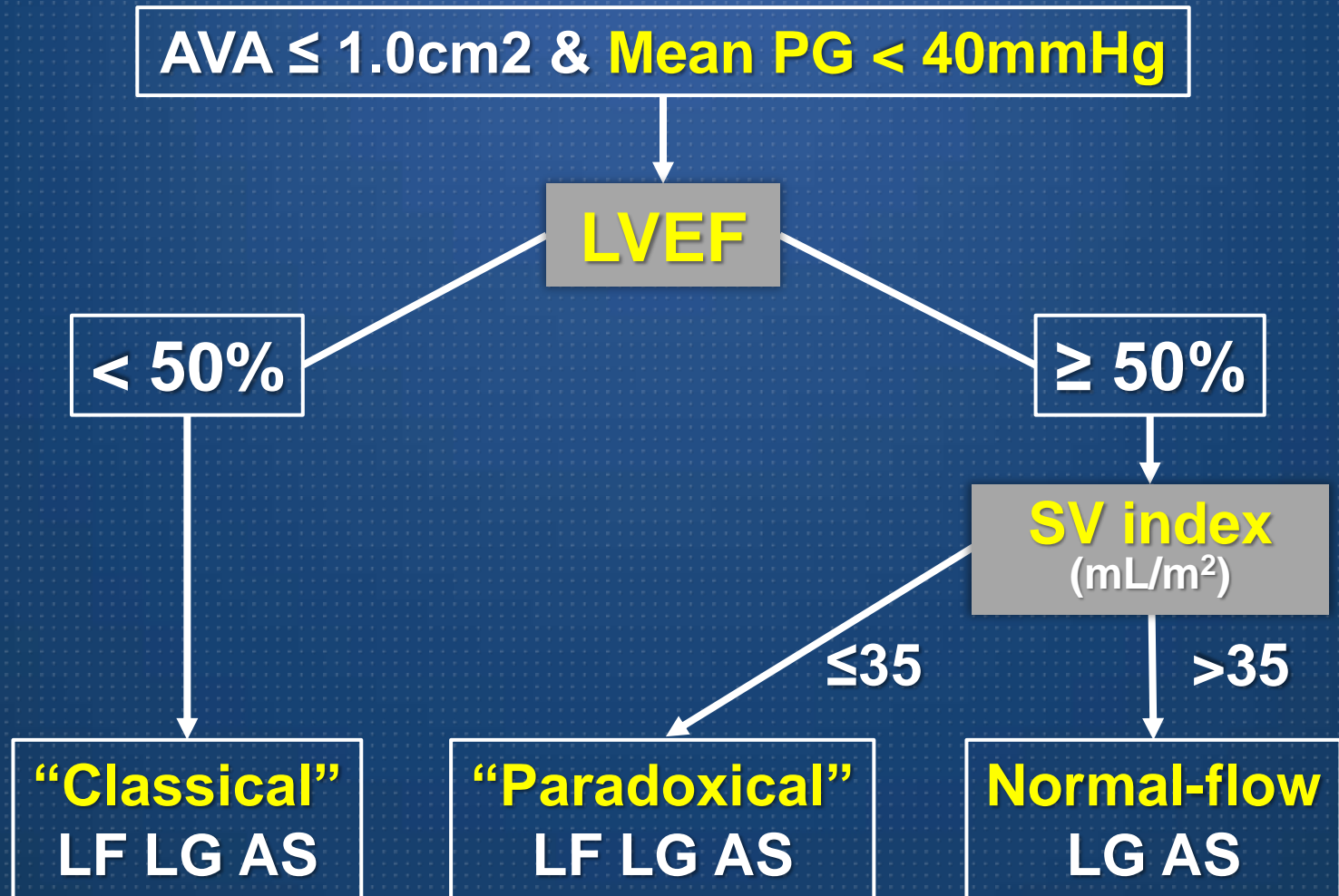


2014 AHA/ACC Guideline: Aortic Stenosis

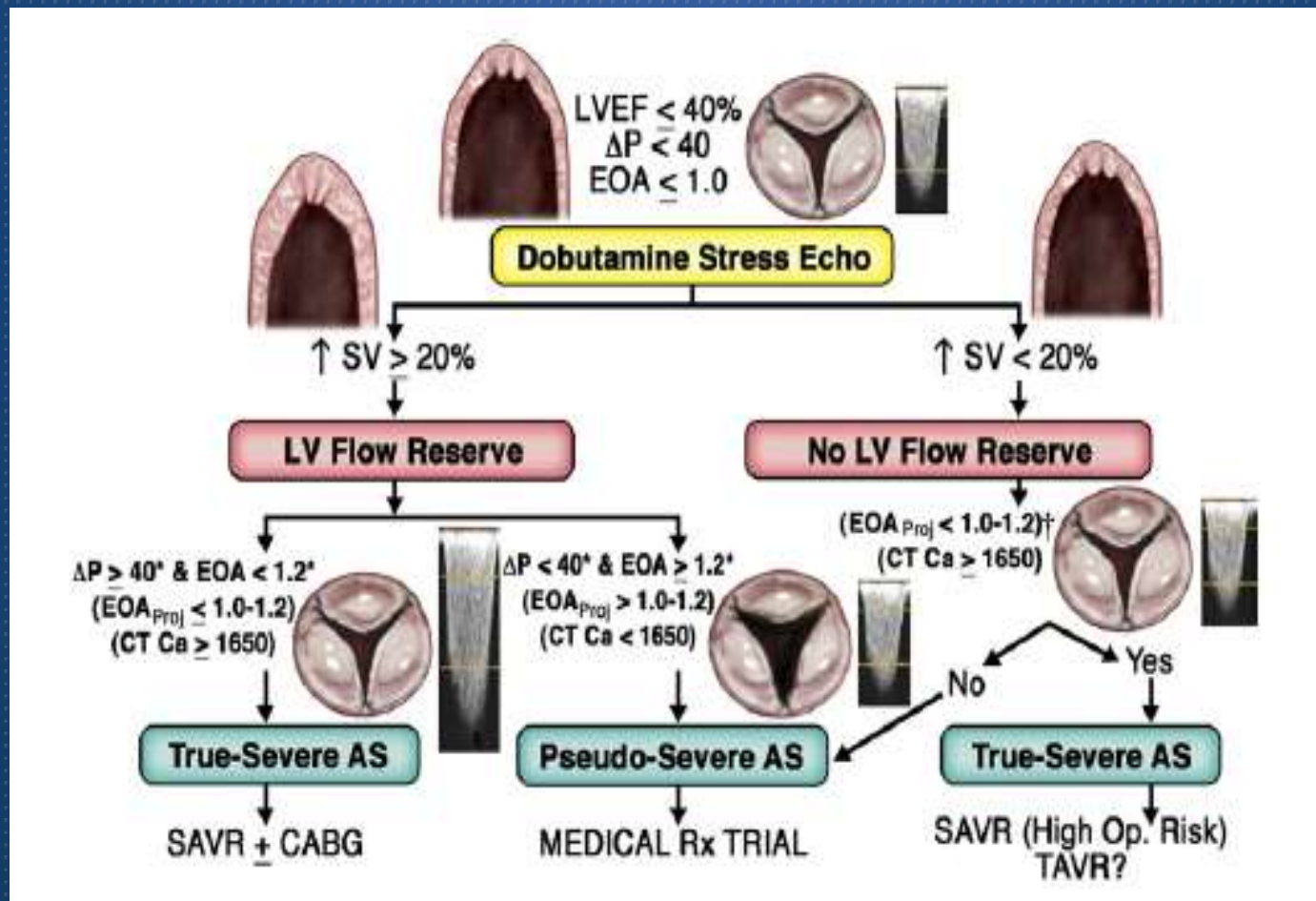
Abnormal AV with Reduced Systolic Opening



Low-gradient AS

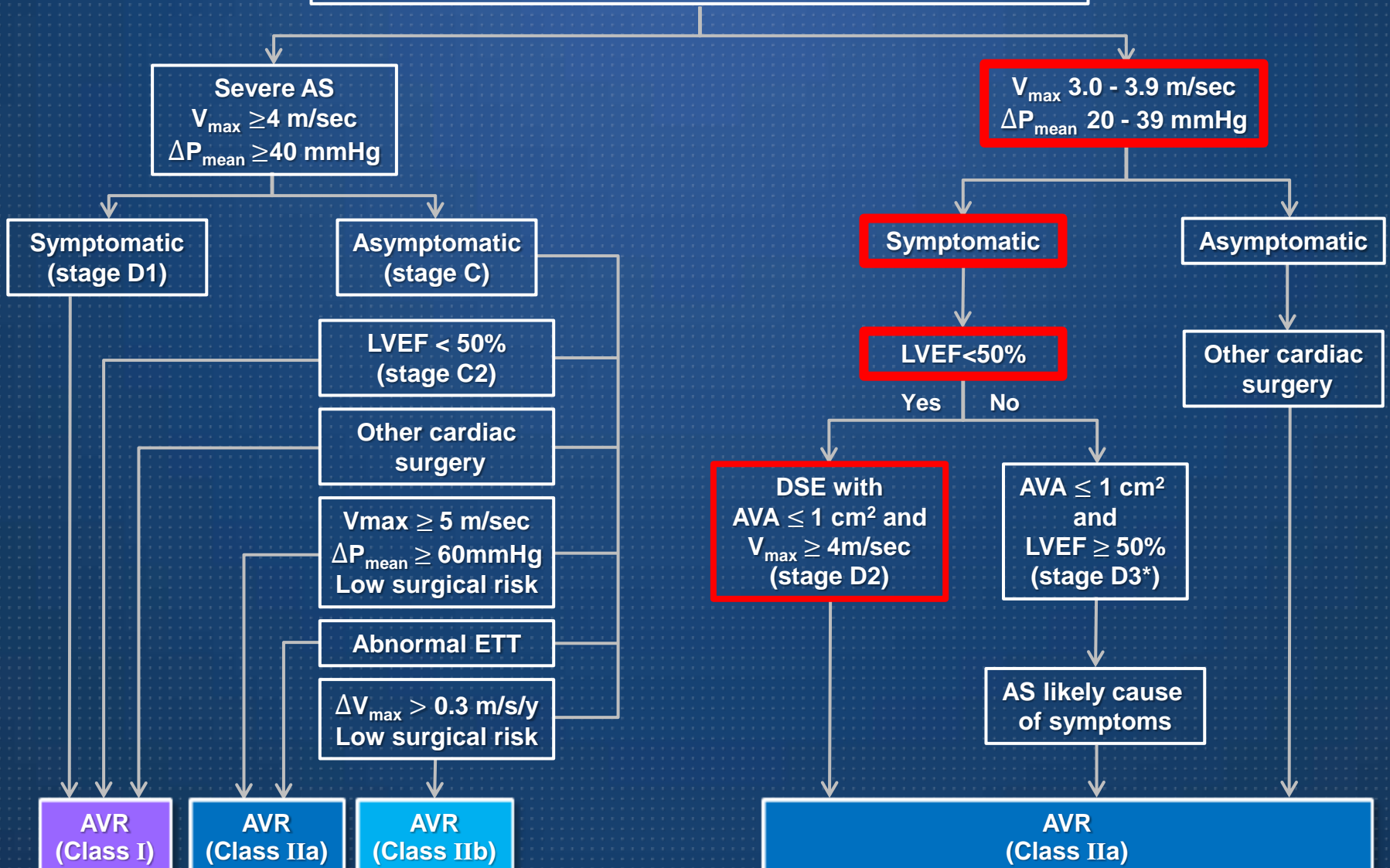


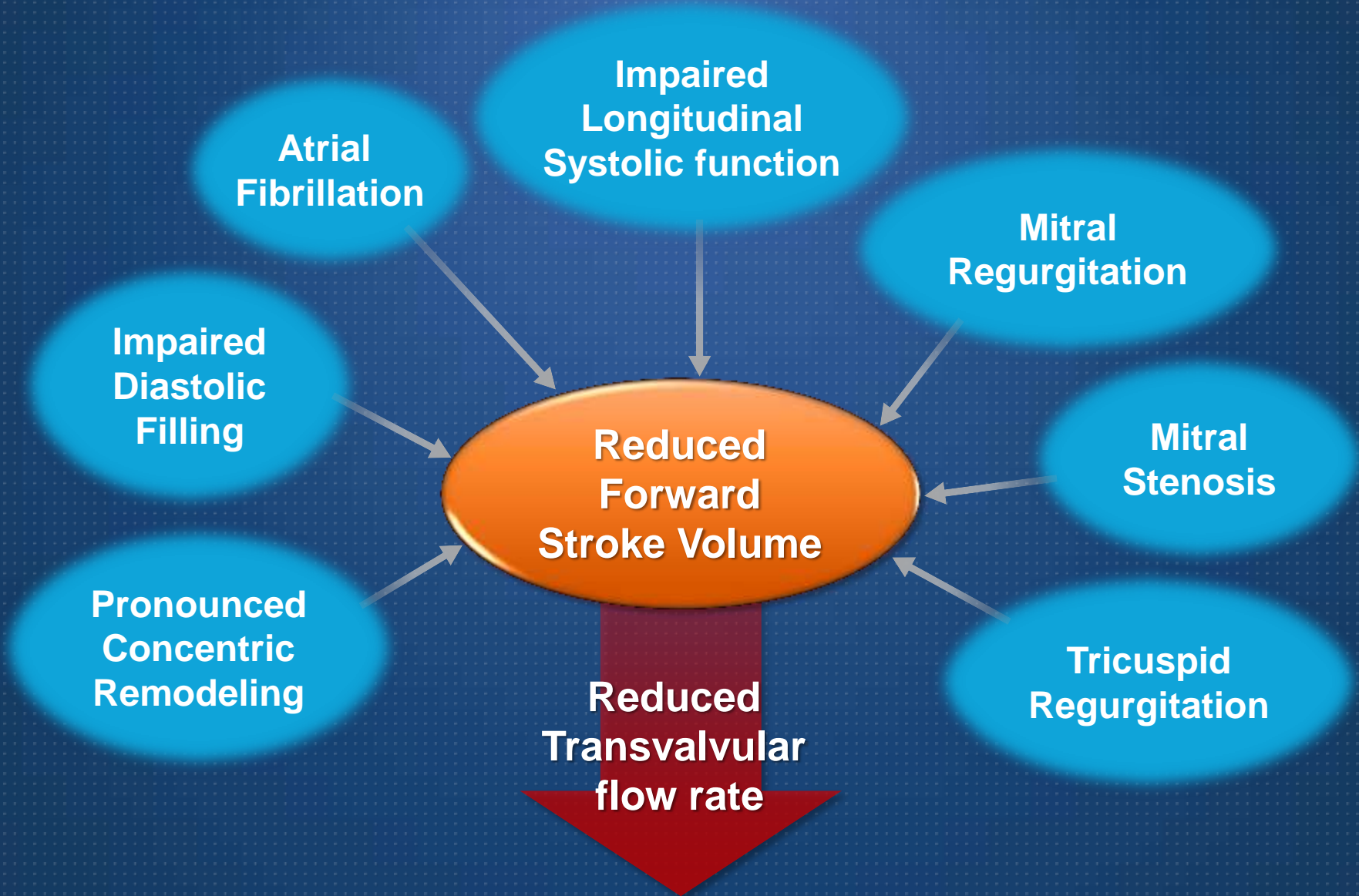
Low-Gradient AS with Depressed LVEF



2014 AHA/ACC Guideline: Aortic Stenosis

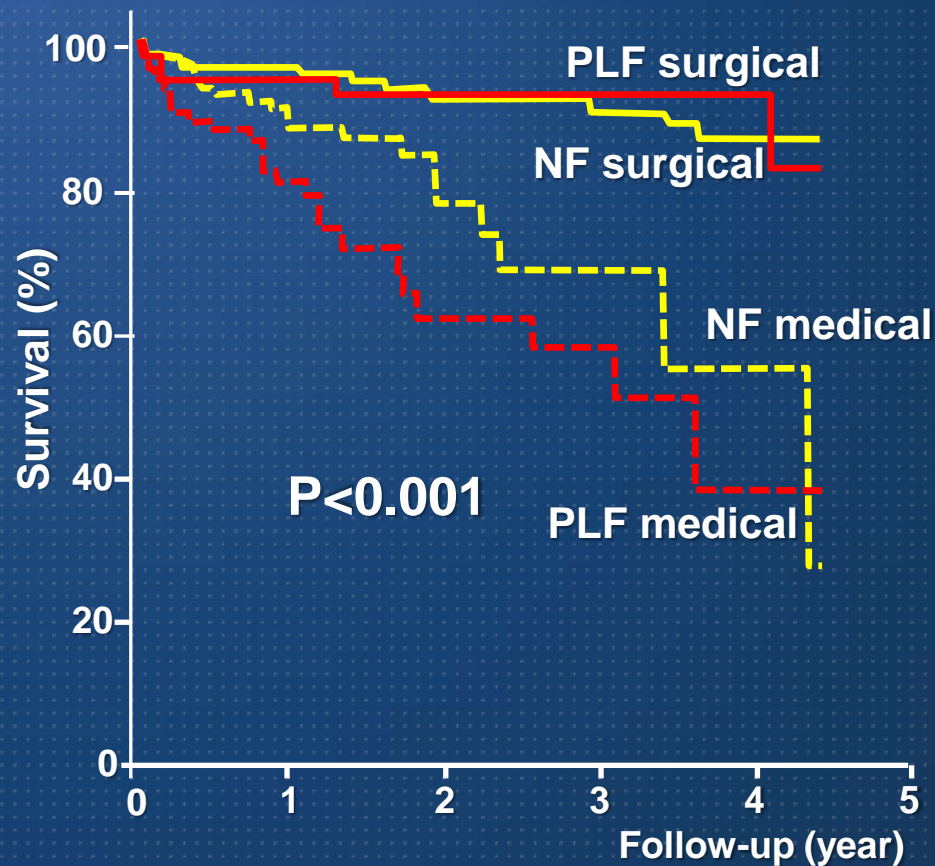
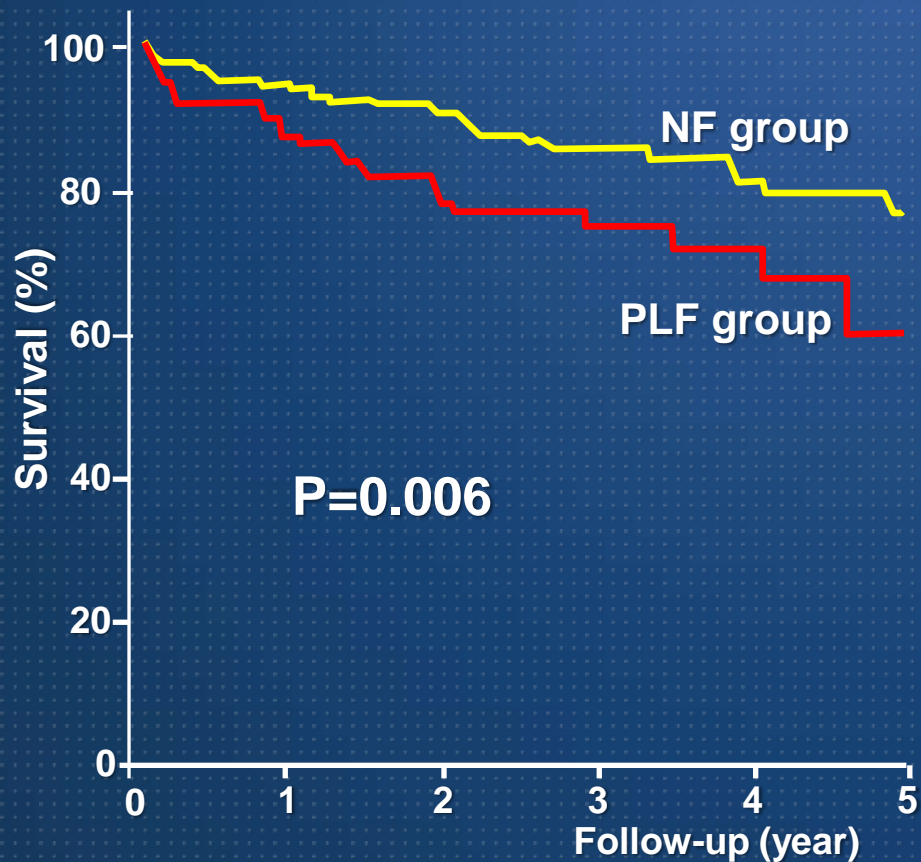
Abnormal AV with Reduced Systolic Opening



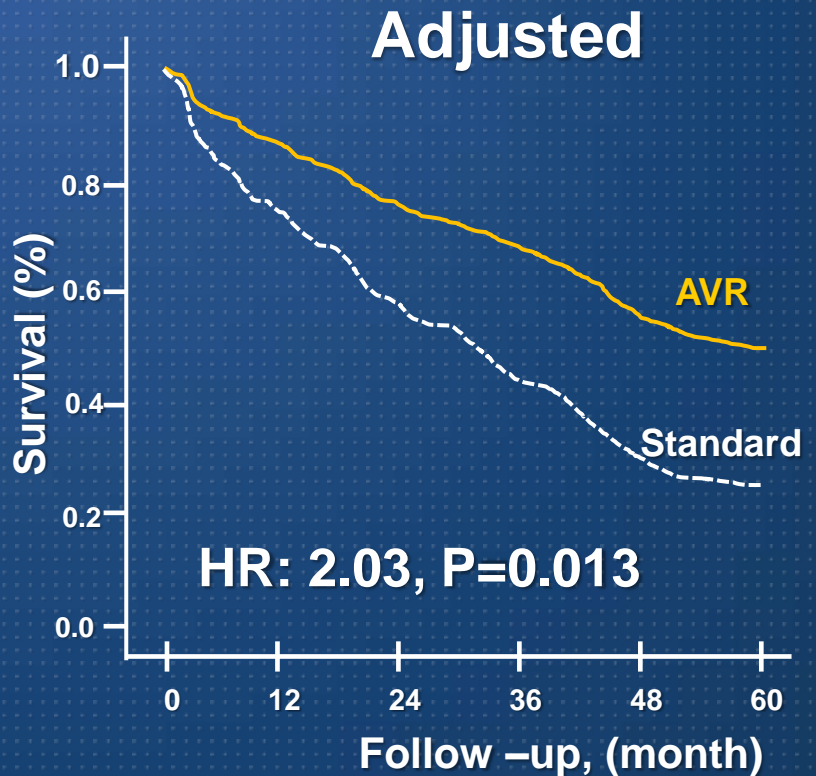
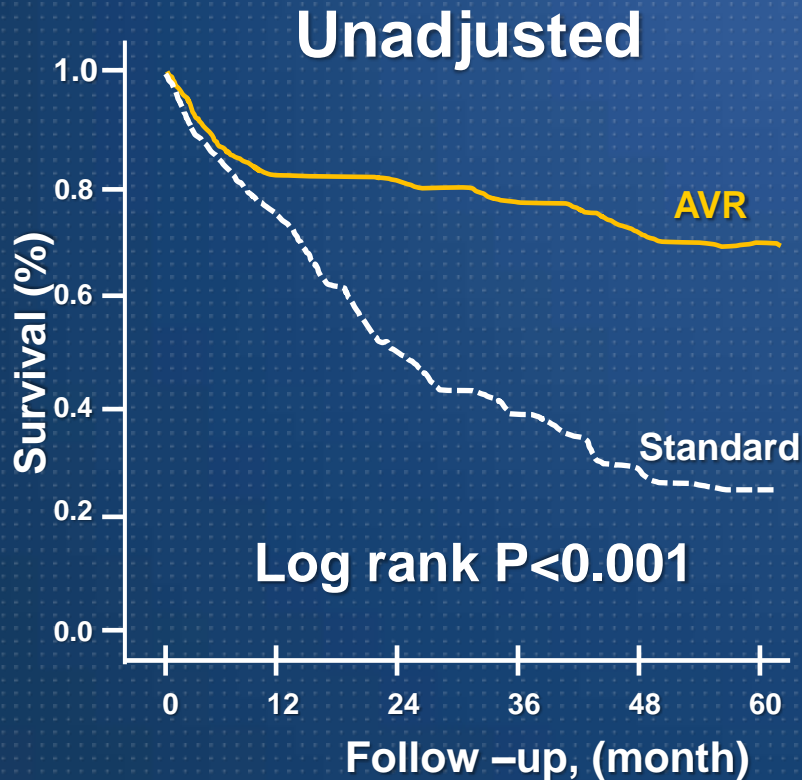


Low-Flow, Low gradient AS with Preserved LVEF

Paradoxical Low-flow, Low-gradient Severe AS with Preserved LVEF

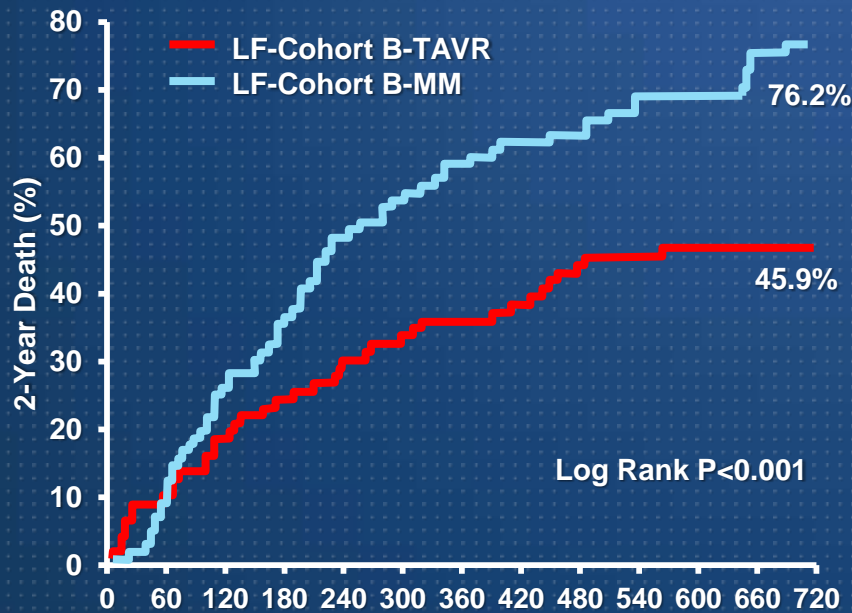


AVR Versus Medical Therapy in Symptomatic LGAS

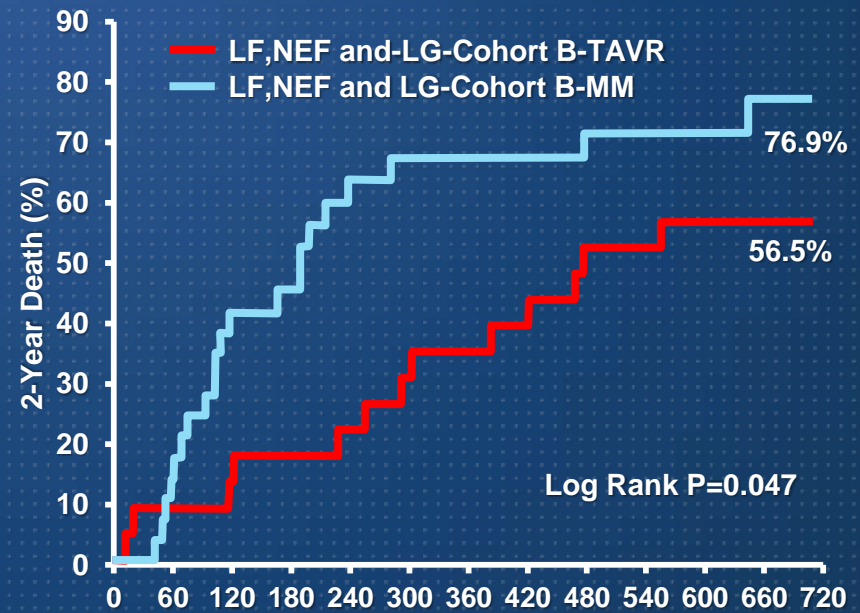


Outcome of Low-flow Severe AS in PARTNER Trial

- PARTNER-I B (inoperable): Medical vs. TAVR**



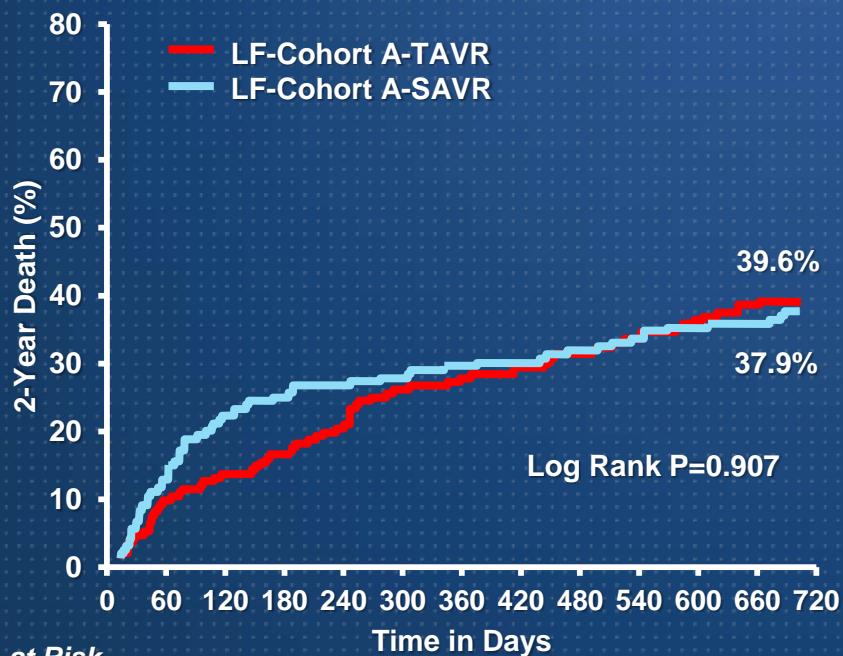
No. at Risk		Time in Days												
		0	60	120	180	240	300	360	420	480	540	600	660	720
B-TAVR	85	74	65	58	55	50	47	46	46					
B-MM	95	78	60	47	39	35	26	25	18					



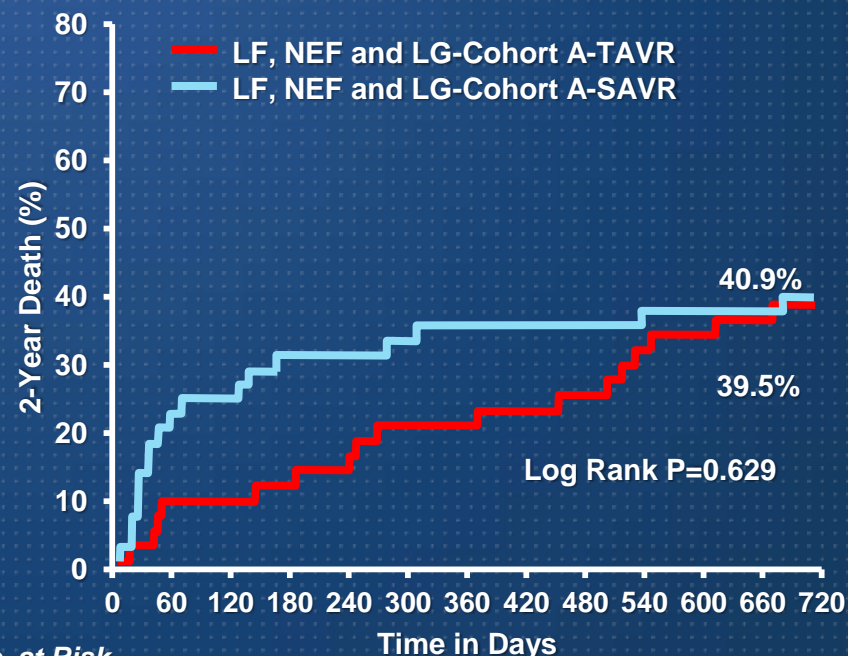
No. at Risk		Time in Days												
		0	60	120	180	240	300	360	420	480	540	600	660	720
B-TAVR	23	21	19	17	15	13	11	10	10					
B-MM	29	22	15	10	9	9	6	5	4					

Outcome of Low-flow Severe AS in PARTNER Trial

- PARTNER-I A: TAVR \approx SAVR**



No. at Risk		Time in Days												
		0	60	120	180	240	300	360	420	480	540	600	660	720
A-TAVR	170	152	143	127	123	119	112	106	100					
A-SAVR	180	138	127	123	119	116	112	107	101					



No. at Risk		Time in Days												
		0	60	120	180	240	300	360	420	480	540	600	660	720
A-TAVR	43	39	38	34	34	33	29	27	26					
A-SAVR	44	33	30	30	28	28	28	27	26					

PARTNER Trial Included High-Gradient Severe AS

- **Inclusion Criteria**

Aortic valve area $< 0.8 \text{ cm}^2$ with mean gradient $> 40 \text{ mmHg}$ or peak aortic jet velocity $> 4 \text{ m/s}$

- **Only 16% patients had normal EF and low flow, low gradient severe AS**

AVR for Symptomatic LG Severe AS

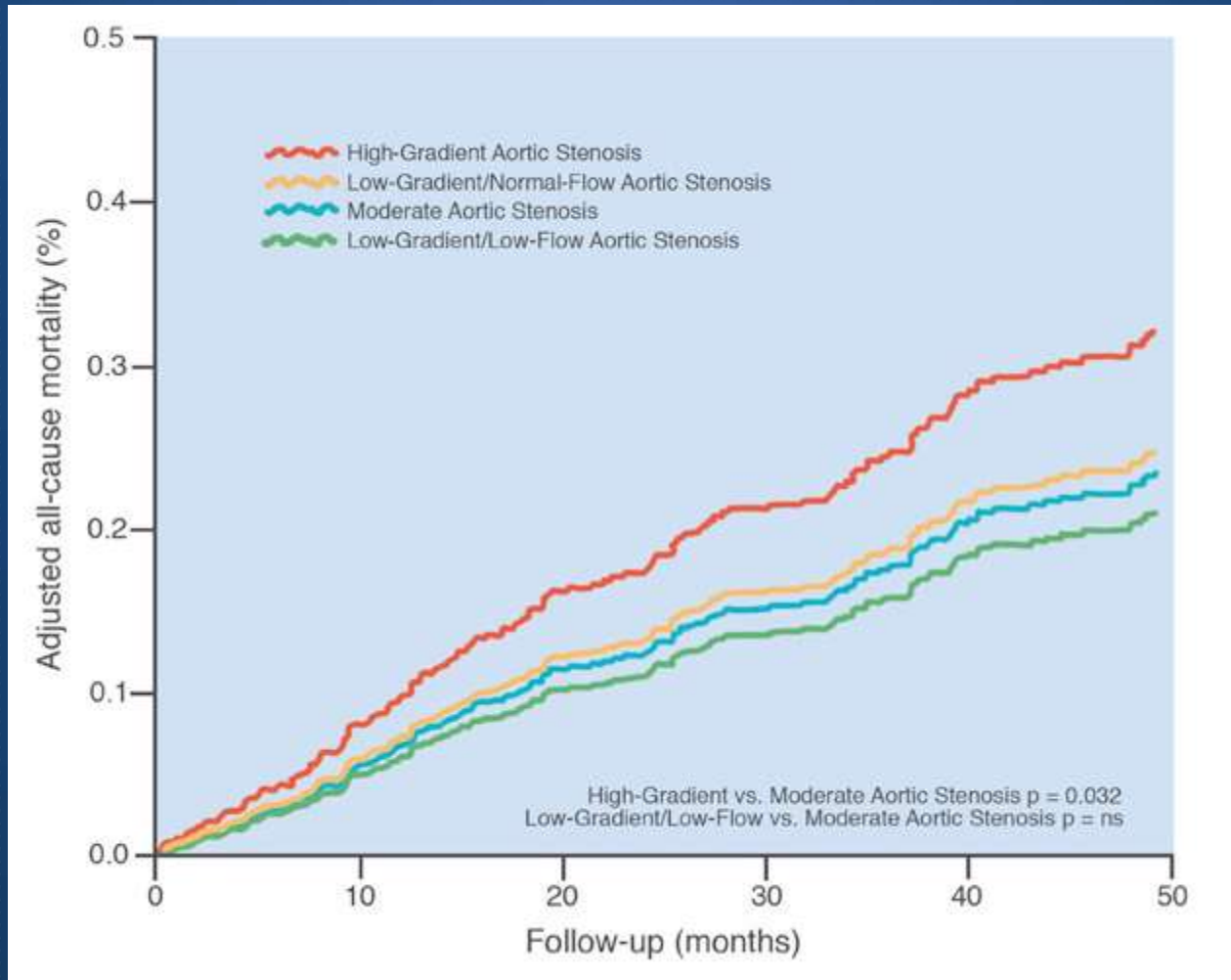
2012 ESC guidelines

- LF, LG AS with reduced EF and flow reserve (IIa)
- LF, LG AS and reduced EF without flow reserve (IIb)
- **Low-flow, low-gradient AS with normal EF (IIa)**

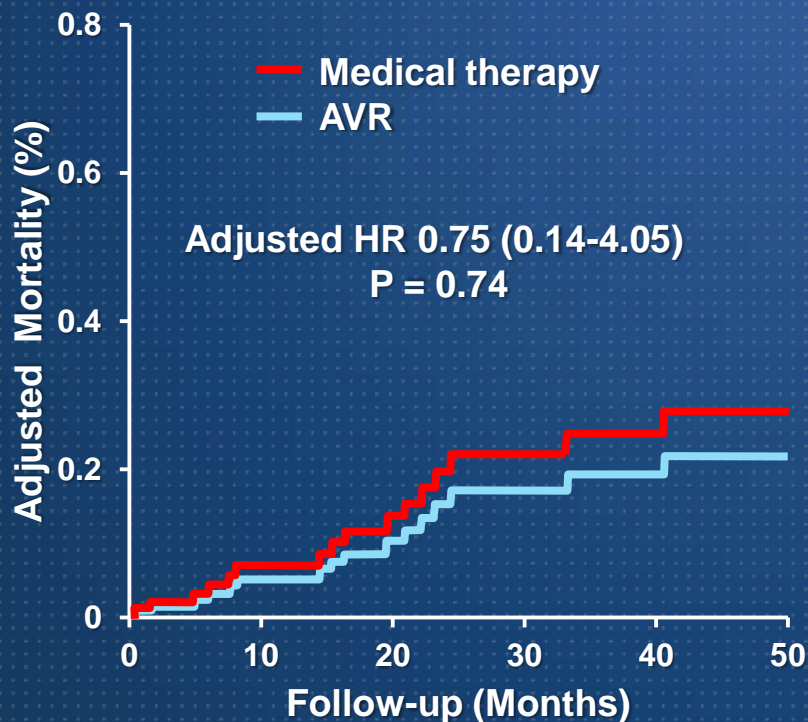
2014 ACC/AHA guidelines

- **Dobutamine stress echo (IIa)**
- LF, LG AS with reduced EF and flow reserve (IIa)
- **Low-flow, low-gradient AS with normal EF (IIa)**

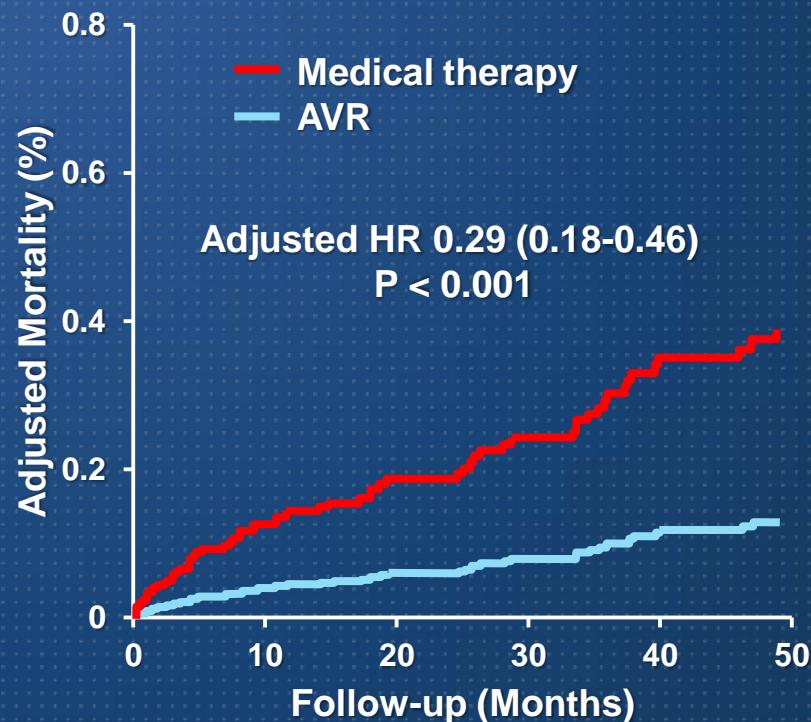
Long Term Outcome of Low-Gradient AS, Moderate AS, and High-Gradient AS Under Medical Management



Comparison of Survival Benefit of AVR Between LG/LF AS and HG AS

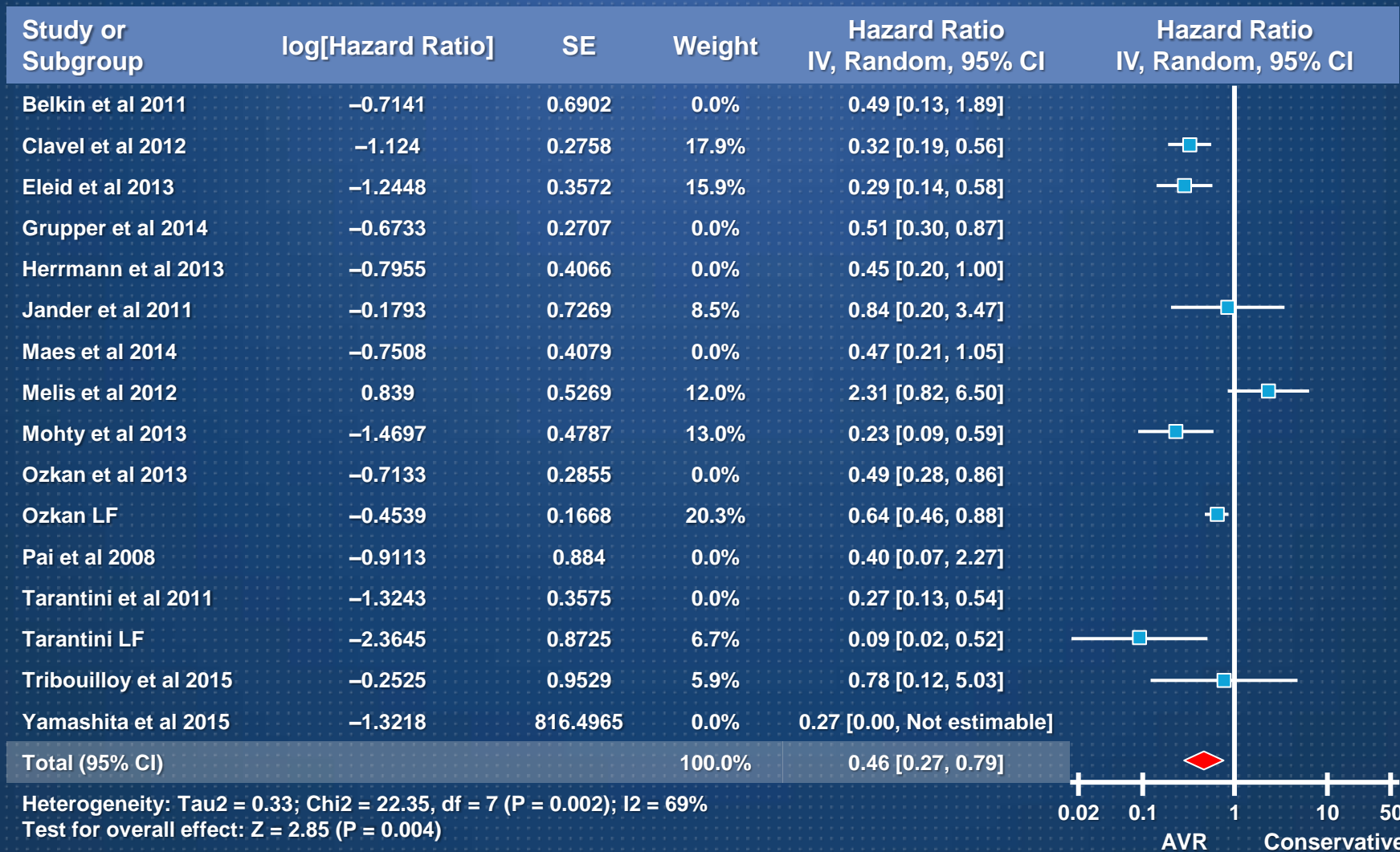


Low-gradient, Low flow AS



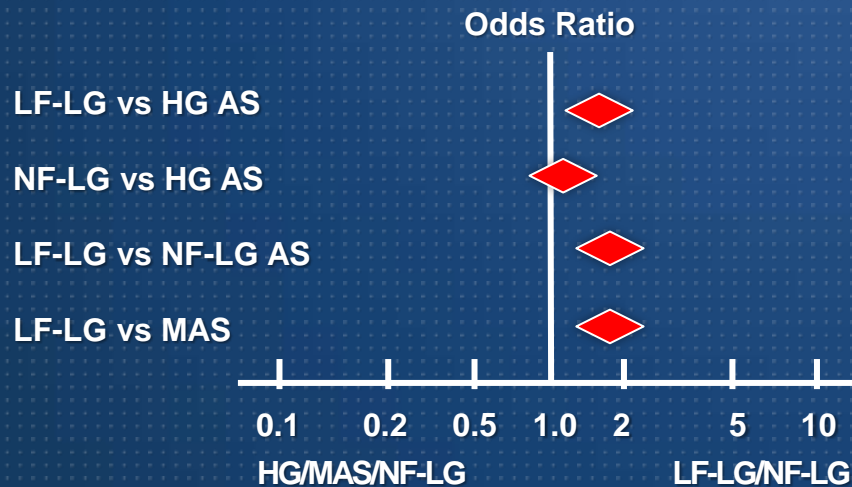
High-gradient AS

Impact of AVR on Survival in LF-LG aortic stenosis

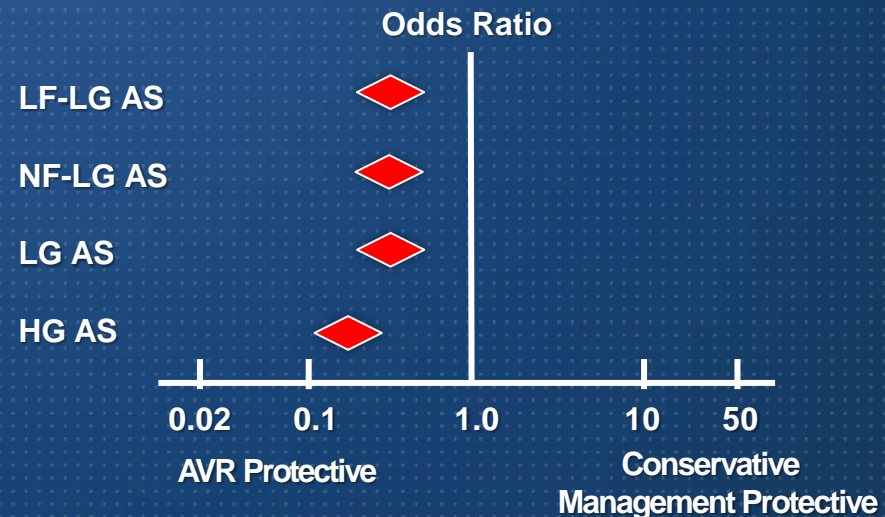


Outcome and Impact of AVR in the Different Subtypes of Flow/Gradient Aortic Stenosis

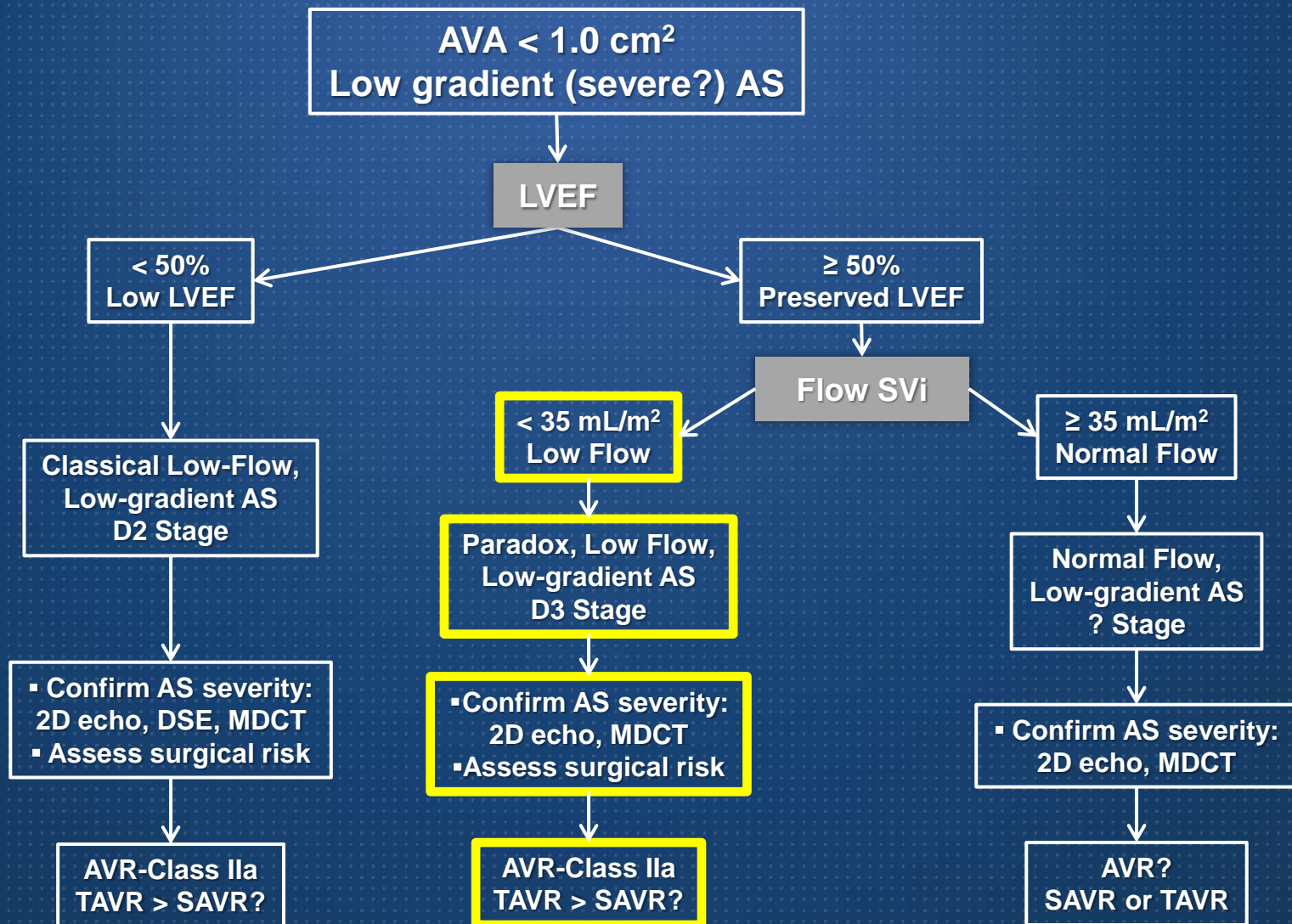
Mortality According to Subtypes of Aortic Stenosis



Mortality According to type of Treatment



Algorithm for Management of Symptomatic Low-Gradient Severe AS



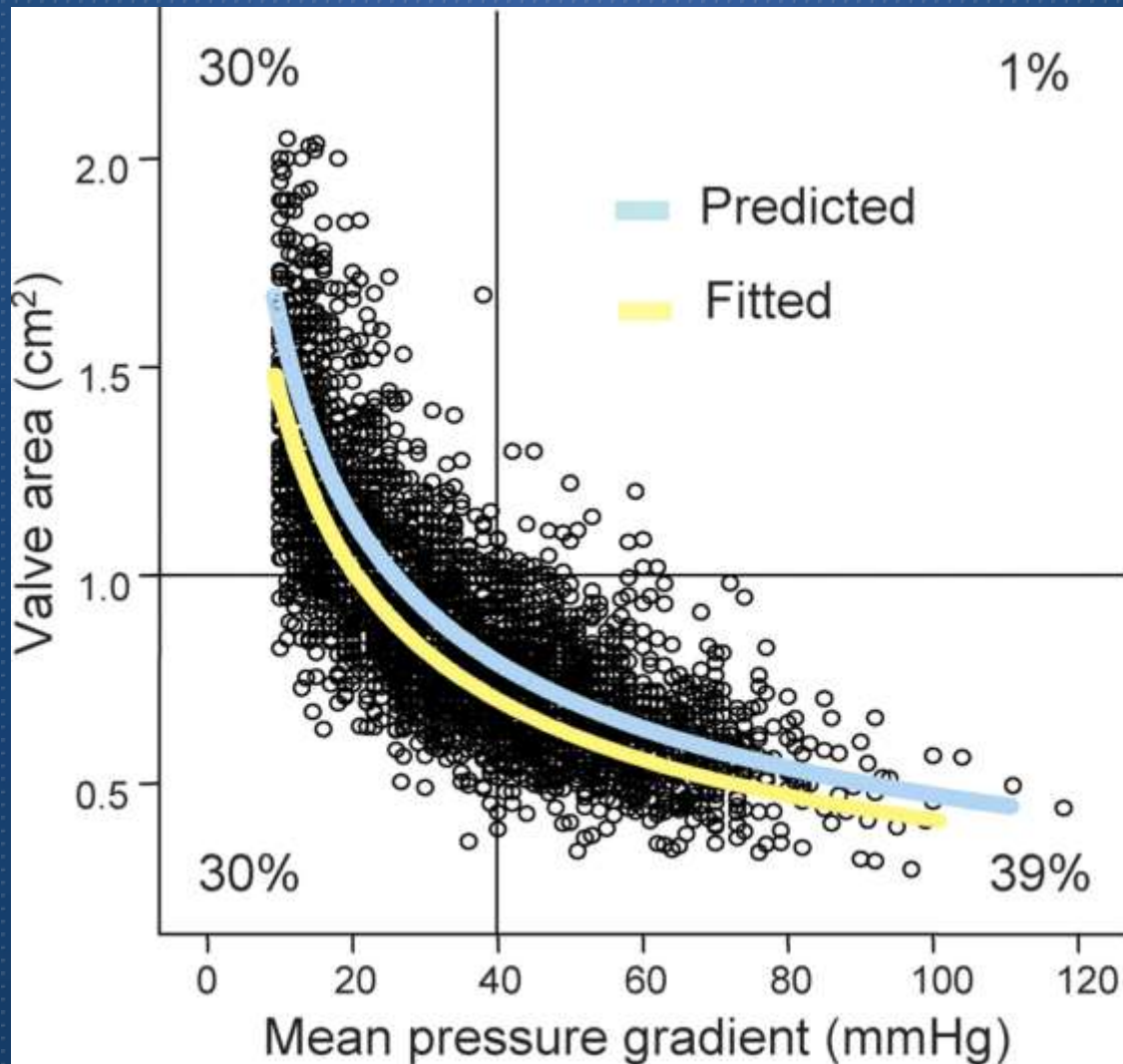
Low gradient Severe AS with Preserved LVEF

- **Paradoxical Low-flow, Low-gradient severe AS**
 - Severe concentric LVH and smaller LV cavity size
 - High valvuloarterial impedance and low stroke volume
- **Normal-flow, Low-gradient severe AS**
 - Measurement error
 - Small body surface area
 - Inconsistency between cutoff values of AVA and gradient

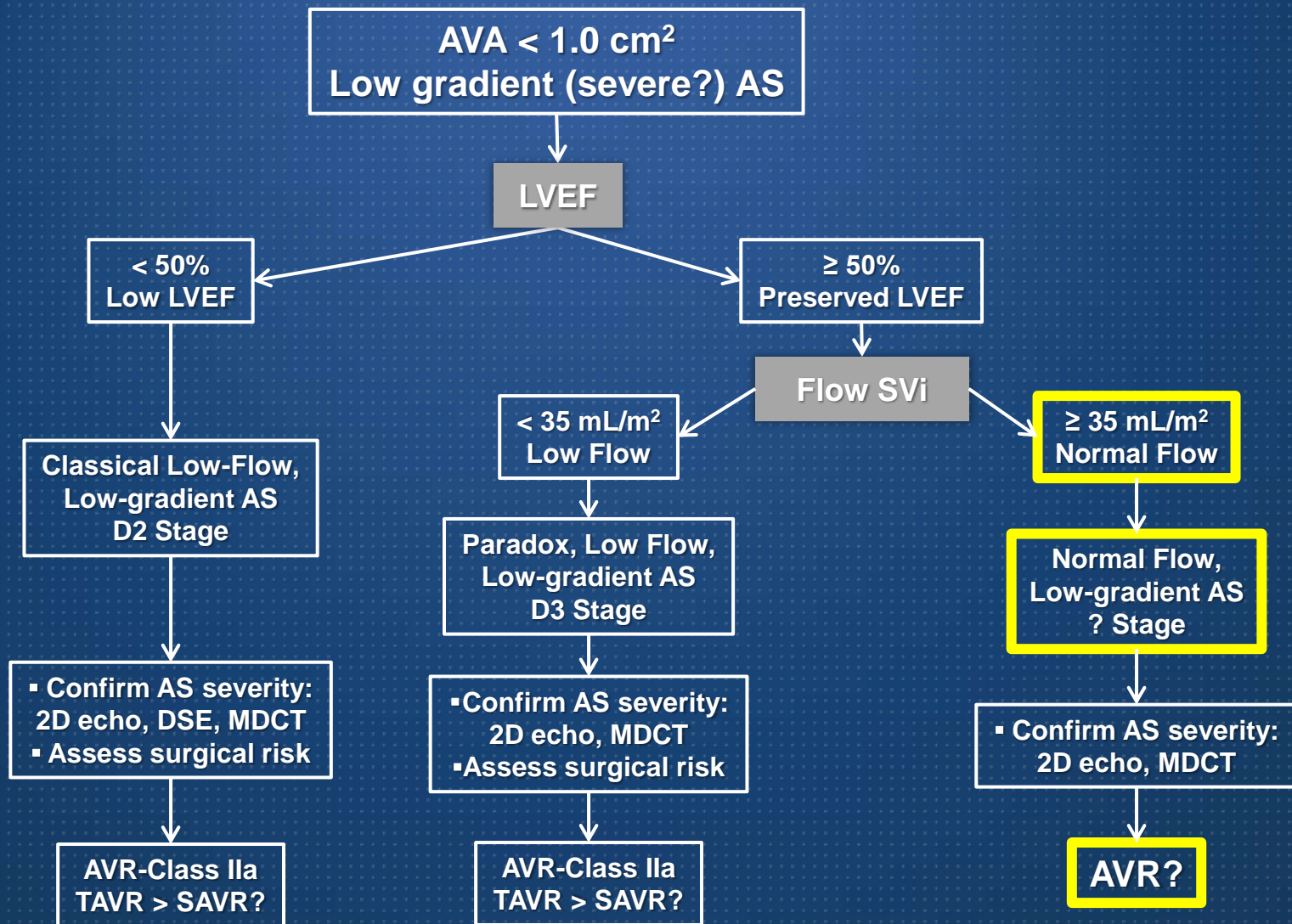
Relation of AV Area to the Mean Pressure Gradient

Aortic valve area (cm ²)	Mean gradient (mmHg)
3.0	2.9
2.0	6.6
1.0	26
0.9	32
0.8	41
0.7	53
0.6	73

AV Area vs. Mean Pressure Gradient



Algorithm for Management of Symptomatic Low-Gradient Severe AS



Watchful Observation Versus Early Aortic Valve Replacement for Patients with Normal flow, Low-Gradient Severe Aortic Stenosis

Duk-Hyun Kang, Jeong Yoon Jang, Sung-Ji Park,

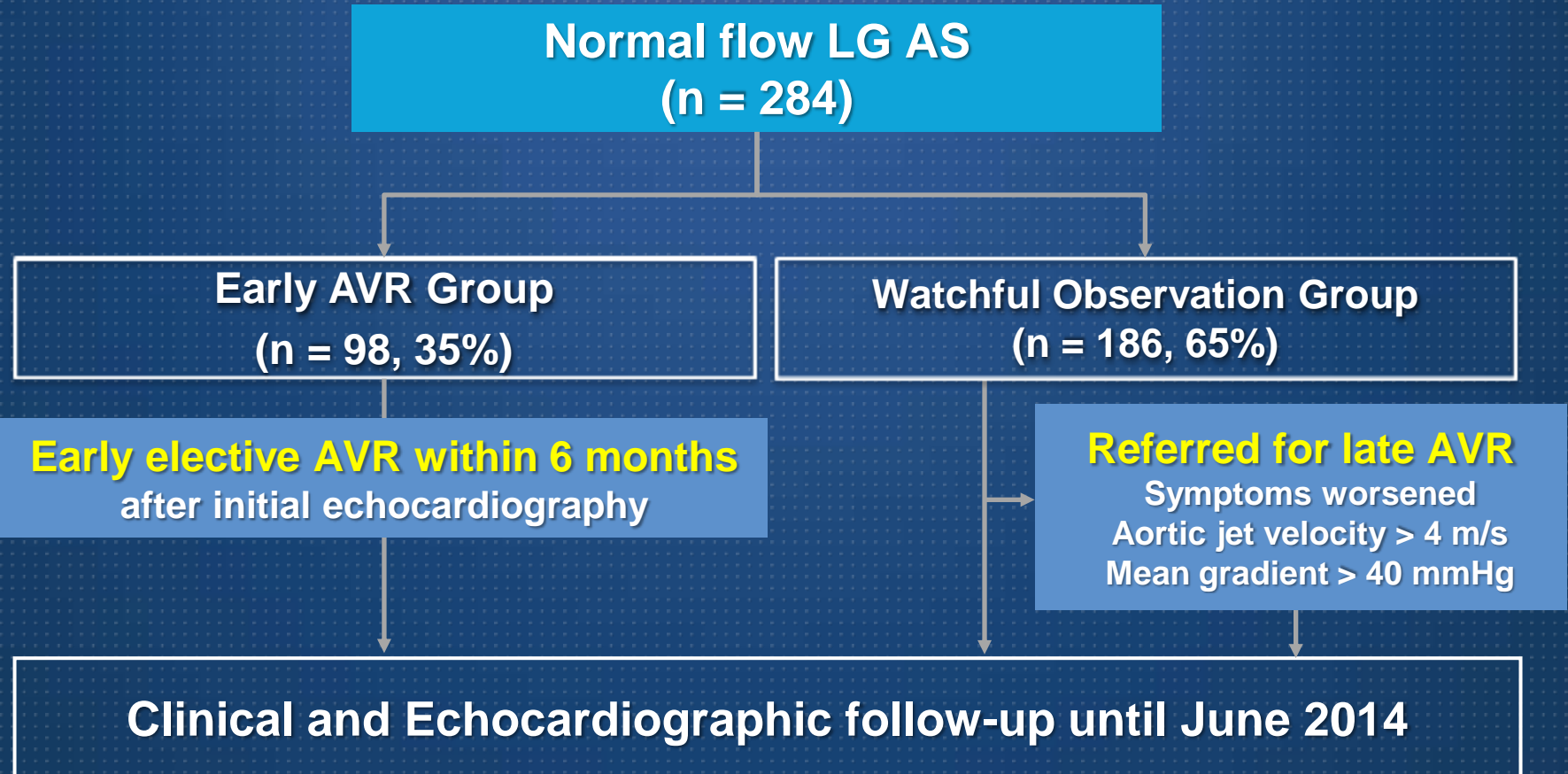
Dae Hee Kim, Jong-Min Song, Seung Woo Park,

Jae-Kwan Song, Jae Won Lee, Seung-Jung Park

Asan and Samsung Medical Center

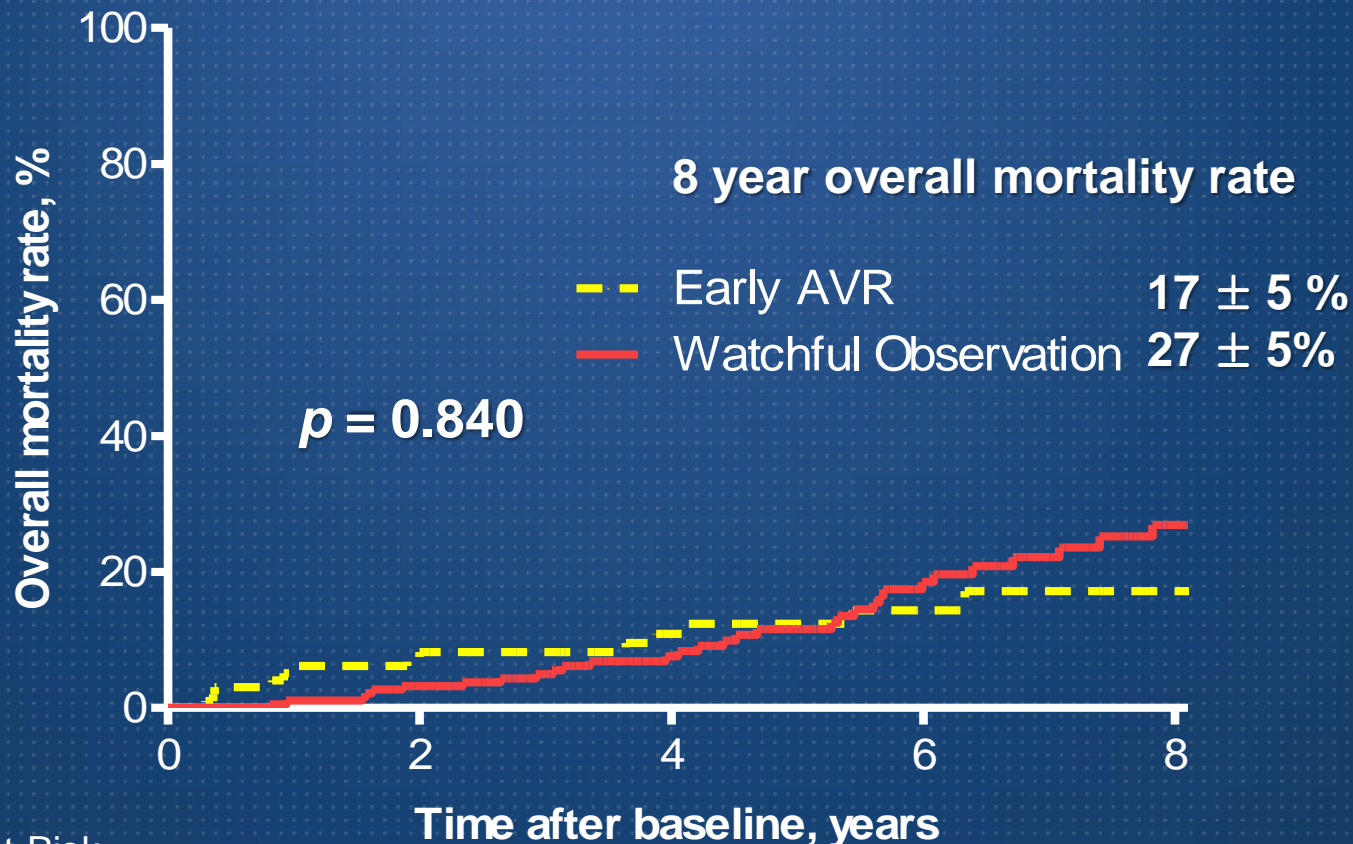
Seoul, Korea

Study Flow



Overall Mortality

Early AVR vs Watchful observation

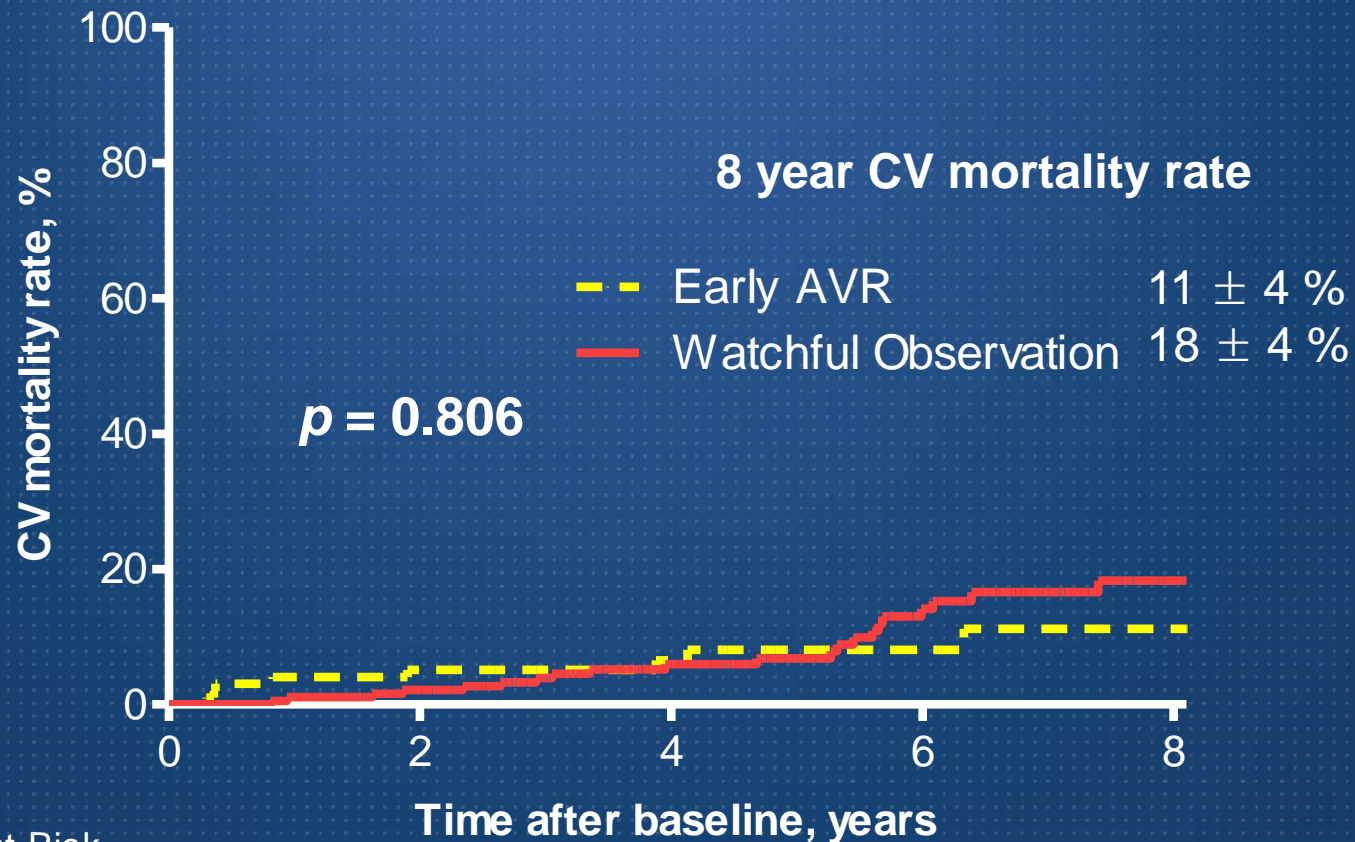


No. at Risk

Early AVR	98	90	64	38	22
Watchful Observation	186	178	123	74	39

Cardiovascular Mortality

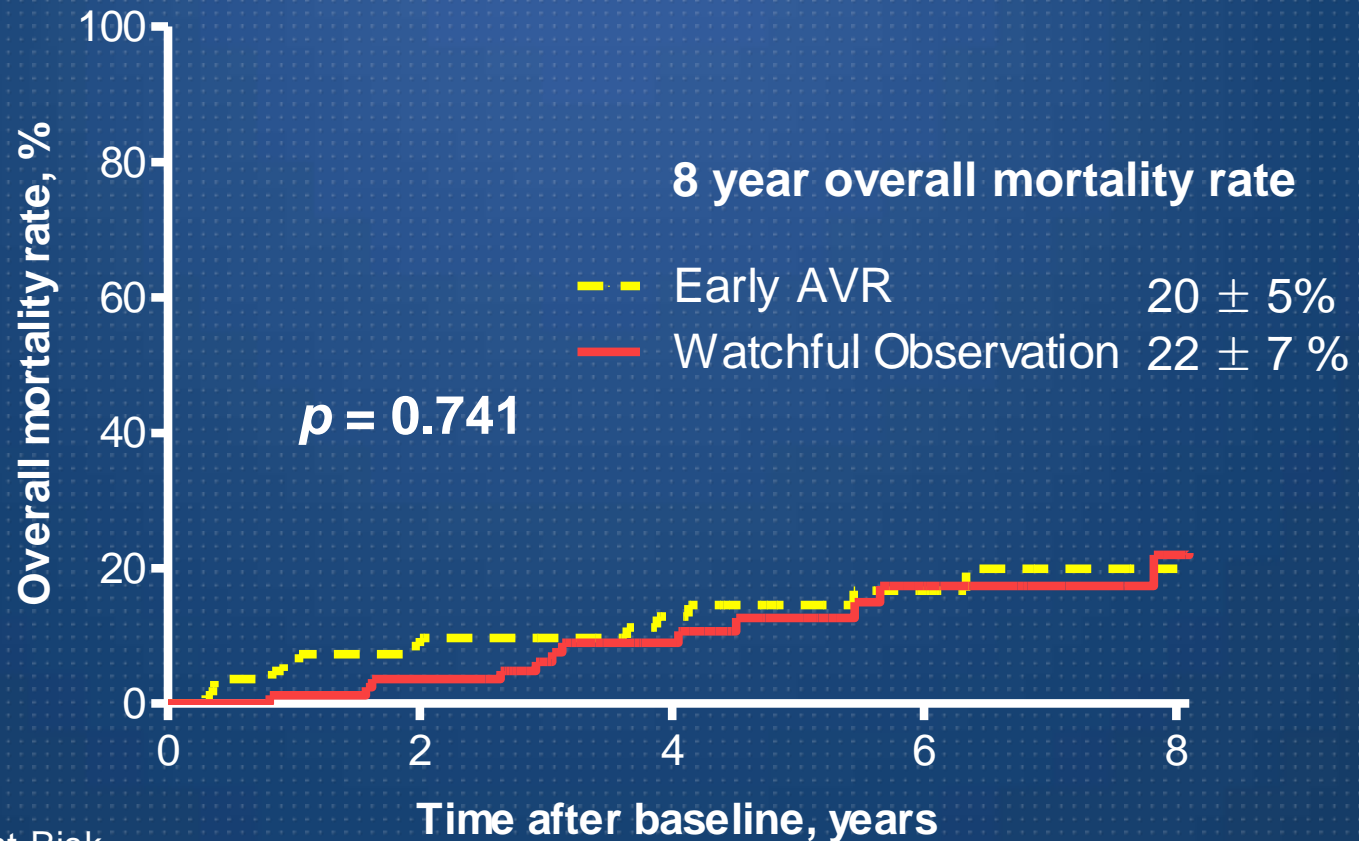
Early AVR vs Watchful observation



No. at Risk

Early AVR	98	90	64	38	22
Watchful Observation	186	178	123	74	39

Overall Mortality Propensity-matched Cohort



No. at Risk

Early AVR	83	75	54	34	21
Watchful Observation	83	80	54	30	16

Take Home Messages

- Flow-gradient pattern, AVA, EF, symptoms and operative risk should be considered in a decision for AVR in severe AS
- Clinical trials are required to evaluate benefit of AVR and optimal timing of AVR for LG severe AS
- Further studies are also needed to determine whether TAVR is superior to surgical AVR in low-flow LG severe AS