

Management of Asymptomatic Severe AS

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2014 AHA/ACC Guidelines

Severity of AS

Indicator	Mild	Moderate	Severe
Jet velocity (m/s)	2.0-2.9	3.0 - 3.9	≥ 4.0
Mean gradient (mmHg)	< 20	20 - 39	≥ 40
Valve area (cm ²)			≤ 1.0
Valve area index (cm ² /m ²)			≤ 0.6

Definition of Severe AS

Traditional Definition

Asymptomatic

Symptomatic
Severe AS

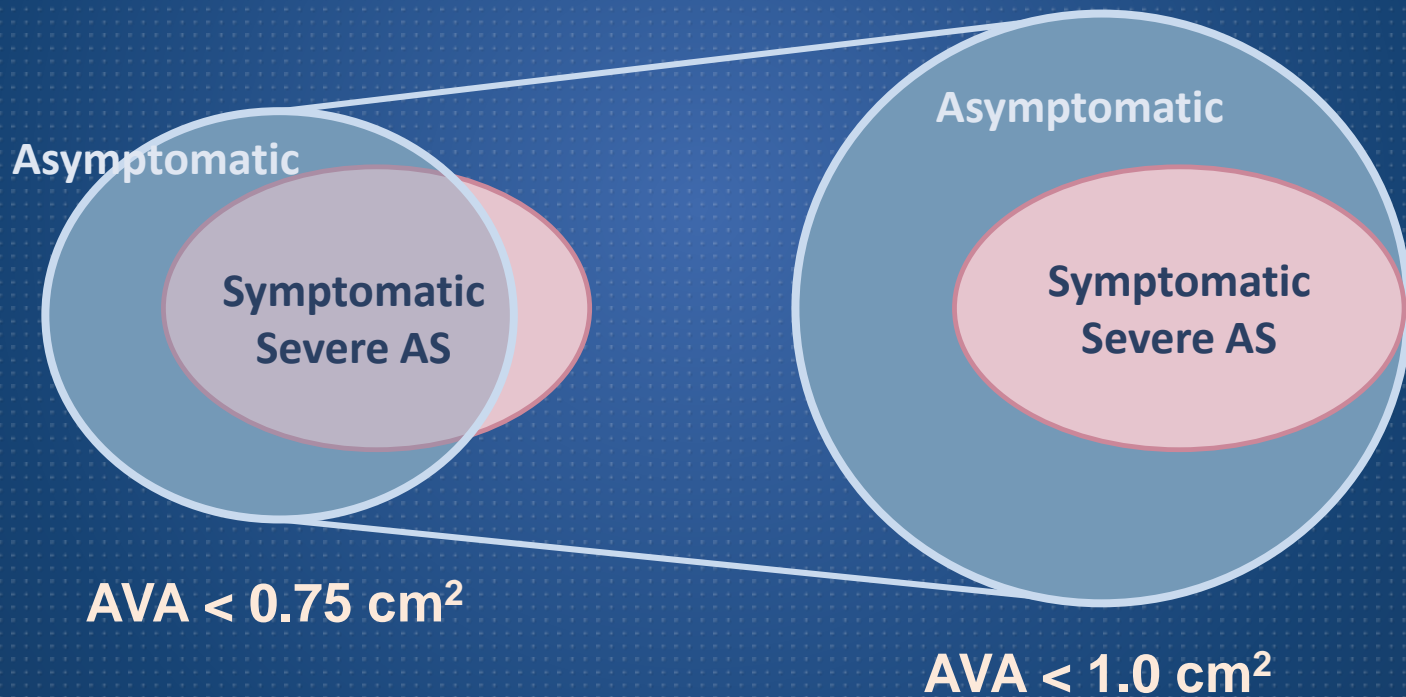
$AVA < 0.75 \text{ cm}^2$

2006 ACC/AHA Guidelines

Asymptomatic

Symptomatic
Severe AS

$AVA < 1.0 \text{ cm}^2$



Relation of AV Area to the Mean Pressure Gradient

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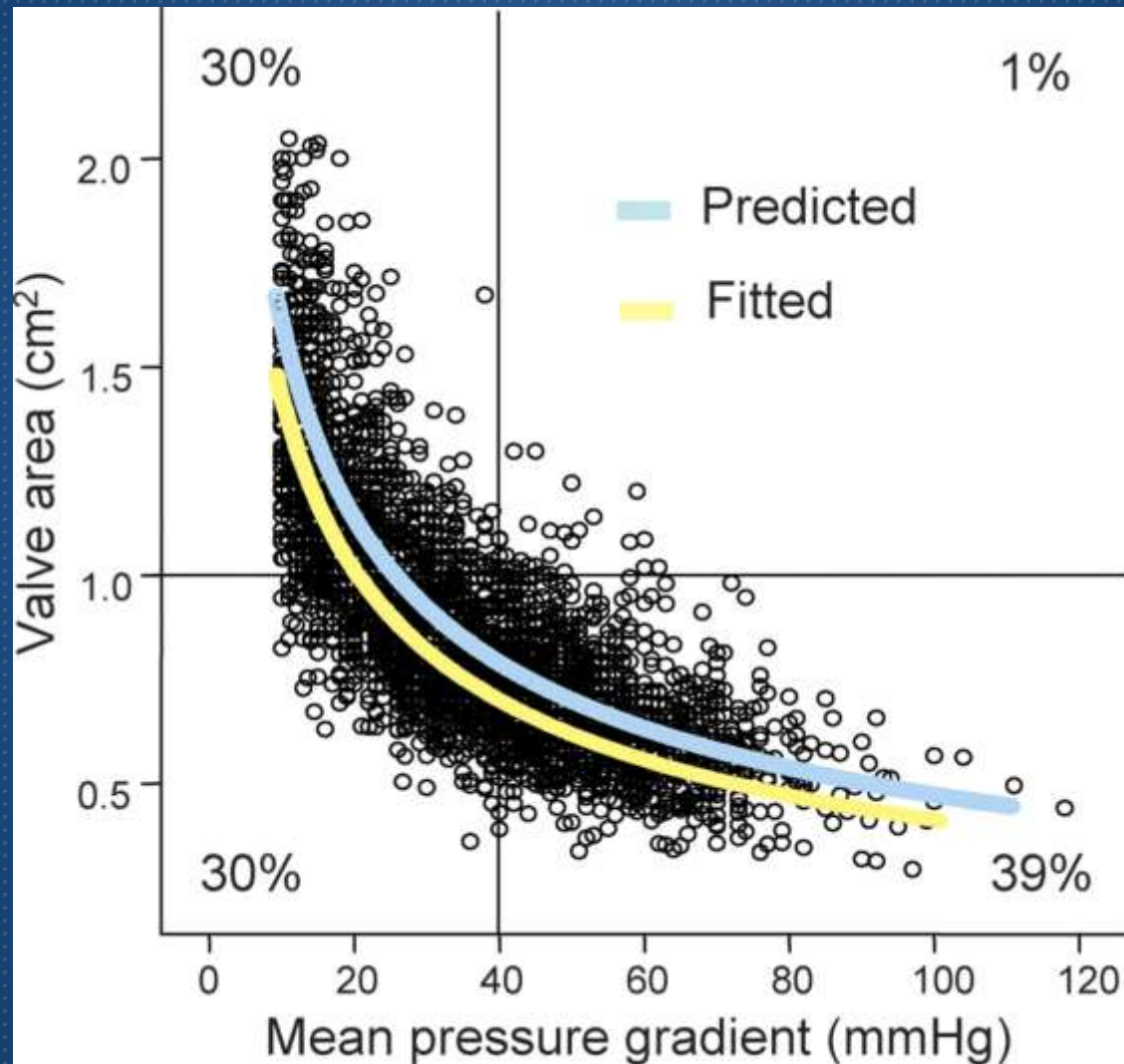
0.9	32
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0.8	41
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0.7	53
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0.6	73
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AV Area vs. Mean Pressure Gradient



Aortic Stenosis

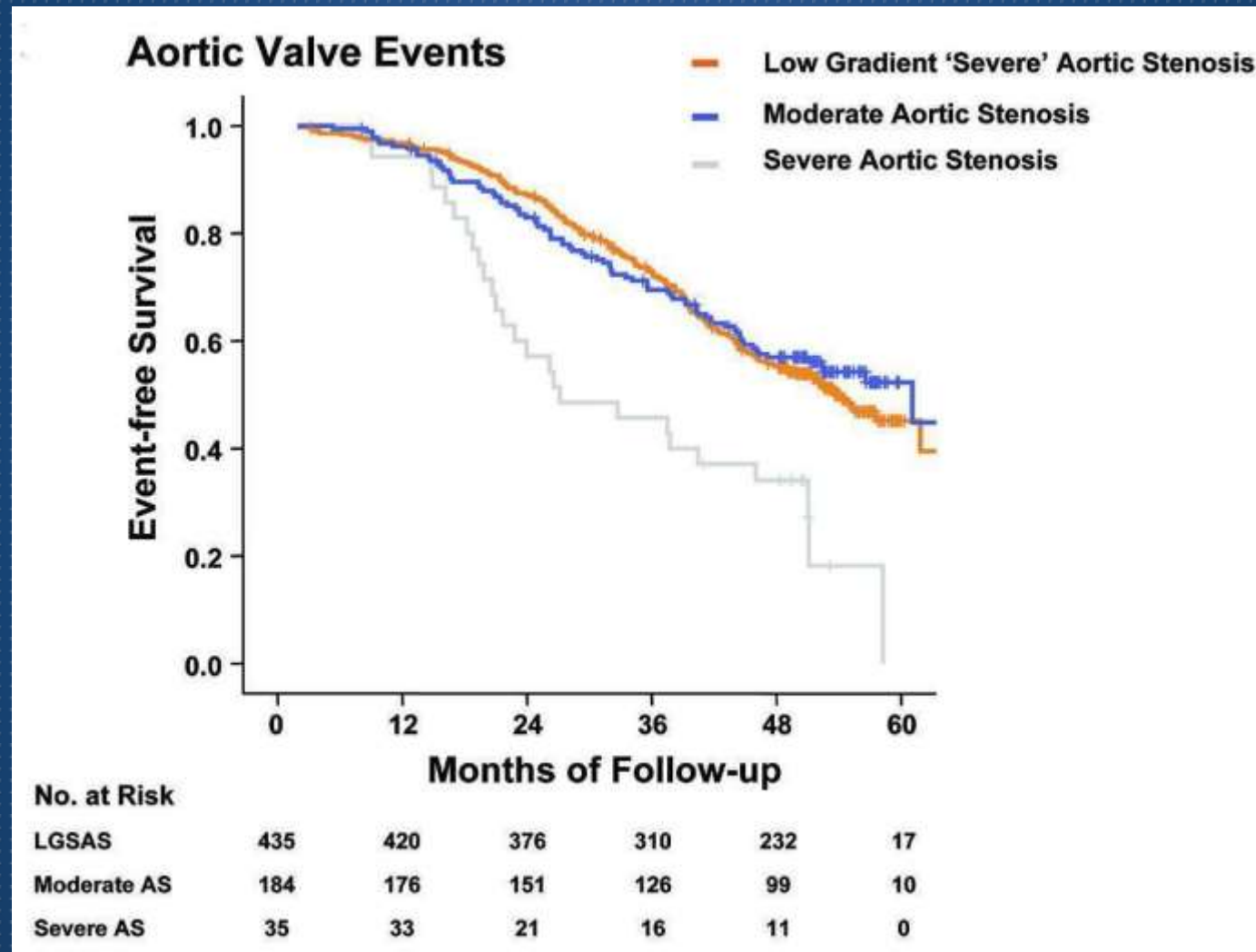
Low Gradient

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

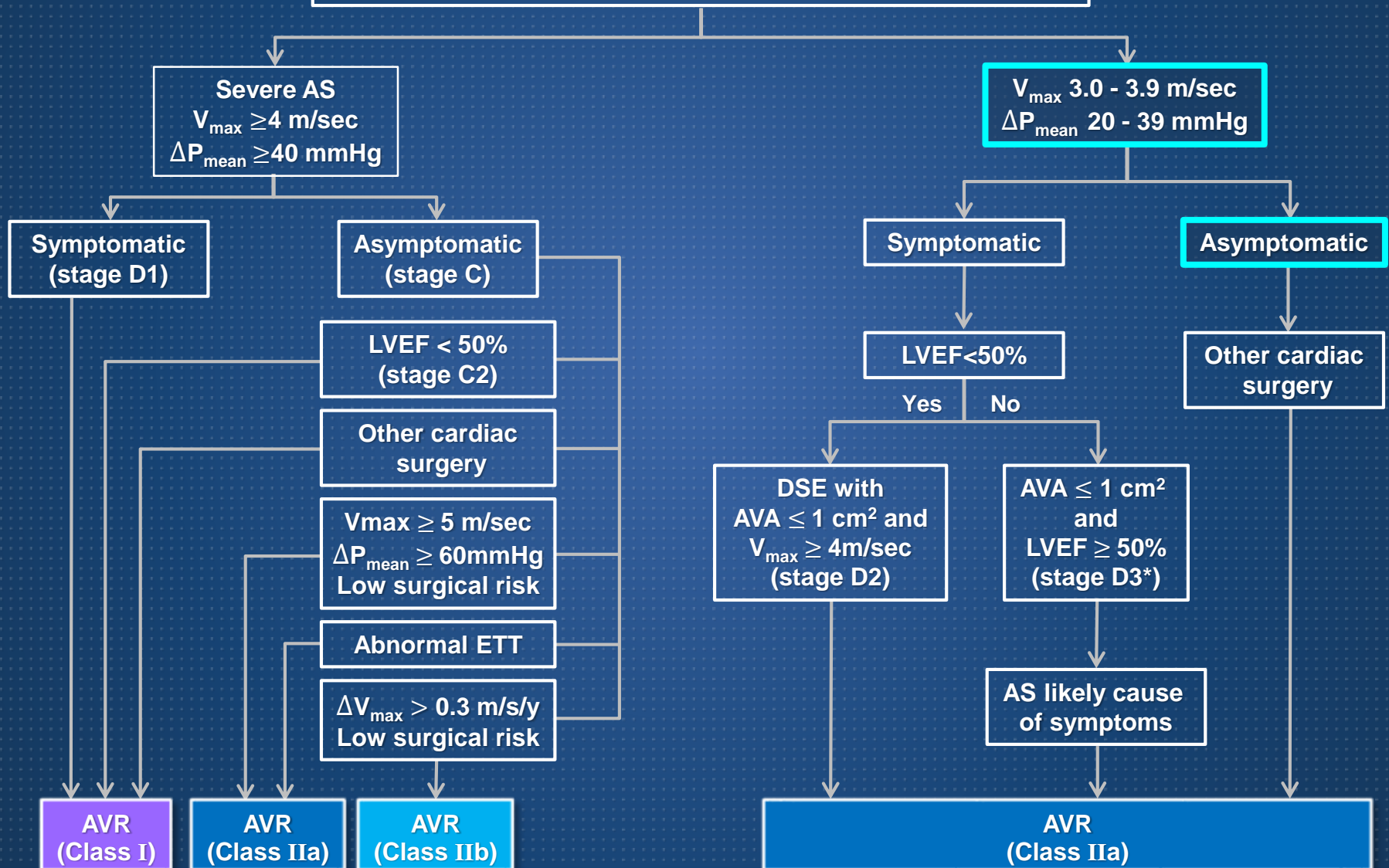
AV events*: CV death, AVR and CHF

Outcome in Low-Gradient "Severe" AS



2014 AHA/ACC Guideline: Aortic Stenosis

Abnormal AV with Reduced Systolic Opening

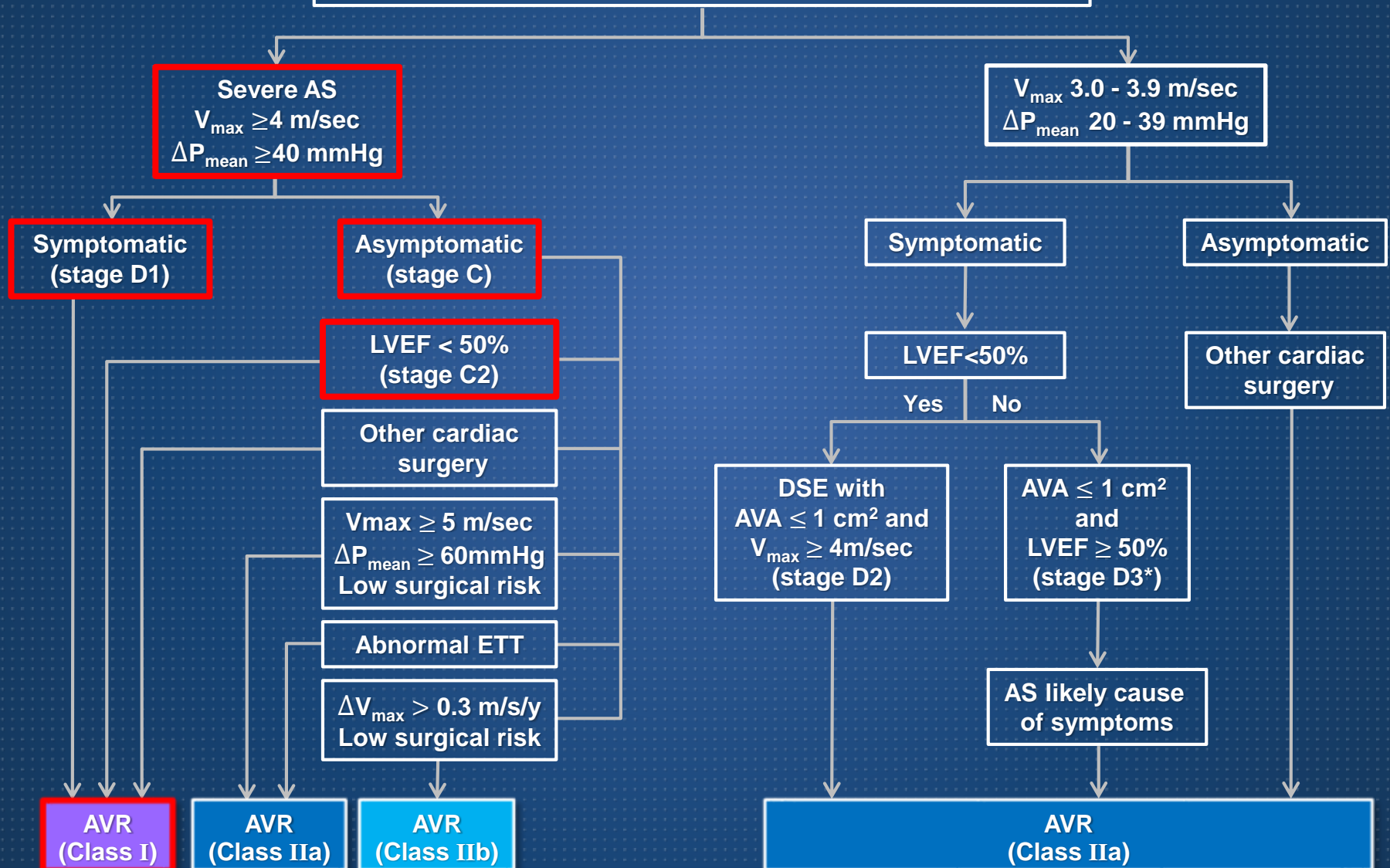


Aortic Stenosis

High Gradient

2014 AHA/ACC Guideline: Aortic Stenosis

Abnormal AV with Reduced Systolic Opening



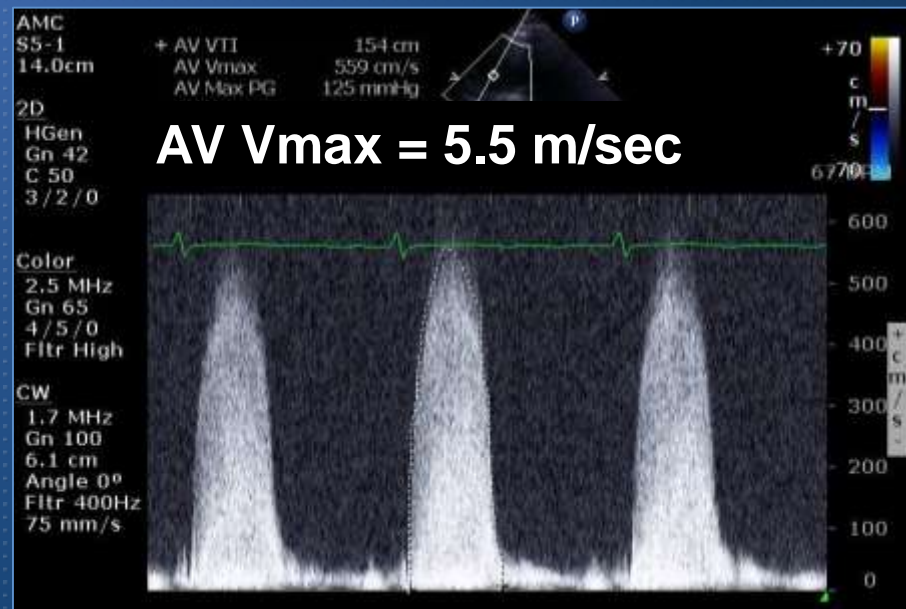
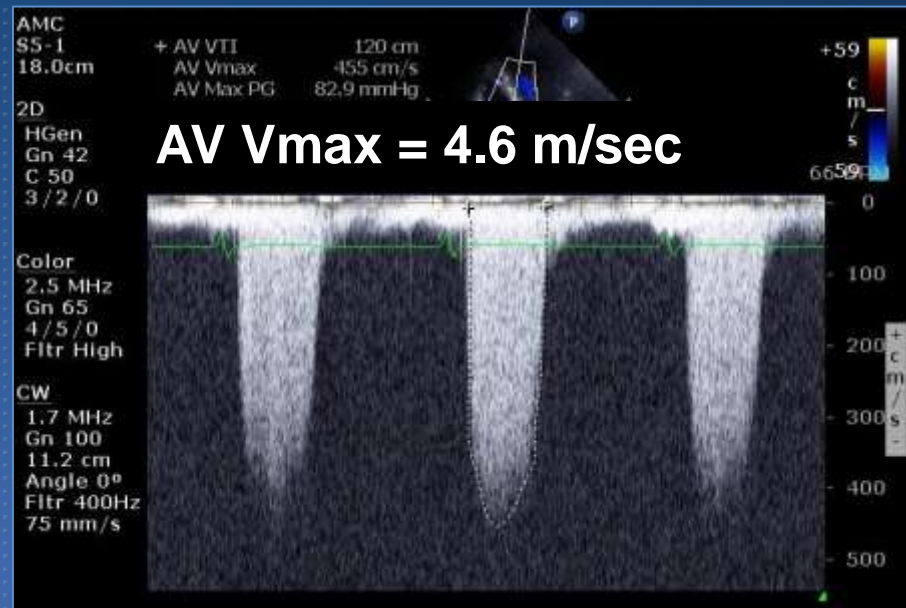
Case. Asymptomatic Severe AS

- *60 year-old female*
- *Referred from local clinic due to cardiac murmur*
- *No chest pain or dyspnea*
- *She regularly went to dance class without symptoms*

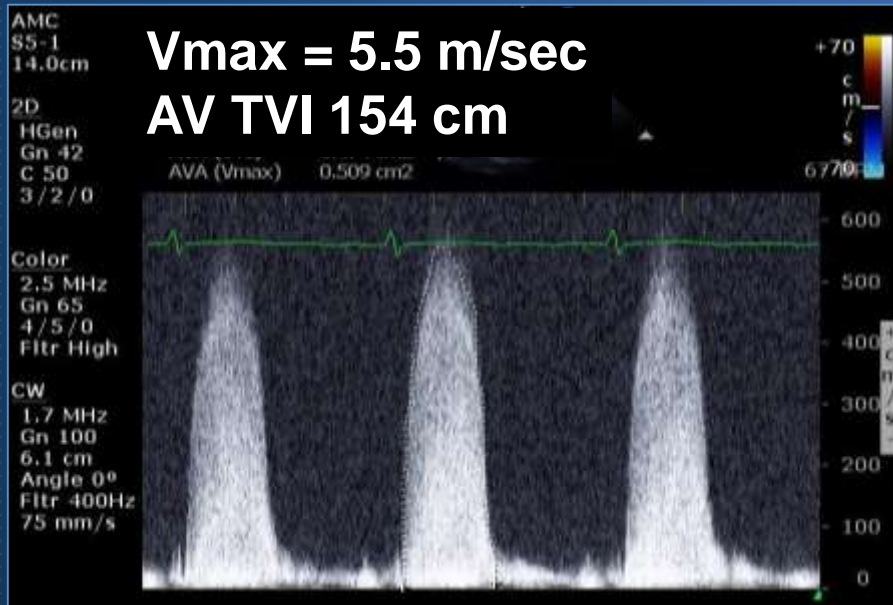
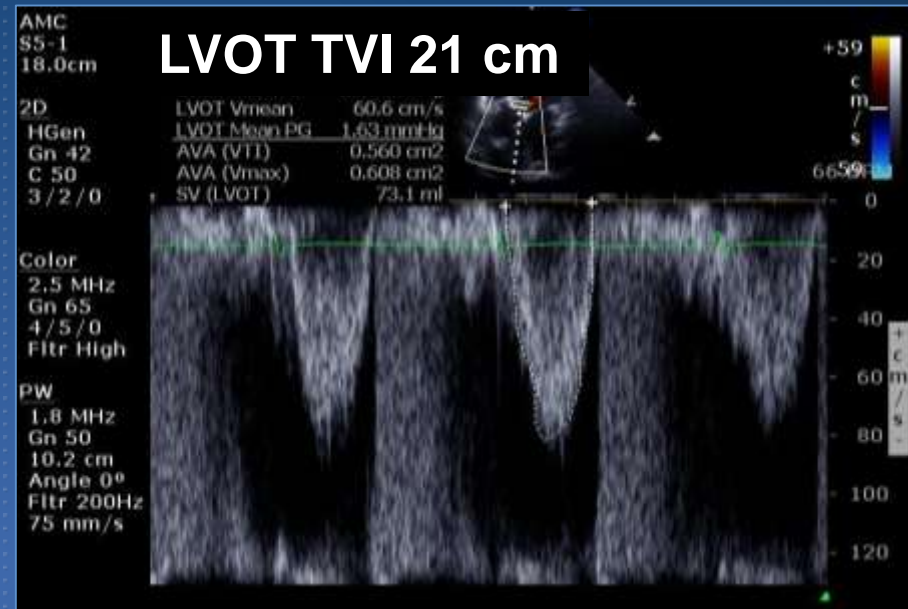
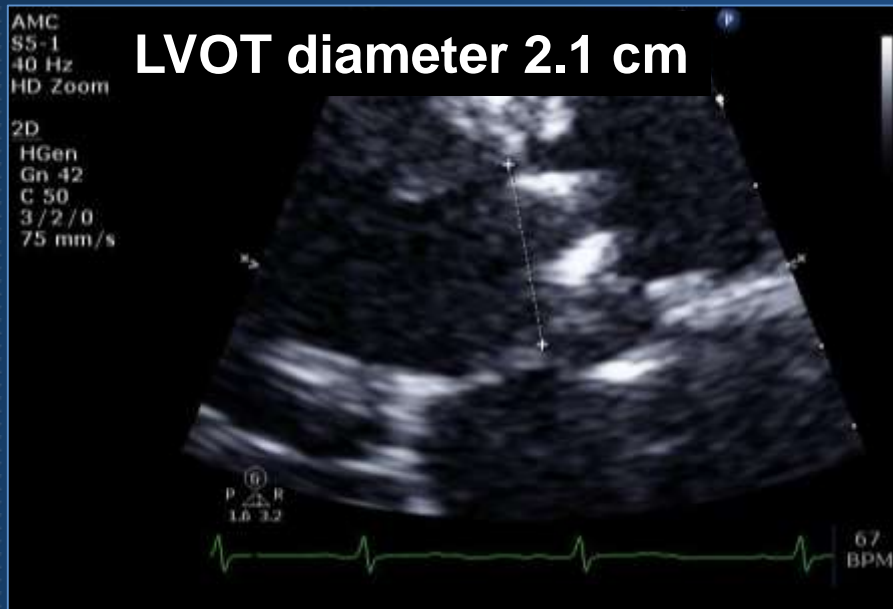
Case. Asymptomatic Severe AS



Case. Asymptomatic Severe AS



Case. Asymptomatic Severe AS



$$\begin{aligned}
 AVA &= \frac{0.785 \times (LVOT D)^2 \times LVOT TVI}{AV TVI} \\
 &= \frac{0.785 \times (2.1)^2 \times 21}{154} \\
 &= 0.47 \text{ cm}^2
 \end{aligned}$$

What will you recommend to this patient?

- 1) Watchful Waiting
- 2) Surgical Aortic Valve Replacement
- 3) Transcatheter AV Replacement (TAVR)

Dilemma of Early AVR

Balancing the real risks versus potential benefits of AV replacement in asymptomatic severe AS

Risks

- Operative mortality
- Prosthesis-related mortality and morbidity

Benefits

- Preventing sudden death
- Lowering cardiac mortality related with refusal and delay of surgery

Comparison of Early Surgery versus Conventional Treatment in Asymptomatic Very Severe Aortic Stenosis

**Duk-Hyun Kang, Sung-Ji Park*, Ji Hye Rim,
Dae-Hee Kim, Jong-Min Song, Kee-Joon Choi,
Seung Woo Park*, Jae-Kwan Song,
Jae-Won Lee, Pyo-Won Park***

**Division of Cardiology, Cardiac Surgery
Asan Medical Center, Samsung Medical Center*
Seoul, South Korea**

Echocardiographic Evaluation

- Etiology of AS and grading of AV calcification on 2D echo
- Maximal aortic jet velocity, mean pressure gradients and aortic valve area on Doppler
- **Very severe aortic stenosis**
AV area $\leq 0.75 \text{ cm}^2$ fulfilling one of criteria; peak aortic velocity $\geq 4.5 \text{ m/sec}$ or mean pressure gradient $\geq 50 \text{ mmHg}$

Definition of Severe AS

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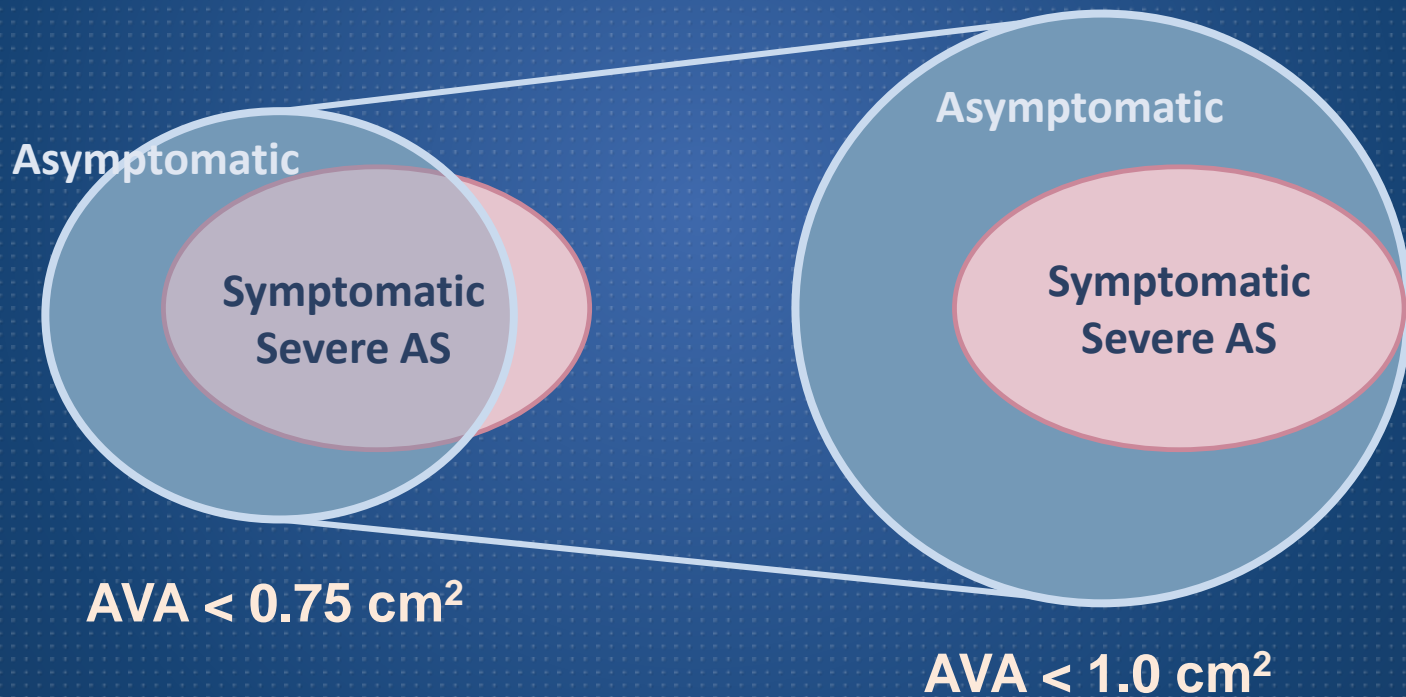
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2006 ACC/AHA Guidelines

Asymptomatic

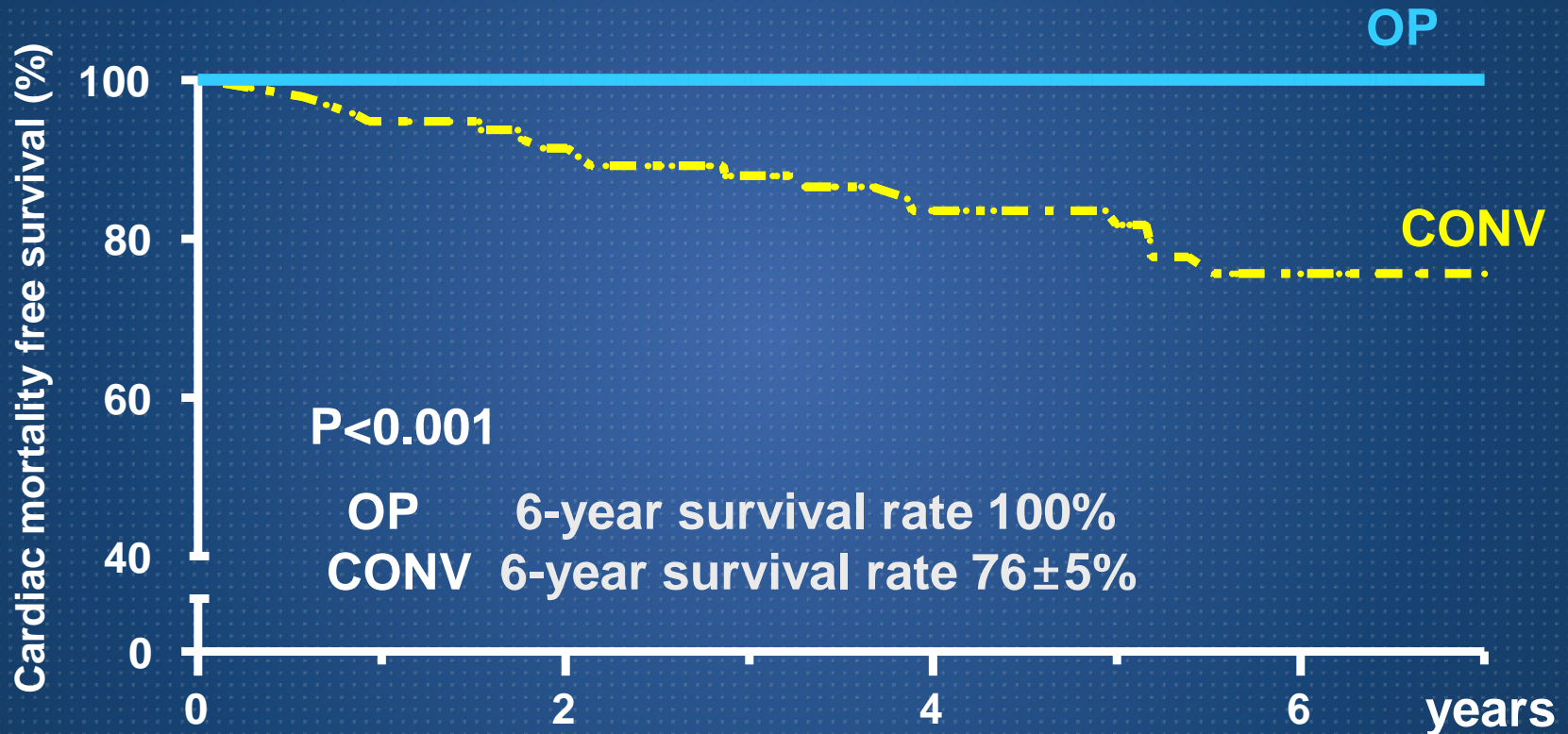
Symptomatic
Severe AS

$AVA < 1.0 \text{ cm}^2$



Survival Free of Cardiac Death

OP versus CONV group



No at Risk

OP	102	96	48	29
CONV	95	82	54	32

Conclusions

- Early surgery is associated with improved long-term survival by decreasing cardiac mortality and sudden cardiac death in very severe AS
- A prospective randomized trial is required to confirm the efficacy of early surgery

Summary of Debate in 2012

- **Watchful waiting** for the majority of asymptomatic patients with severe AS
- **High risk patients with AVA < 0.8 cm²** may benefit from **preemptive AVR** in selected centers with excellent operative outcomes

Initial Surgical versus Conservative Strategies in Patients with Asymptomatic Severe Aortic Stenosis

CURRENT AS Registry

**Retrospective, multicenter registry enrolled 1808
asymptomatic severe AS patients in 27 Japanese centers
between 2003 and 2011**

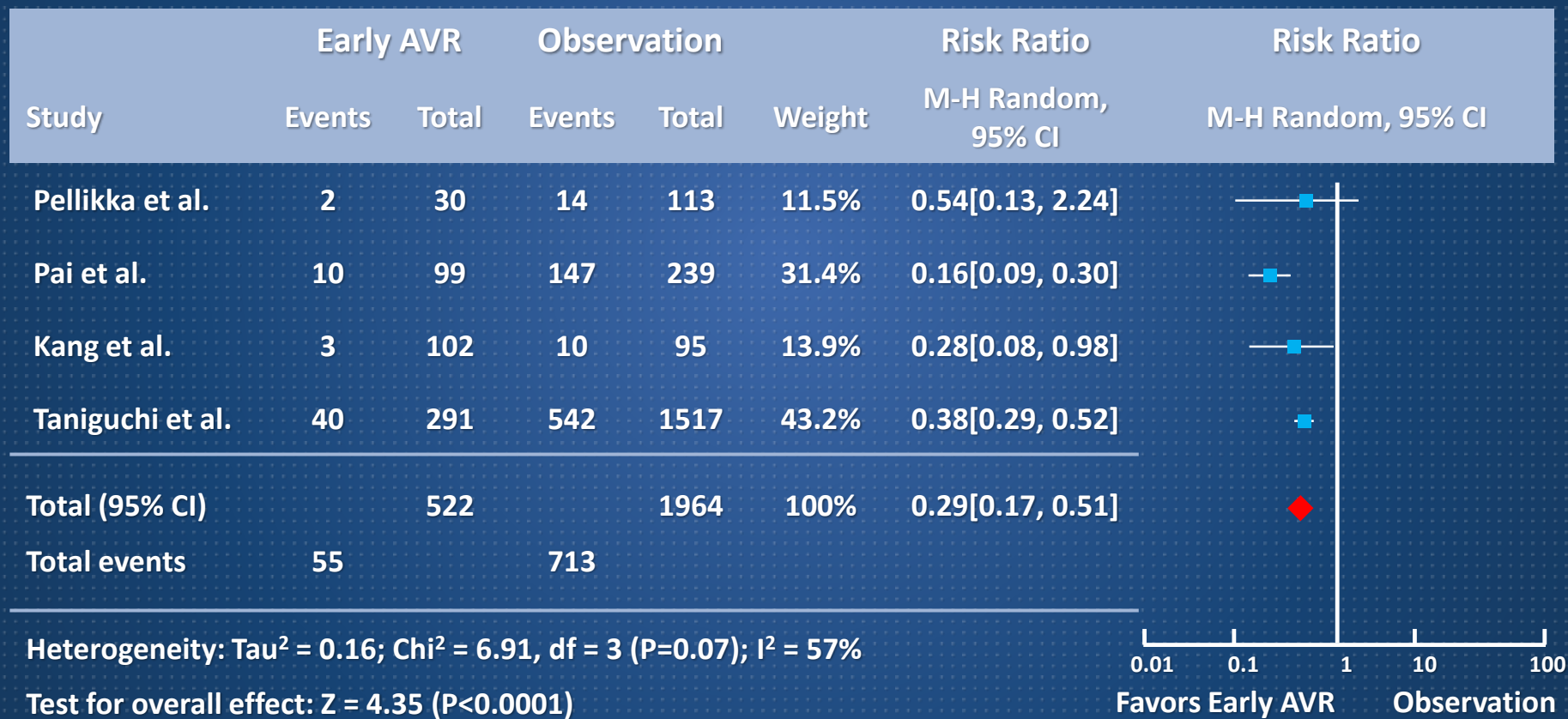
Incidence of Events at 5 Years

Propensity-matched Cohort

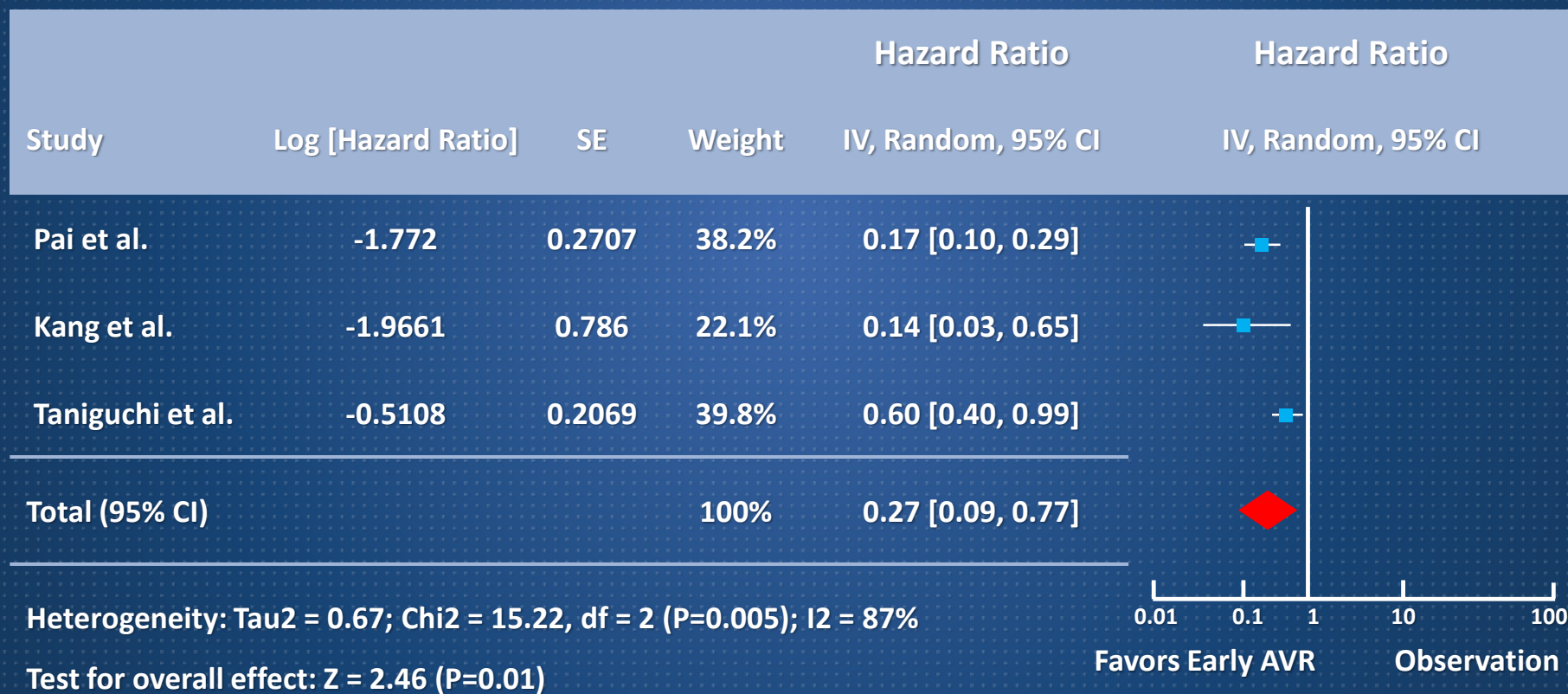
	Initial AVR Group	Conservative Group	P value
Number	291	291	
Age, years	71.6±8.7	73.1±9.3	0.047
High gradient AS	243 (84%)	179 (62%)	< 0.001
All-cause Death	40 (15%)	69 (26%)	0.009
Cardiovascular Death	25 (10%)	46 (19%)	0.01
AV related Death	13 (5%)	33 (14%)	0.003
HF Hospitalization	10 (4%)	50 (20%)	< 0.001

Unadjusted All-cause Mortality

Early Surgical AVR versus Observation



Adjusted All-cause Mortality Early Surgical AVR versus Observation



Limitations of meta-analysis

- Residual confounding and selection bias
- Patients in conservative group were older and sicker; refusal of AVR in 31% during follow-up
- Prospective randomized clinical trials comparing AVR to conservative treatment is warranted

Aortic Valve replacement versus conservative Treatment in Asymptomatic severe Aortic Stenosis (AVATAR)

12 Clinical Sites

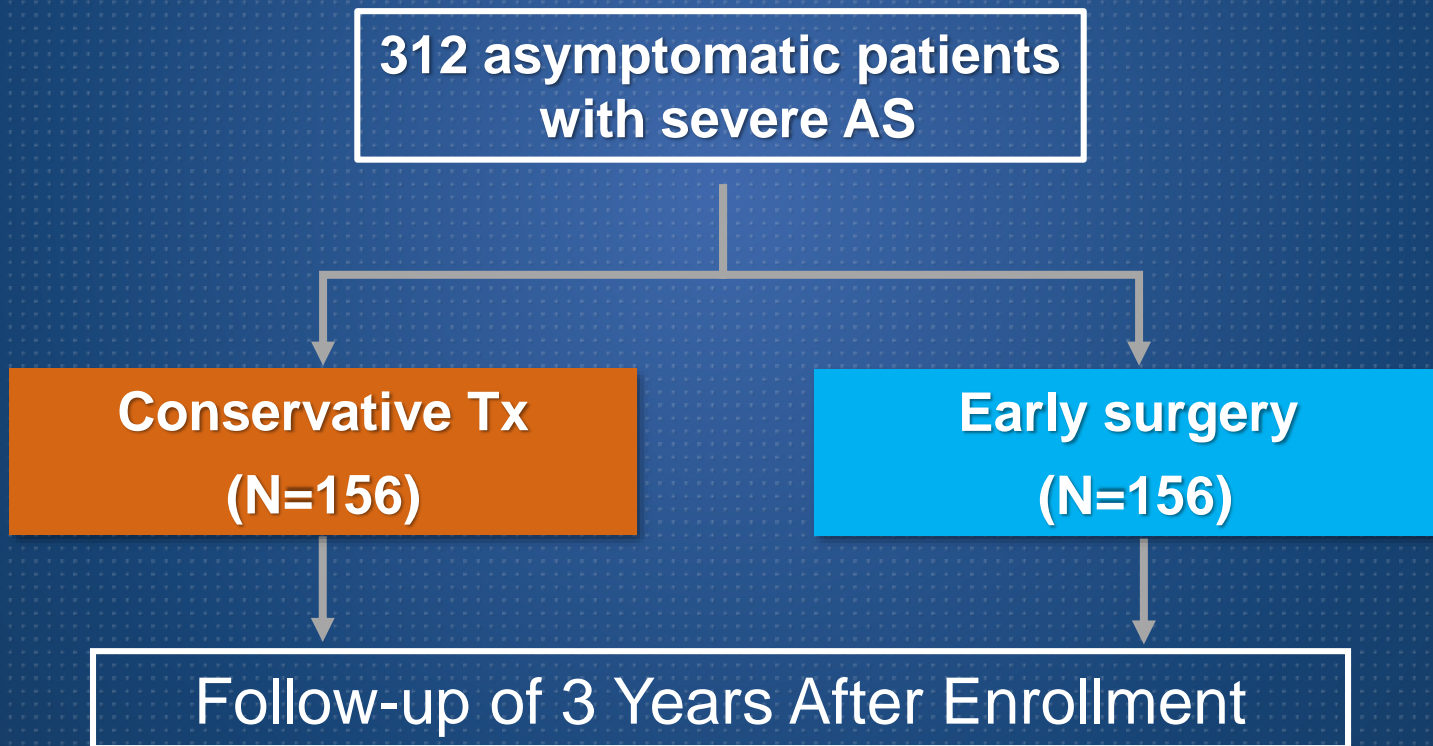
**Belgium, Croatia, Czech Republic, France,
Ireland, Lithuania, Poland, Serbia**

Methods

- **Primary End Point:**
Composite of all-cause death, AMI, stroke and CHF hospitalization
- **Secondary End Point:**
Operative mortality, repeat AV surgery, major bleeding and thromboembolic complications

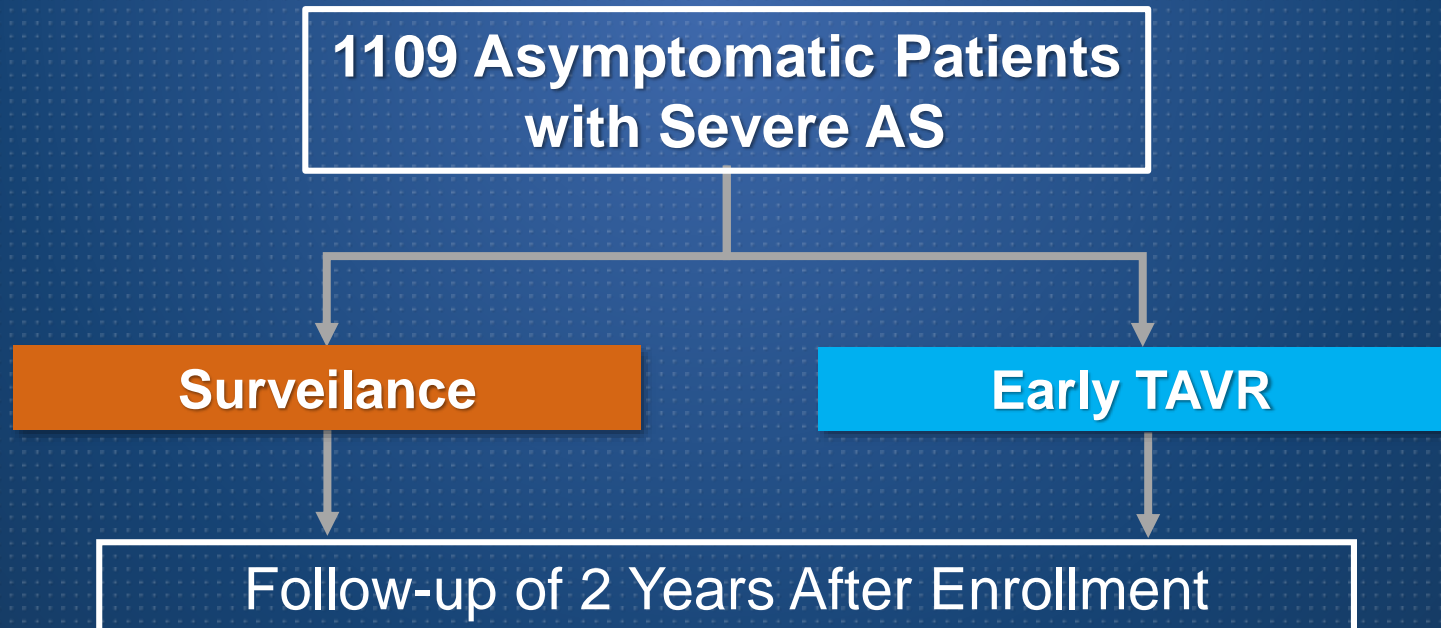
Methods

From 2015 to 2020



Evaluation of Transcatheter Aortic Valve Replacement Compared to Surveillance for Patients with Asymptomatic Severe Aortic Stenosis (EARLY TAVR)

From 2017 to 2021

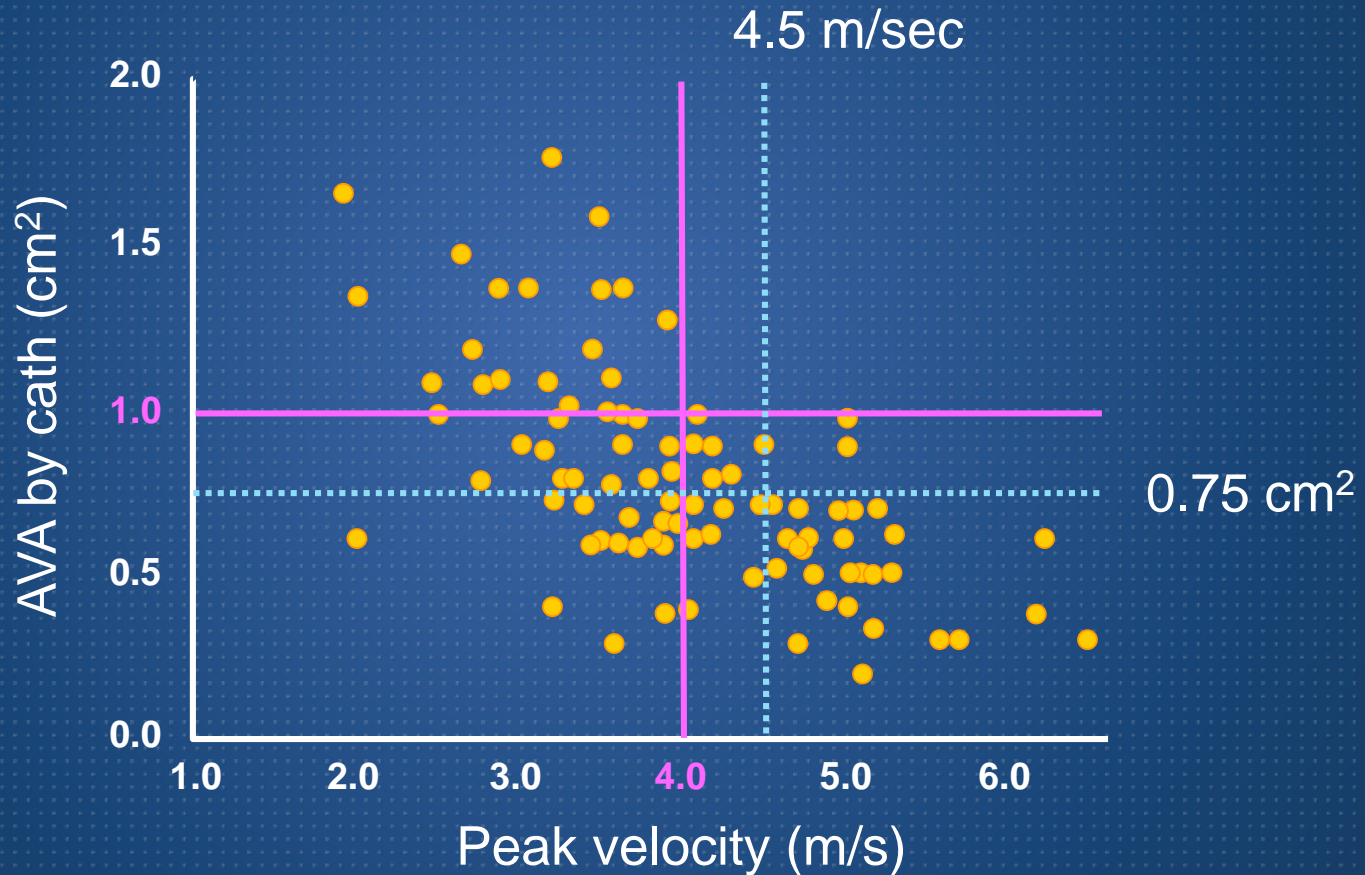


Randomized Comparison of Early Surgery versus COventional Treatment in Asymptomatic VERY Severe Aortic Stenosis (RECOVERY)

**Duk-Hyun Kang, Sung-Ji Park*, Geu-Ru Hong⁺,
Sahmin Lee, Dae-Hee Kim, Hyung-Kwan Kim,
Jong-Min Song, Seung Woo Park*, Jae-Kwan Song,
Jae-Won Lee, Pyo-Won Park***

**Division of Cardiology, Cardiac Surgery
AMC, SMC*, SNUH, YUH⁺
Seoul, South Korea**

AV area and Peak velocity

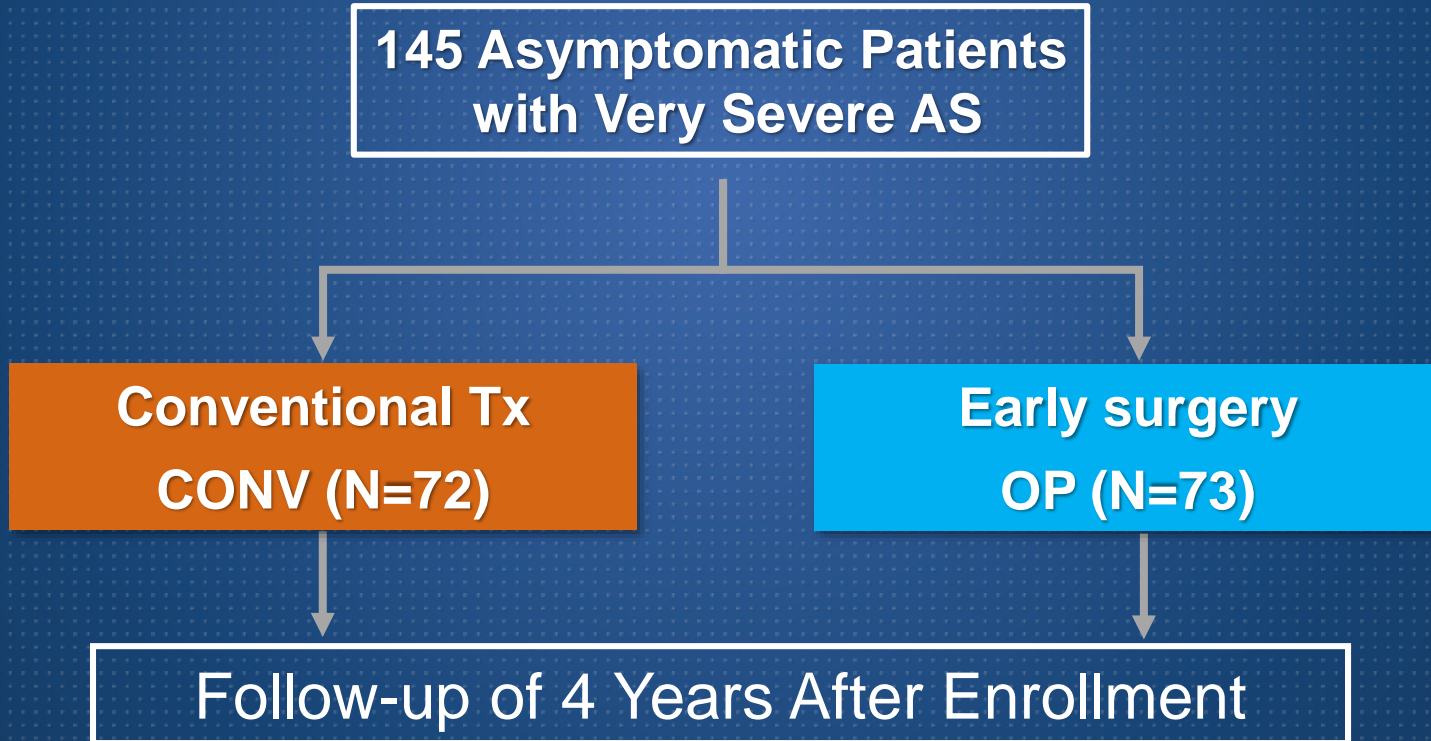


Methods

- **Primary End Point:**
Composite of operative mortality, cardiac death and prosthesis related mortality during follow-up for 4 years
- **Secondary End Point:**
All-cause mortality during follow-up

Methods

From 2010 to April, 2019



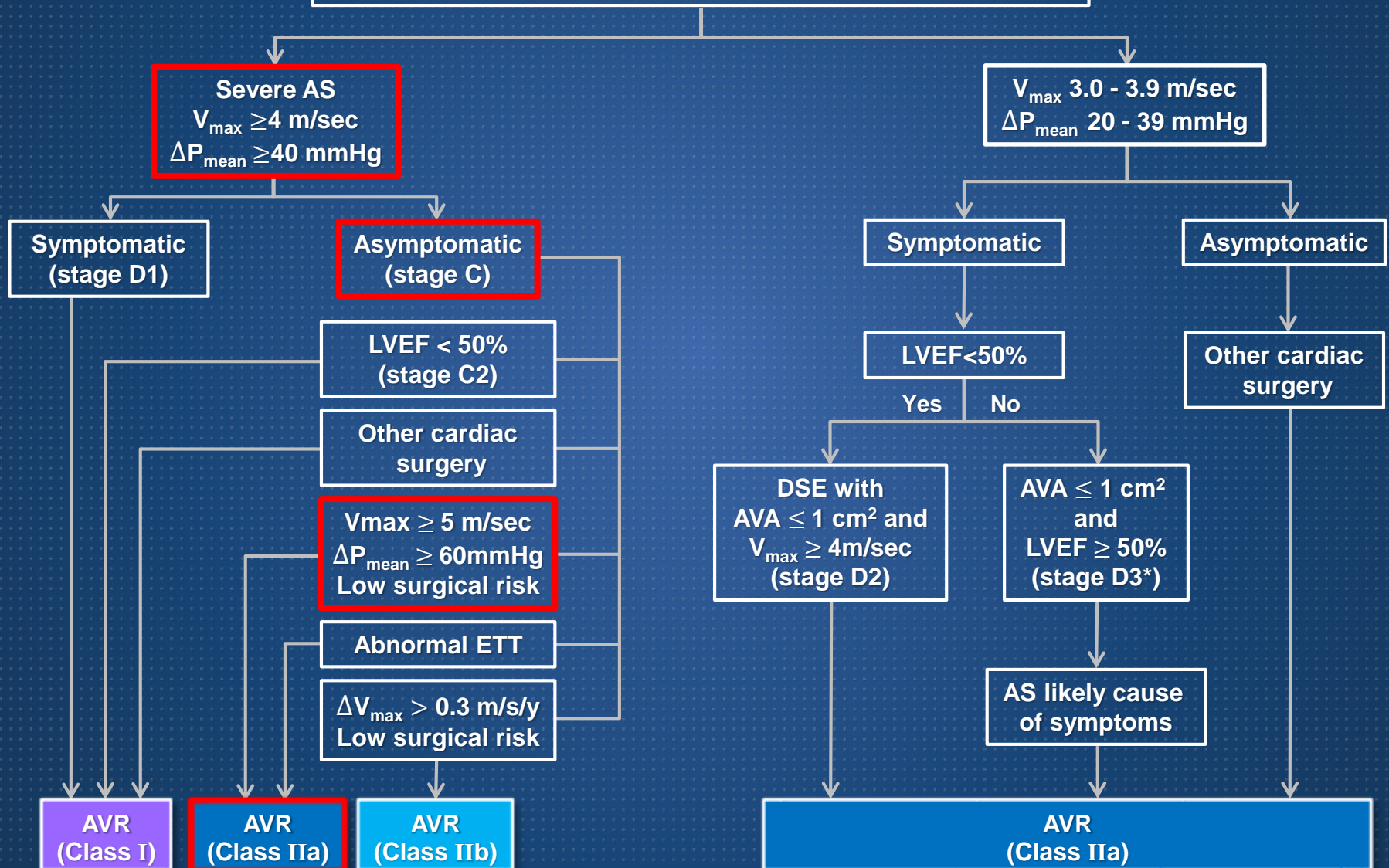
Randomized Trial of **E**arly Surgery Versus **C**onventional Treatment for Asymptomatic **VERY** Severe Aortic Stenosis *(RECOVERY)*

2019 ESC Late Breaking Trial Session

Duk-Hyun Kang, MD, PhD
on behalf of The RECOVERY Trial Investigators
Asan Medical Center, Seoul, Korea

2014 AHA/ACC Guideline: Aortic Stenosis

Abnormal AV with Reduced Systolic Opening



Take Home Messages

- Watchful waiting for the majority of asymptomatic patients with severe AS
- Patients with very severe AS may benefit from preemptive AVR in selected centers with excellent operative outcomes
- Ultimately, a randomized trial will solve the debate between early AVR and watchful observation