

Early Surgery versus Conventional Management for Asymptomatic Severe Aortic Stenosis

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on behalf of the RECOVERY Investigators

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Introduction

- Although aortic valve replacement (AVR) is the only effective therapy for symptomatic severe aortic stenosis (AS), optimal timing for AVR in *asymptomatic* severe AS remains controversial
- In asymptomatic patients, the potential benefit of preventing sudden death may not be greater than the risk of AVR
- Watchful observation is recommended for the majority of asymptomatic patients, with AVR planned once symptoms develop
- Recent advances in surgery may change the risk-to-benefit ratio



Method: Study Design and Patients

RECOVERY A prospective, multicenter, open-label, randomized trial to compare long-term clinical outcomes of early surgical AVR vs. conservative management in asymptomatic pts with very severe AS

Inclusion	Exclusion
<ul style="list-style-type: none">▪ Age 20-80 years	<ul style="list-style-type: none">▪ Presence of symptoms (exertional dyspnea, syncope, or angina)
<ul style="list-style-type: none">▪ Very severe AS (defined as $AVA \leq 0.75 \text{cm}^2$ with peak aortic jet velocity $\geq 4.5 \text{m/s}$ or mean trans-aortic gradient $\geq 50 \text{mmHg}$)	<ul style="list-style-type: none">▪ LV ejection fraction $< 50\%$▪ Significant aortic regurgitation▪ Significant mitral valve disease
<ul style="list-style-type: none">▪ Candidates for early surgery	<ul style="list-style-type: none">▪ Previous cardiac surgery
<ul style="list-style-type: none">▪ Informed consent	<ul style="list-style-type: none">▪ Positive exercise test

Method: Study Procedures

- Patients were randomly assigned on a 1:1 basis to early surgery or conventional treatment using a Web-based interactive response system
- **In the early surgery group**, AVR should be performed within 2 months of randomization
- **Patients in the conventional treatment group** were treated according to the current guidelines and referred for AVR if they became symptomatic, LV EF < 0.50 or an increase in peak aortic velocity > 0.5 m/s per year

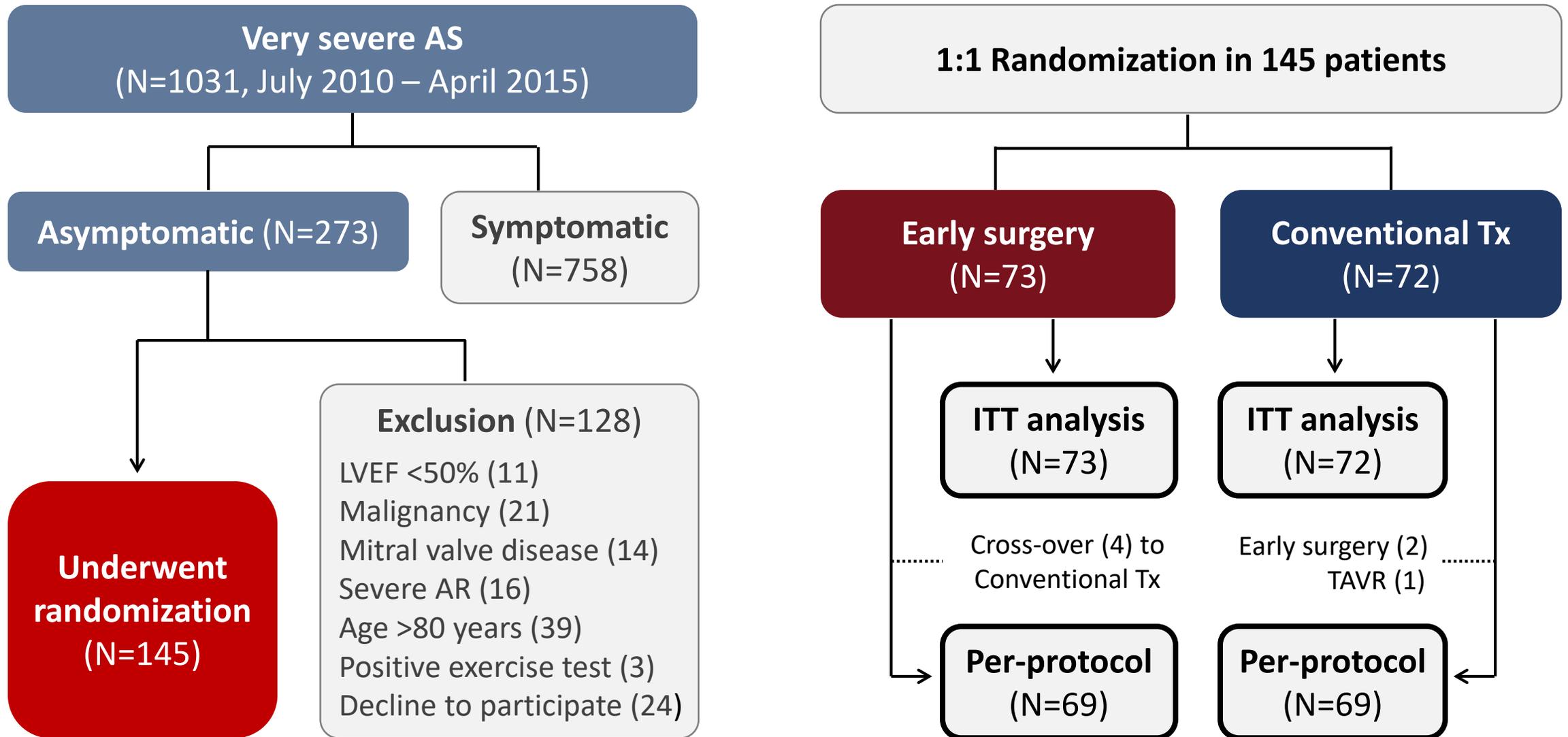
Method: Endpoints

Hypothesis Early surgery would reduce the risk of cardiovascular mortality as compared with conservative management

End point	Sample size
<ul style="list-style-type: none">▪ Primary end point*<ul style="list-style-type: none">- Operative mortality- Cardiovascular death▪ Secondary end point*<ul style="list-style-type: none">- All-cause death- Repeat aortic valve surgery- Clinical thromboembolic event- Hospitalization for CHF	<ul style="list-style-type: none">▪ Assumptions<ul style="list-style-type: none">- Event rate of 2% in early surgery vs. 16% in conventional group during minimum follow-up of 4 years (<i>Kang DH et al. Circulation 2010</i>)- 80% Power at 2-sided significance level of 0.05▪ Estimated sample N=144

*occurred during 4-year follow-up period after enrollment of the last patient

Results: Study Flow



Results: Baseline Characteristics

Patient characteristics			Echocardiographic Findings		
	Conventional (n=72)	Early AVR (n=73)		Conventional (n=72)	Early AVR (n=73)
Age (years)	63±11	65±8	Peak AV jet velocity (m/s)	5.0±0.4	5.1±0.5
Male	34 (47%)	37 (51%)	Mean AV PG (mmHg)	63±12	64±14
Diabetes	7 (10%)	13 (18%)	Aortic valve area (cm ²)	0.64±0.09	0.63±0.09
Hypertension	39 (54%)	40 (55%)	LV mass index (g/m ²)	134±31	136±38
Coronary disease	1 (2%)	5 (7%)	LV ejection fraction (%)	65±4	65±5
Previous stroke	3 (4%)	3 (4%)	Cause of AS		
Atrial fibrillation	6 (8%)	3 (4%)	Bicuspid	39 (54%)	49 (67%)
Creatinine (mg/dl)	0.8±0.2	0.8±0.2	Degenerative	26 (36%)	22 (30%)
EuroSCORE II (%)	0.9±0.4	0.9±0.3	Rheumatic	7 (10%)	2 (3%)

Results: AVR Procedures

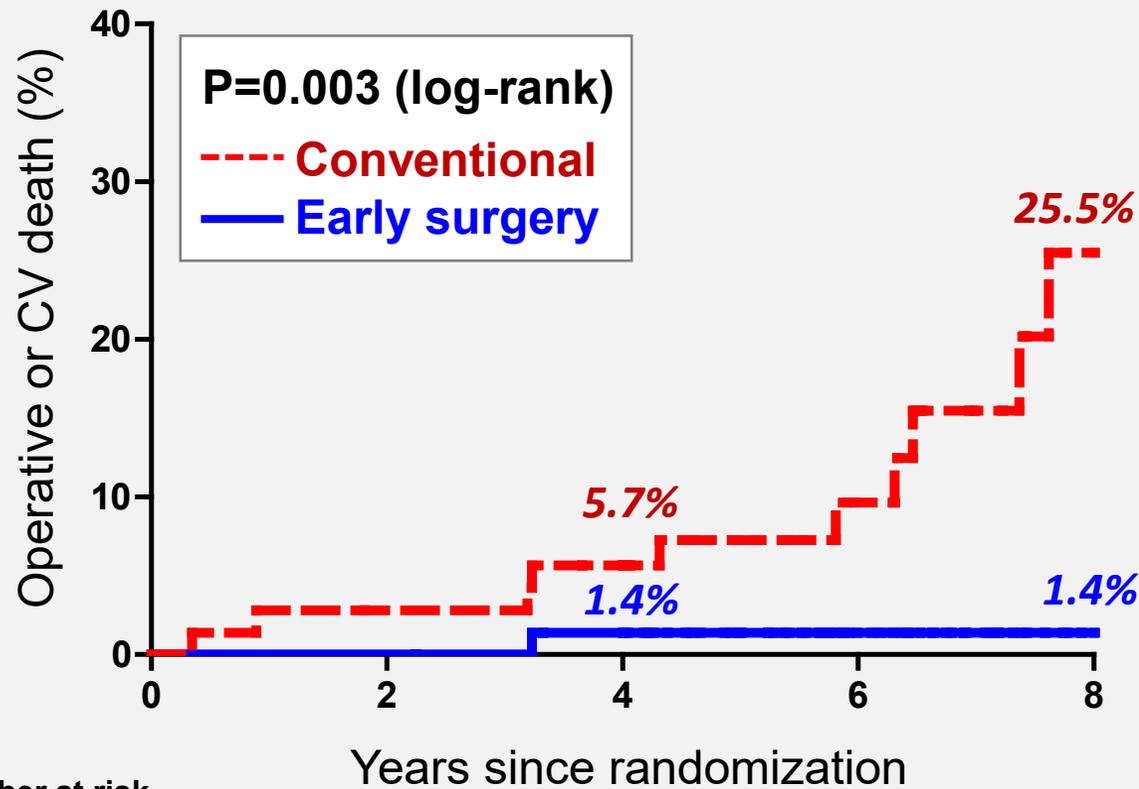
	Conventional Treatment (n=72)	Early Surgery (n=73)
Performance of AVR	53 (74%)	72 (99%)
Early surgery	2 (4%)	69 (96%)
Urgent surgery	9 (17%)	0 (0%)
Mechanical prosthesis	21 (40%)	36 (50%)
CABG	1 (2%)	5 (7%)
Replacement of aorta	8 (15%)	7 (10%)
Operative mortality	0 (0%)	0 (0%)
Stroke	0 (0%)	1 (1%)
Myocardial infarction	1 (2%)	0 (0%)
Reoperation	0 (0%)	0 (0%)

Results: End Points

	Conventional	Early surgery	Hazard ratio	P value
Primary end point (Operative or CV death)	11 (15.3%)	1 (1.4%)	0.09 (0.01-0.67)	0.003
Secondary end point				
▪ All-cause mortality	15 (20.8%)	5 (6.8%)	0.33 (0.12-0.90)	0.030
▪ Thromboembolic events	4 (5.6%)	1 (1.4%)	0.30 (0.04-2.31)	0.25
- Stroke	3	1		
- Myocardial infarction	1	0		
▪ Repeat AV surgery	2 (2.8%)	0 (0%)	0.19 (0.10-8.00)	0.39
▪ CHF hospitalization	8 (11.1%)	0 (0%)	0.05 (0.00-1.05)	0.054

Results: Primary Analysis

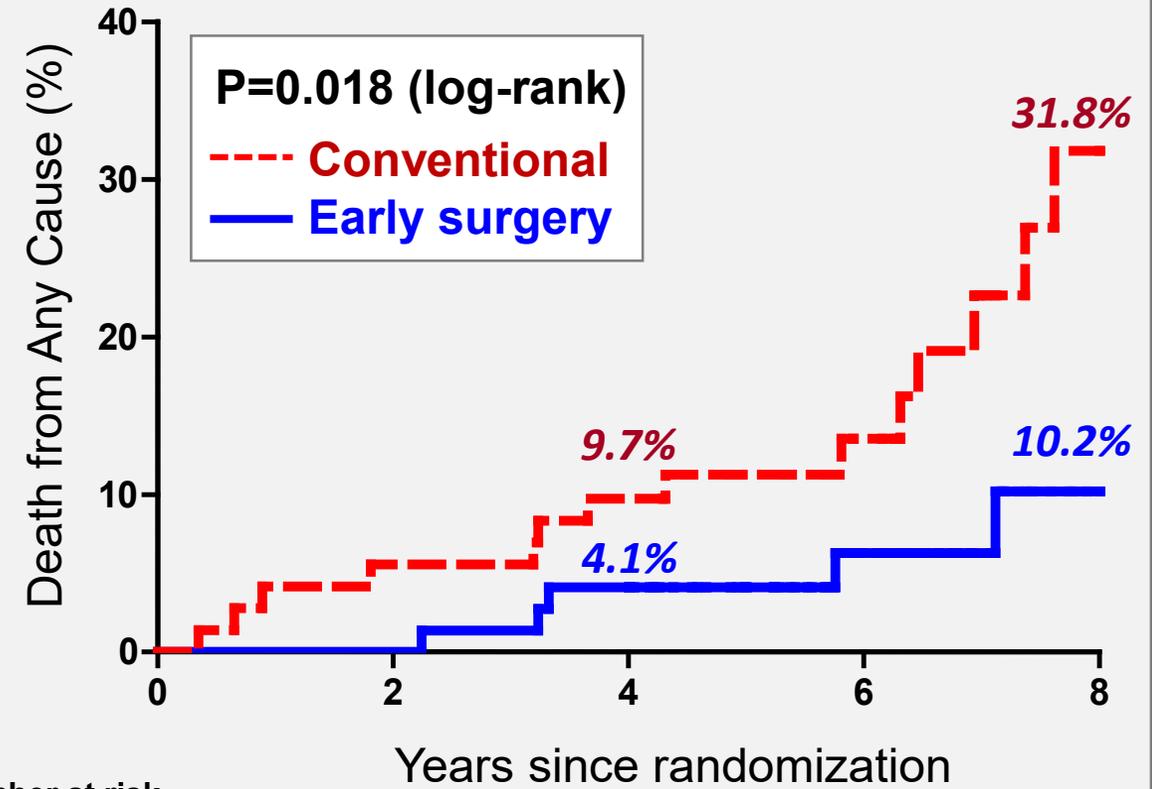
Operative or CV Death



Number at risk

	0	2	4	6	8
Early Surgery	73	73	70	38	13
Conventional	72	68	65	36	12

Death from Any Causes

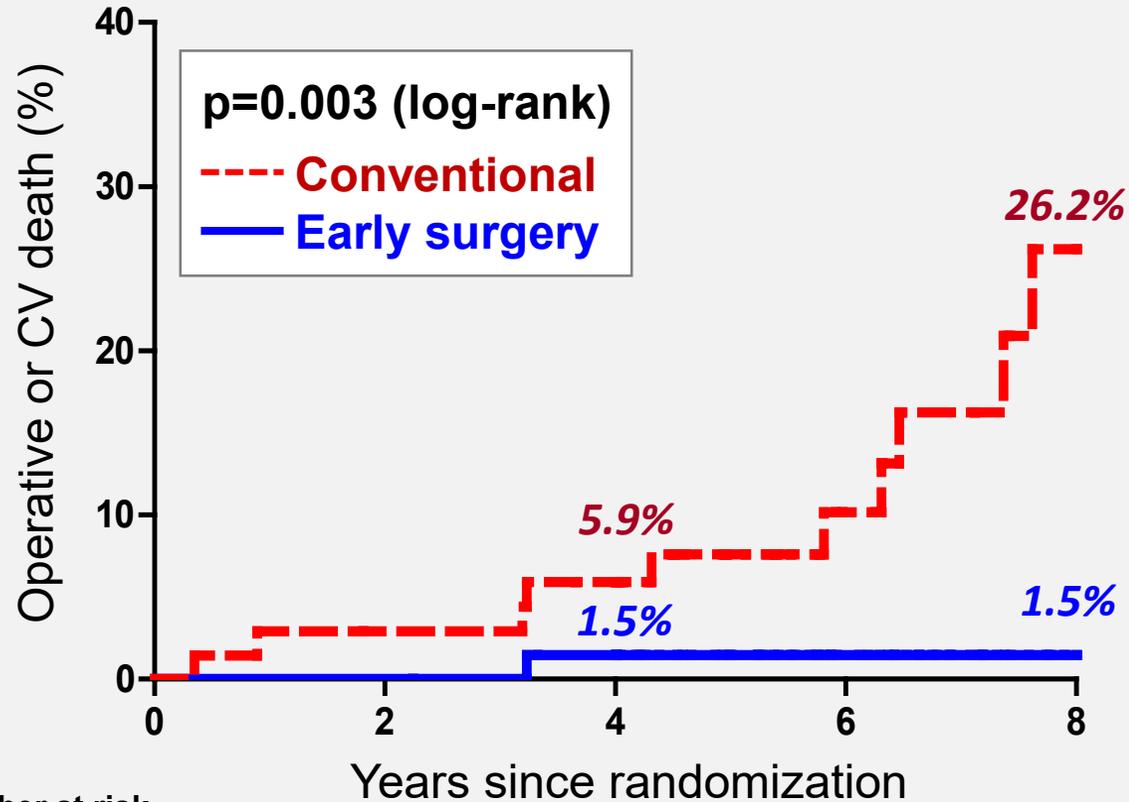


Number at risk

	0	2	4	6	8
Early Surgery	73	73	70	38	13
Conventional	72	68	65	36	12

Results: Secondary Per-Protocol Analysis

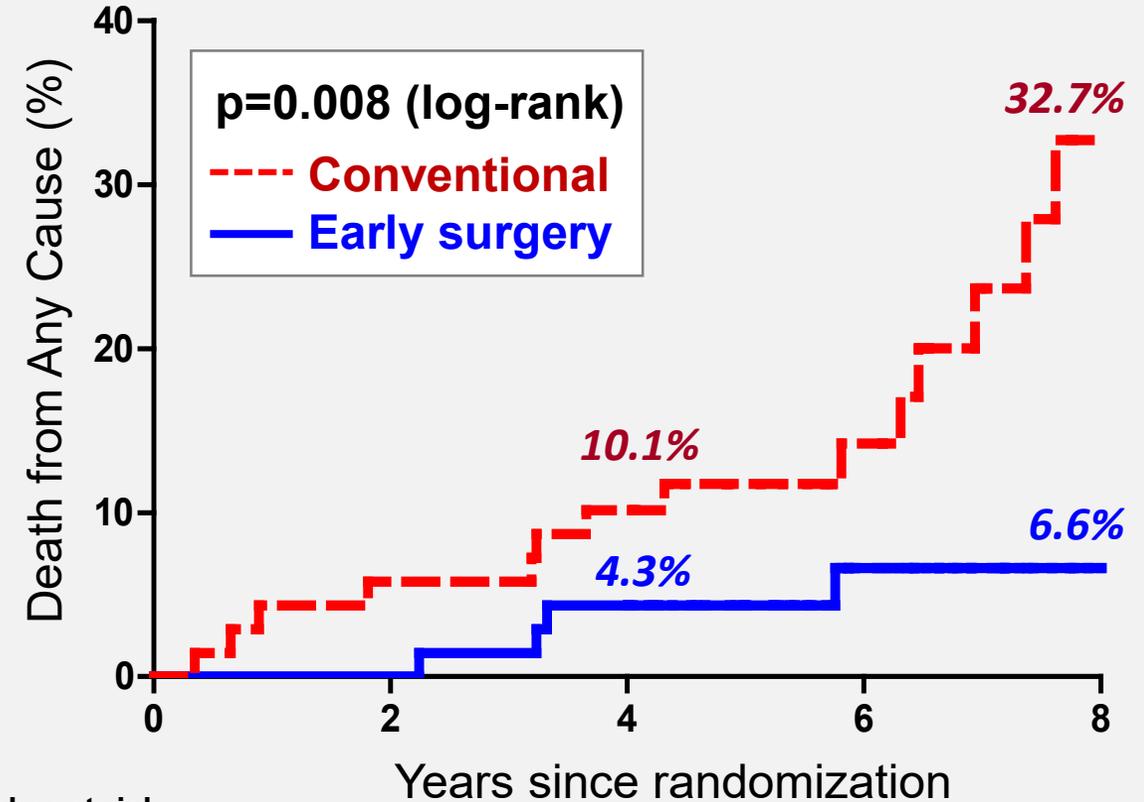
Operative or CV Death



Number at risk

Early Surgery	69	69	67	38	14
Conventional	69	66	63	34	13

Death from Any Causes



Number at risk

Early Surgery	69	69	67	38	14
Conventional	69	66	63	34	13

Limitations

- Patients with very severe AS (aortic velocity > 4.5 m/s)
- Cross-over in 4%: Similar results in per-protocol analysis
- Selective performance of exercise test
- Younger patients with low operative risk and higher incidence of bicuspid AV: Our results cannot be directly applied to early TAVR for asymptomatic severe AS

Conclusions

Early surgical AVR (vs. conservative management) significantly reduced the rates of operative or cardiovascular death, and death from any cause in asymptomatic patients with very severe AS

The RECOVERY trial provides the evidence for early preemptive AVR





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Early Surgery or Conservative Care for Asymptomatic Aortic Stenosis

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