Prevalence and prognosis of aortic valve disease in the oldest old

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Background

- Degenerative aortic valve (AV) disease increases with aging
- Risk factors appear similar to those for atherosclerosis
- In younger populations both AV calcification (AVC) and aortic stenosis (AS) are associated with increased mortality

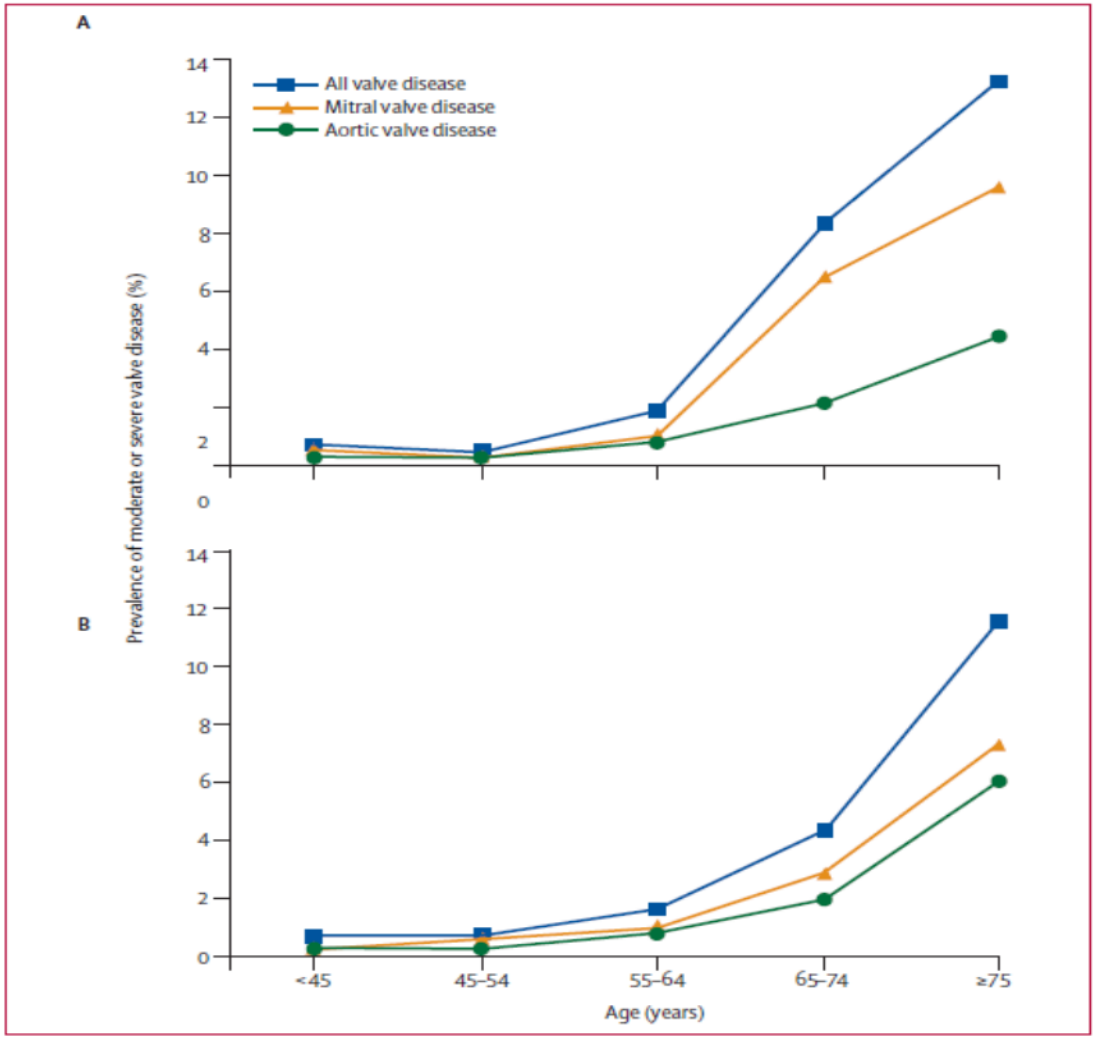


Figure 1: **Prevalence of valvular heart disease by age**
(A) Frequency in population-based studies and (B) in the Olmsted County community.

Nkomo et al, Lancet, 2006

Table 1. Prevalence of Aortic Valve Abnormalities by Echocardiography

	Aortic Valve Abnormality			
	None	Sclerosis	Stenosis	Valve Replacement
All subjects	3,736 (72%)	1,329 (26%)	88 (2%)	23 (0.4%)
Women	2,249 (76%)	641 (22%)	43 (1.5%)	12 (0.4%)
Men	1,487 (67%)	688 (31%)	45 (2%)	11 (0.5%)
65–74 years old	2,684 (78%)	697 (20%)	43 (1.3%)	16 (0.5%)
Women	1,654 (82%)	344 (17%)	20 (1.0%)	9 (0.4%)
Men	1,030 (73%)	353 (25%)	23 (1.6%)	7 (0.5%)
75–84 years old	962 (62%)	542 (35%)	37 (2.4%)	7 (0.5%)
Women	546 (66%)	259 (31%)	22 (2.7%)	3 (0.4%)
Men	416 (58%)	283 (39%)	15 (2.1%)	4 (0.6%)
85+ years old	90 (48%)	90 (48%)	8 (4%)	0 (0%)
Women	49 (56%)	38 (43%)	1 (1%)	0
Men	41 (41%)	52 (52%)	7 (7%)	0

Data are expressed as number (%) of subjects.

Stewart et al JACC, 1997

Table 2. Frequency of Calcification and Thickening of the Aortic Valve Cusps in the Different Age Groups

Grade of Aortic Valve Calcification	Age Group (yr) 55–71 (n = 76)	75–76* (n = 197)	80–81 (n = 155)	85–86 (n = 124)
None	55 (72)	101 (52)	69 (45)	31 (25)
Slight	16 (21)	77 (39)	59 (38)	70 (56)
Severe	5 (7)	17 (9)	27 (17)	23 (19)

Lindroos et al. JACC, 1993

TABLE 2. EVENT RATES IN THE THREE GROUPS.

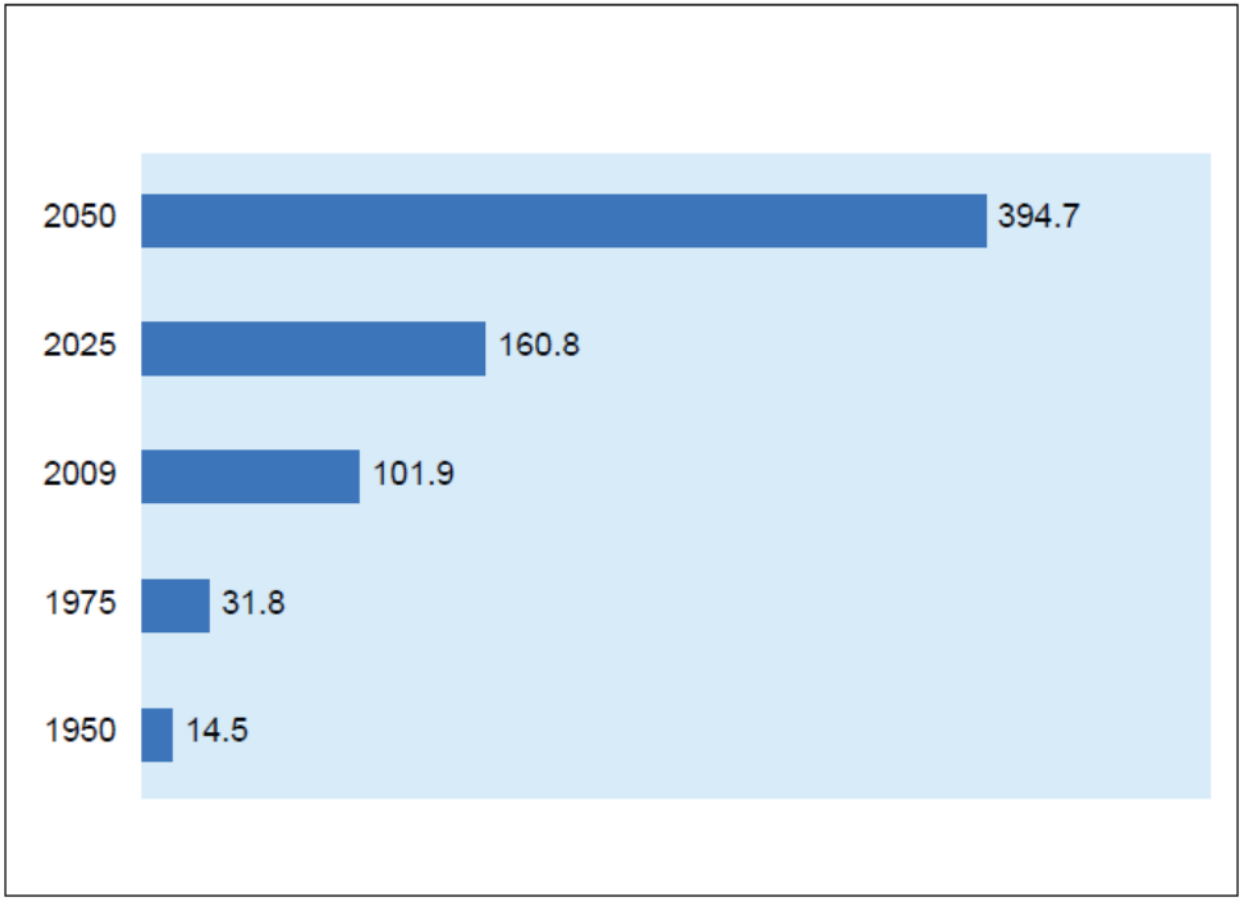
EVENT	NORMAL AORTIC VALVES (N=3919)	AORTIC SCLEROSIS (N=1610)	AORTIC STENOSIS (N=92)	P VALUE FOR TREND
		number (percent)		
Death from any cause	583 (14.9)	353 (21.9)*	38 (41.3)*	<0.001
Death from cardiovascular causes	238 (6.1)	162 (10.1)*	18 (19.6)*	<0.001
Myocardial infarction†	217 (6.0)	123 (8.6)‡	9 (11.3)‡	<0.001
Angina†	358 (11.0)	160 (13.0)	17 (24.3)*	0.001
Congestive heart failure†	337 (8.9)	192 (12.6)*	21 (24.7)*	<0.001
Stroke†	238 (6.3)	122 (8.0)§	10 (11.6)§	0.003

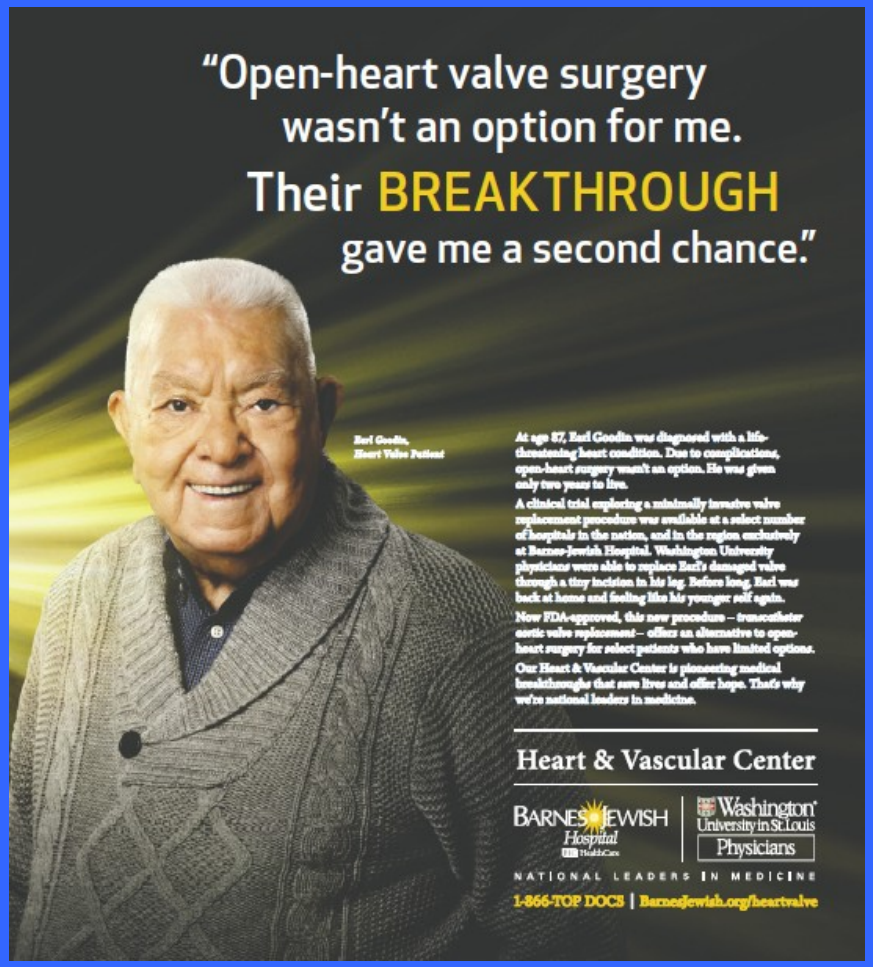
Otto et al., NEJM, 1999

Limitations of previous studies

- Paucity of data (especially mortality) in patients ≥ 85 years
- Performed in clinic/hospital setting-not true community based cohorts
  - Particularly important in very elderly
- No distinction between AVC and AS
- Little data on co-morbidities

Figure 21. Population aged 80 or over: world, 1950-2050
(Millions)




"Open-heart valve surgery
wasn't an option for me.
Their BREAKTHROUGH
gave me a second chance."
Earl Goodin,
Heart Valve Patient
At age 87, Earl Goodin was diagnosed with a life-threatening heart condition. Due to complications, open-heart surgery wasn't an option. He was given only two years to live.
A clinical trial exploring a minimally invasive valve replacement procedure was available at a select number of hospitals in the nation, and in the region exclusively at Barnes-Jewish Hospital. Washington University physicians were able to replace Earl's damaged valve through a tiny incision in his leg. Before long, Earl was back at home and feeling like his younger self again.
Now FDA-approved, this new procedure – transcatheter aortic valve replacement – offers an alternative to open-heart surgery for select patients who have limited options.
Our Heart & Vascular Center is pioneering medical breakthroughs that save lives and offer hope. That's why we're national leaders in medicine.
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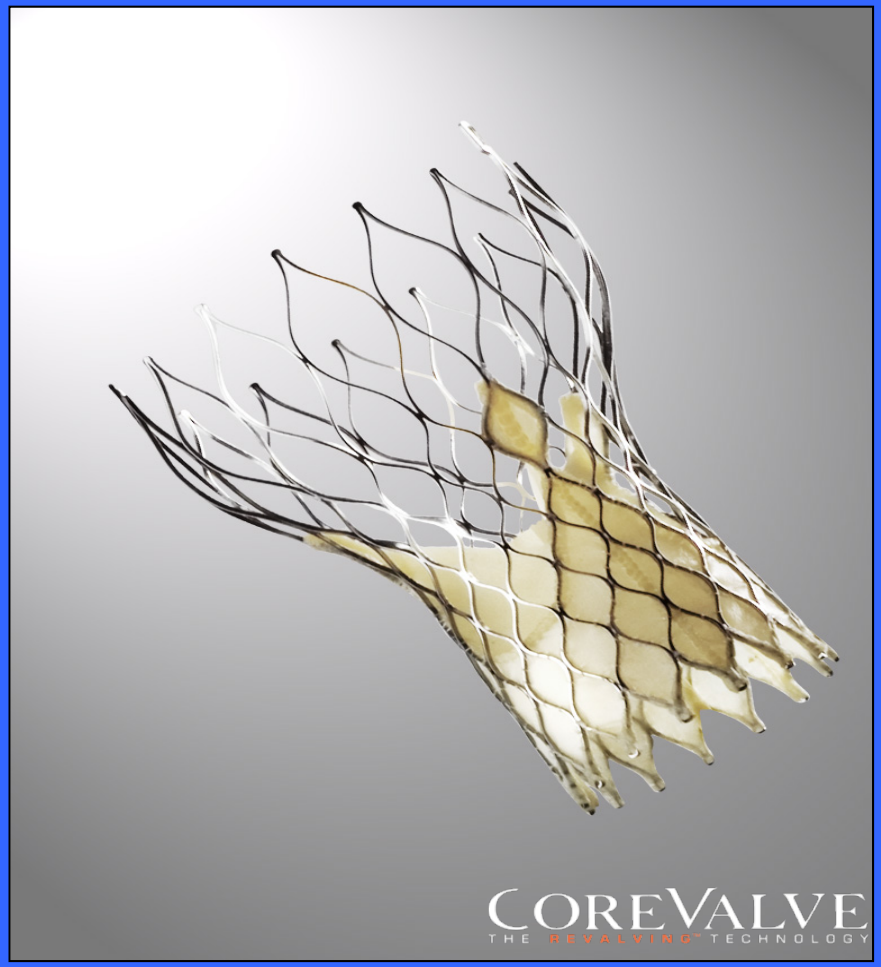
1-866-TOP DOCS | BarnesJewish.org/heartvalve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Objectives

- Assess the prevalence of AVC and AS in a community-dwelling cohort of subjects born in 1920-21
- Examine risk factors for aortic valve disease in this population
- Examine impact of AVC and AS on mortality in this very elderly cohort (critical in the TAVI era)

Methods

- Subjects were recruited from the Jerusalem Longitudinal Cohort Study which follows an age-homogenous cohort born in 1920-21.
- History, physical exam and comprehensive echocardiographic exam (GE, Vivid I) performed at patients home
- 5 year mortality from Ministry of Interior database

- 2-D assessment of the AV performed in parasternal views, Doppler in apical views
- Pts s/p AVR excluded
- Calcifications defined as bright echos > 1 mm in length
- AS defined as reduced systolic opening and velocity of ≥ 2.5 m/s across the AV

Results-Clinical parameters

	Total (N= 498)	Normal (N= 183)	AVC (N= 274)	AS (N = 41)
		36.8%	55%	8.2%
Men	46.8%	50.3%	44.5%	46.3%
Monetary difficulty	26.2%	22.8%	29.4%	20%
Not Married	48.2%	47.5%	48%	48.8%
Poor health	68.7%	68.4%	69.6%	65%
Depression	32.7%	27.2%	35.2%	40%
Difficulty in ADL	28.9%	27%	30%	29.3%
Renal ins	10.1%	12.1%	9.2%	7.3%
Diabetes	19%	20.3%	19.6%	9.8%
Ischemic HD	36.4%	36.8%	36.2%	36.6%
CHF	11.1%	11.5%	10.3%	14.6%
HTN	71.2%	72%	72%	63.4%
Dementia	17.6%	57.5%	58.5%	73.2%

No significant differences in clinical parameters between subgroups

Results-Echo parameters

N = 498	Normal (N= 183)	AVC (N= 274)	AS (N = 41)	P-value
Measurements of cardiac morphology				
LA volume index	60.9 ± 23	63 ± 21.7	75.5 ± 26.9	0.002
LV end diastolic volume index	66.3 ± 17	68.8 ± 19	73.3 ± 19	NS
LV end systolic volume index	30.5 ± 13.5	31.3 ± 14.7	32.1 ± 10.8	NS
LV mass index	116.7± 35.7	123.1 ± 33.1	144.6 ± 36	0.0002
Measurements of cardiac systolic function				
LV ejection fraction (%)	55.1 ± 10.6	55.6 ± 10.1	56.6 ± 7.8	NS
Tissue Doppler lateral s wave	7.6 ± 2.1	7.9 ± 2.1	7.7 ± 2.2	NS
Tissue Doppler septal s wave	7.0 ± 2	6.6 ± 1.8	6.5 ± 1.9	NS
Measurements of cardiac diastolic function				
Mitral valve E wave	75.3 ± 19	75.4 ± 22.9	85.4 ± 20.4	0.02
Mitral valve A wave	89.2 ± 22.8	88.1 ± 23.8	103.7 ± 31.1	0.001
E/A ratio	0.93 ± 0.5	1.02 ± 1.3	1 ± 0.68	NS
Deceleration time	193.4 ± 63.5	207.7 ± 63.5	232.7 ± 77.8	0.002
Tissue Doppler lateral E wave	7.3 ± 1.9	7.1 ± 2.2	6.6 ± 2.0	NS
Tissue Doppler lateral A wave	10.3 ± 3.3	9.8 ± 3.4	8.9 ± 3.6	NS
Tissue Doppler septal E wave	6.4 ± 2	5.8 ± 1.9	5.4 ± 1.9	0.004
Tissue Doppler septal A wave	8.5± 2.9	8.1 ± 2.6	7.8 ± 2.9	NS
E:E'	11.6 ± 4.2	12.4 ± 5	15.1 ± 6.3	0.0004

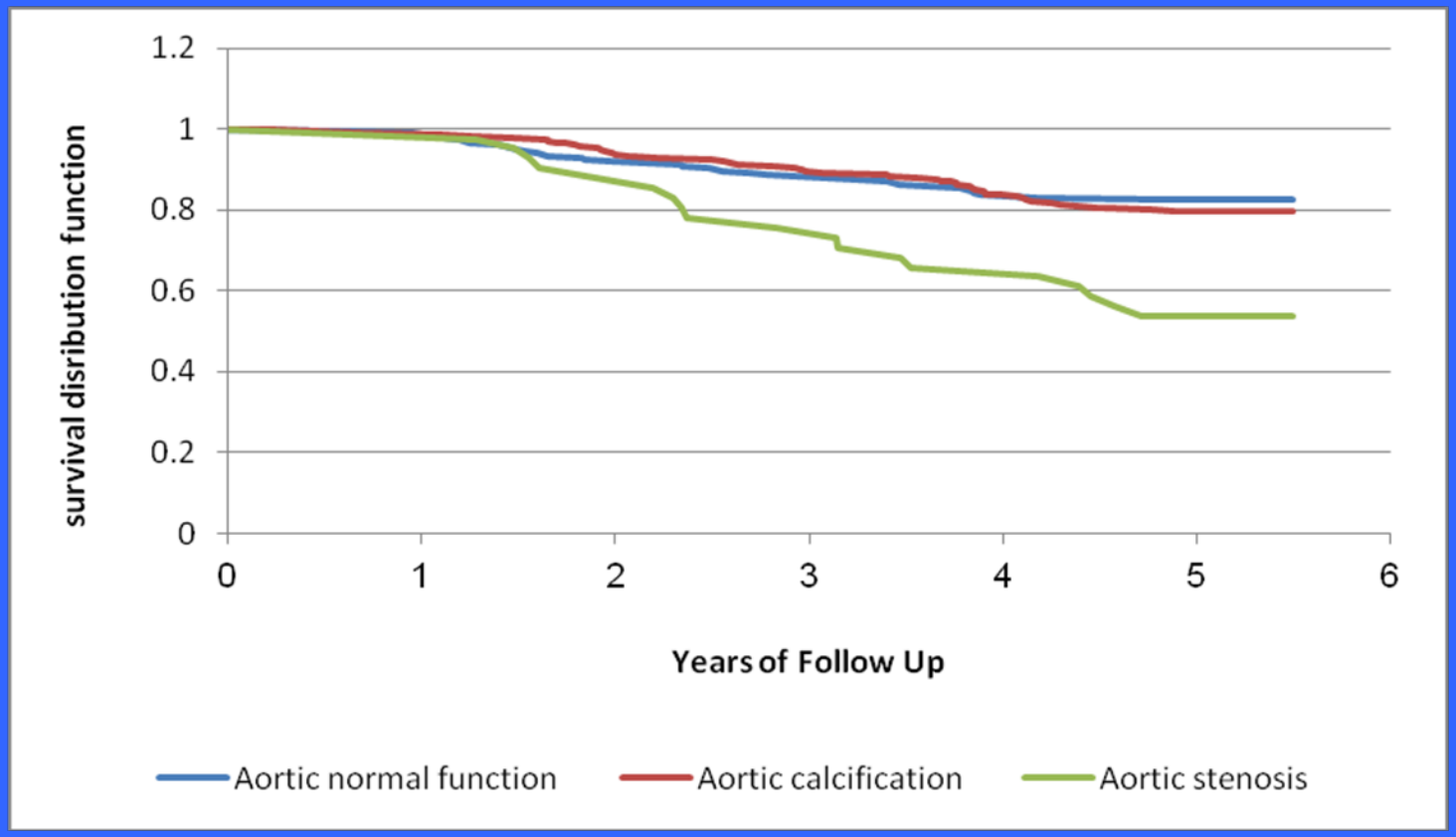
- 5-year mortality was 21%
  - Normal AV 17%
  - AVC but no stenosis 20%
  - AS 46%

P-value < 0.0055

Cox hazard model

	HR	95% CI
Normal AV	Ref	
AVC	1.61	(0.83-3.13)
AS	3.72	(1.47-9.38)

Adjusted for sex, HTN, CHF, DM, renal disease, LA volume, LV mass, E;e'; EF



P < 0.0001 for normal vs AS

Conclusions

- The prevalence of AS in the very elderly is higher than previously reported.
- AVD does not appear to be associated with risk factors for vascular disease in this population
- AS but not AVC is predictive of 5-year mortality

- Differences in study populations
  - Ethnicity
  - Sample size
  - Home echo
- Differences in pathophysiology
  - Calcium accumulation/ossification

Limitations

- Echo only performed in a subset of the cohort (randomly selected)
- Definition using gradients alone, no data on AVA
- Only total mortality data available

Clinical implications

- Confirms previous findings that treatment of risk factors does not reduce progression of AS
- Aggressive therapy of severe AS should be considered