Valvular Heart Disease
The Art of Clinical Decision Making

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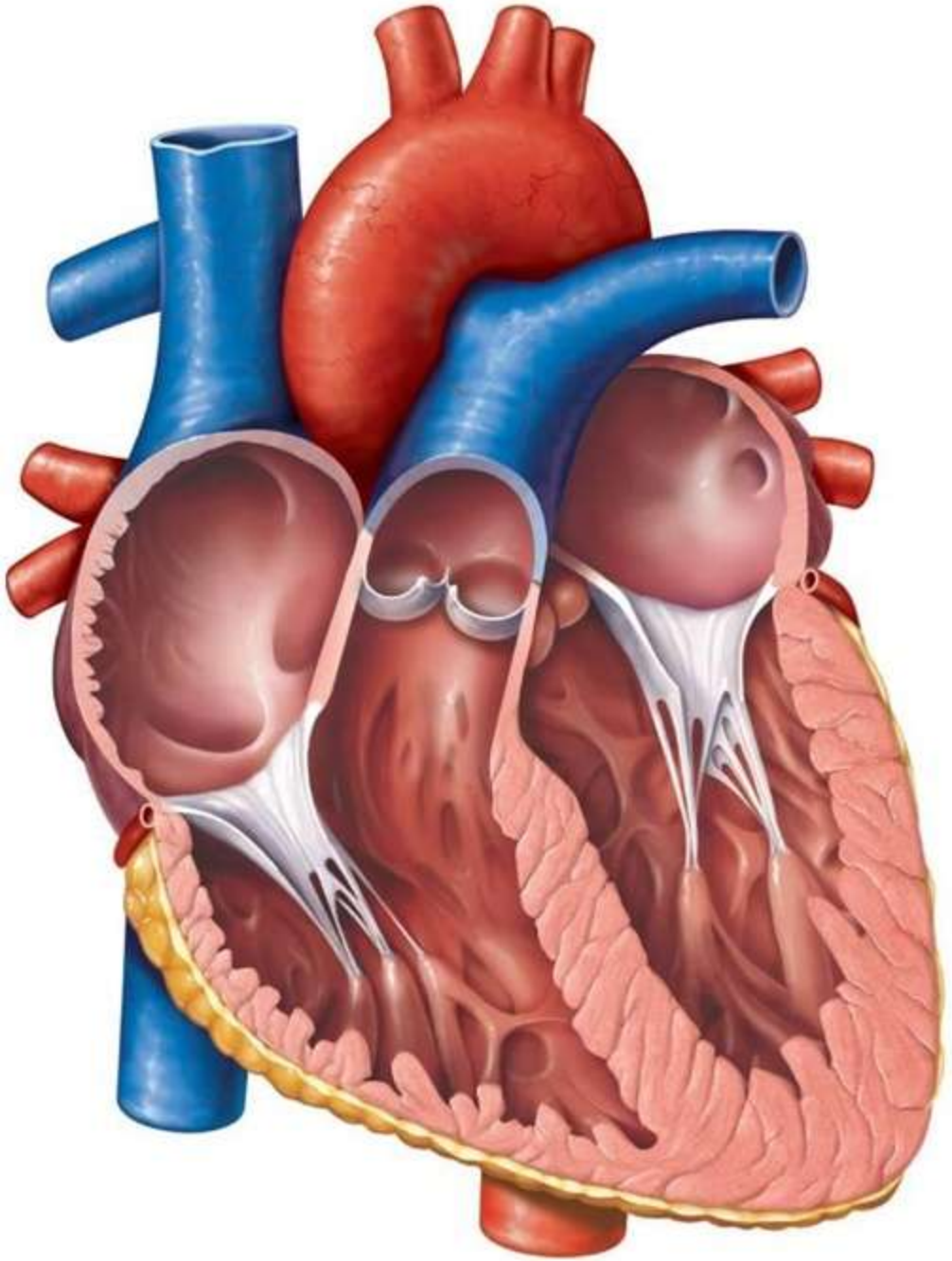
No disclosures



Mitral Regurgitation
Etiology

- Mitral valve prolapse
- Chordal rupture
- Papillary muscle rupture (ischemic)
- Annular dilation (cardiomyopathy)
- Endocarditis
- Rheumatic
- Collagen vascular disease

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Mitral Regurgitation
Indication for TEE

Class I

1. **Transthoracic echo data are insufficient (severity, mechanism, LV function) *(B)***
2. **Establish anatomic basis of MR to guide surgical repair *(B)***

Mitral Regurgitation
Indication for Catheterization

Class I

1. **Inconclusive information provided by noninvasive testing *(C)***
2. **PA pressures by echo are out of proportion to MR severity *(C)***
3. **Clinical findings ≠ noninvasive testing *(C)***
4. **Pre-surgical coronary angiography *(C)***

Severe Mitral Regurgitation
Surgical Intervention

Class I

1. **Symptoms, Acute *(B)***
2. **Symptoms,**

   EF > 30% and/or
   ESD > 55 mm *(B)*
3. **Asymptomatic,**

   EF 30 – 60% and/or
   ESD > 40mm *(B)*

Severe Mitral Regurgitation
Surgical Intervention

Class IIa

1. **Asymptomatic**

   EF > 60%

   ESD < 40 mm

   Likelihood of successful repair without residual MR > 90% (B)

Severe Mitral Regurgitation
Surgical Intervention

Class IIa

1. **Asymptomatic**

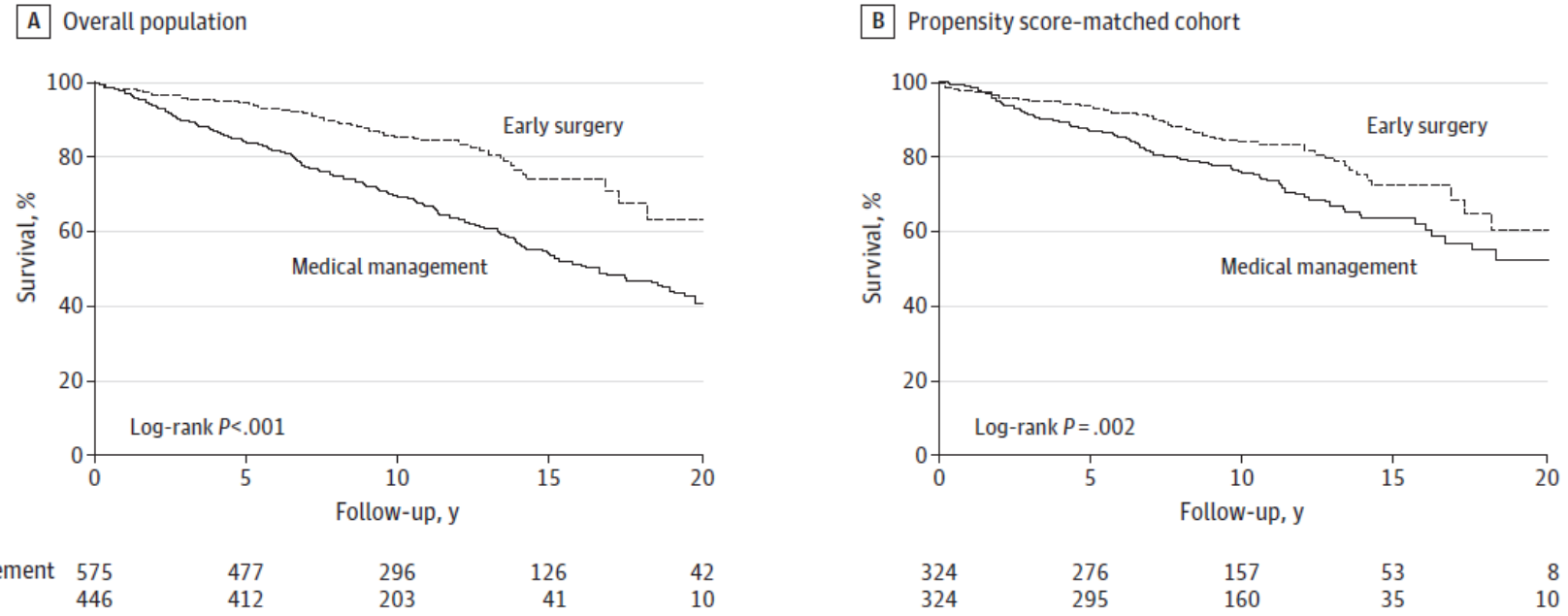
   EF > 60%

   ESD < 40 mm

   New onset atrial fibrillation or Pulmonary HTN (C)

Severe Mitral Regurgitation
Surgical Intervention

Figure 1. Survival After Diagnosis of Mitral Regurgitation Due to Flail Mitral Leaflet According to Initial Treatment Strategy



No. at risk					
Medical management	575	477	296	126	42
Early surgery	446	412	203	41	10

324	276	157	53	8
324	295	160	35	10

Long-term survival following early surgery vs initial medical management overall population (A) and in the propensity score–matched cohort (B).

Suri RM, Vanoverschelde JL, Grigioni F, et al. Association between early surgical intervention vs watchful waiting and outcomes for mitral regurgitation due to flail mitral valve leaflets. JAMA 2013;310(6):609-616.

Severe Mitral Regurgitation
Surgical Intervention

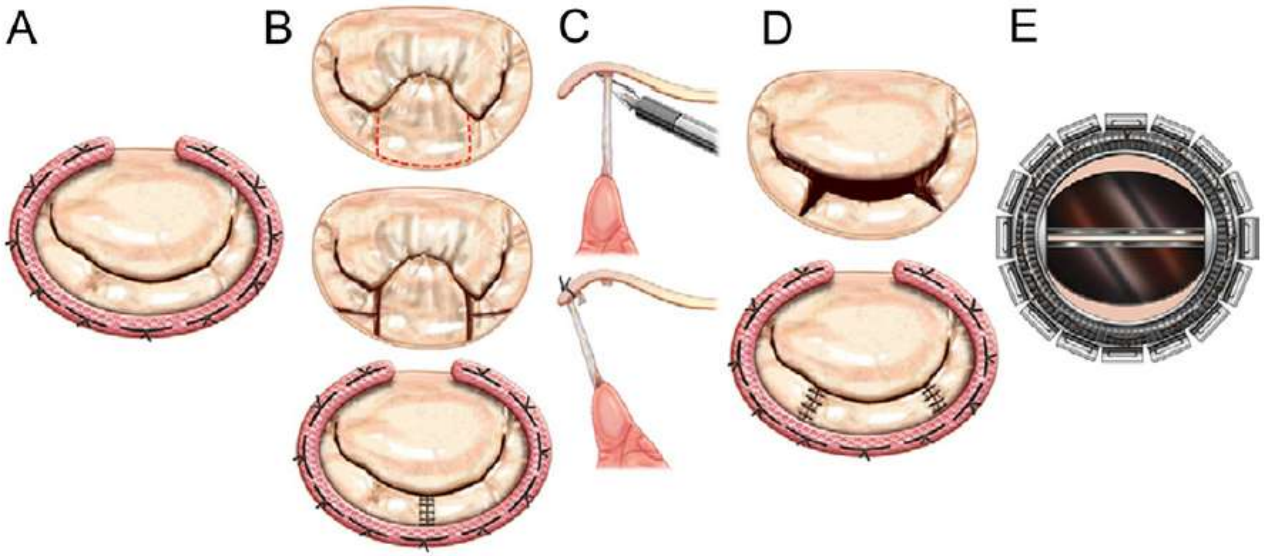


Figure 1 **Common Established Surgical Techniques Used to Correct Mitral Regurgitation**

(A) Ring annuloplasty. **(B)** Quadrangular resection and sliding leaflet plasty. **(C)** Chordal transfer. **(D)** Cleft closure. **(E)** Mitral replacement. Figure illustration by Craig Skaggs.

Glower DD. Surgical Approaches to Mitral Regurgitation. J Am Coll Cardiol 2012; 60:1315-22.

Severe Mitral Regurgitation
Medical therapy

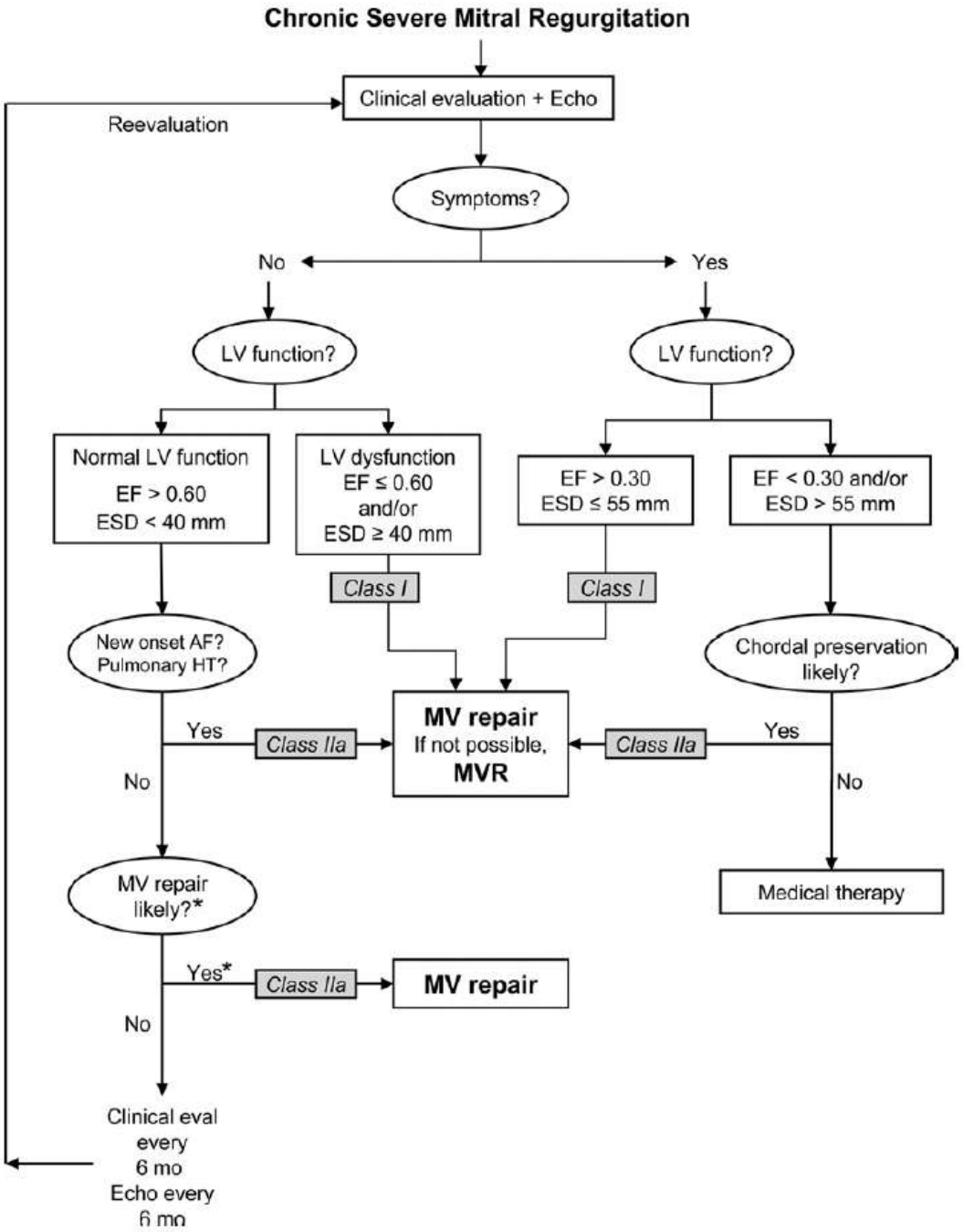
- **Treat hypertension**
- **No specific therapy affects outcomes**

Severe Mitral Regurgitation
Observation

- **Clinical evaluation, including transthoracic echocardiogram, every 6 months**

- **Exercise echocardiogram to assess exercise tolerance and PA pressure *(IIa, C)***

2008
ACC
Guidelines



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Aortic Stenosis
Etiology

- Calcific
  - Trileaflet
  - Bicuspid
- Rheumatic
- Congenital

Roberts WC, Vowels TJ, Filardo G, et al. Natural History of Unoperated Aortic Stenosis during a 50-year period of Cardiac Valve Replacement. Am J Cardiol 2013;112:541-553.

Aortic Stenosis

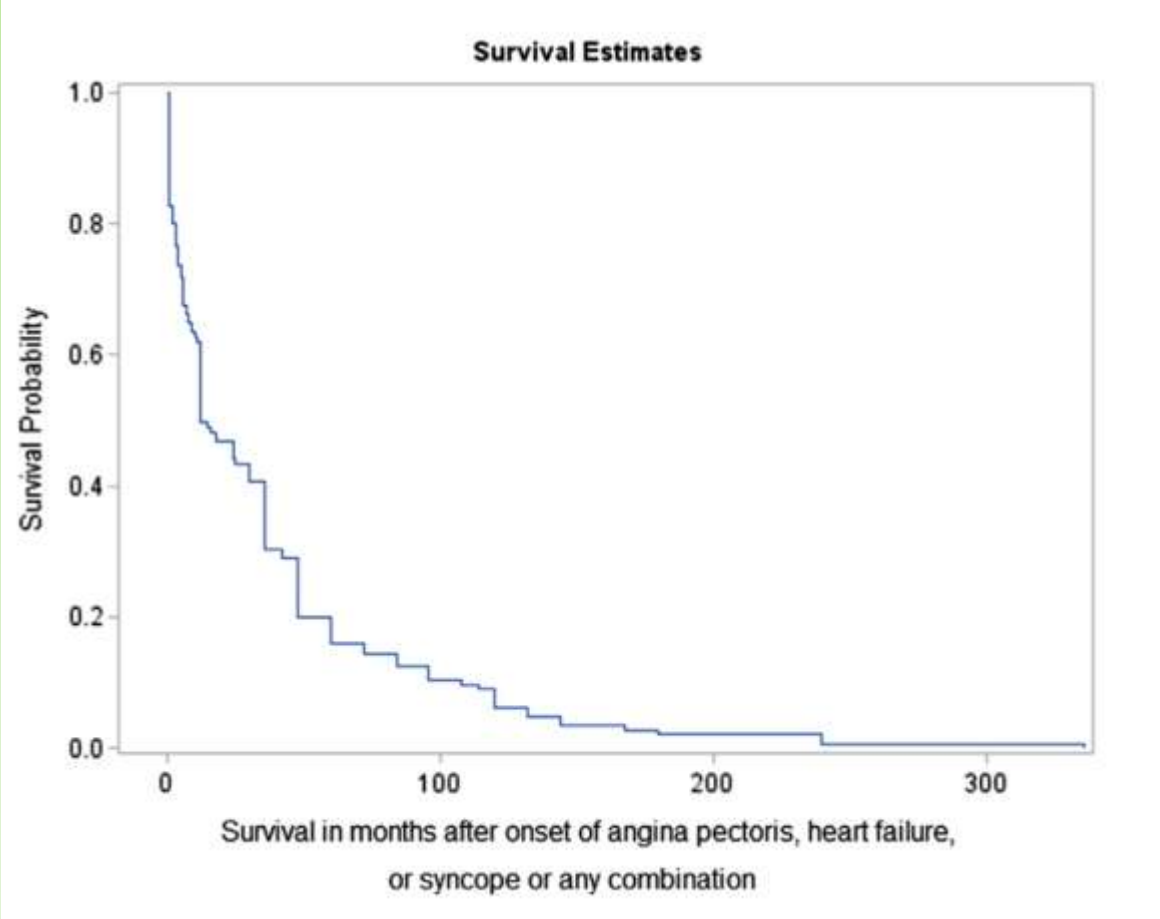
Observation

Table 12. Clinical Outcomes in Prospective Studies of Asymptomatic Aortic Stenosis in Adults

Study, Year	No. of Patients	Severity of Aortic Stenosis	Age, y	Mean Follow-Up	Group	Event-Free Survival Without Symptoms
Kelly et al., 1988 (109)	51	V_{max} greater than 3.6 m per second	63 ± 8	5–25 mo	Overall	59% at 15 mo
Pellikka et al., 1990 (114)	113	V_{max} 4.0 m per second or greater	40–94	20 mo	Overall Overall	86% at 1 y 62% at 2 y
Kennedy et al., 1991 (115)	66	AVA 0.7–1.2 cm^2	67 ± 10	35 mo	Overall	59% at 4 y
Otto et al., 1997 (61)	123	V_{max} greater than 2.6 m per second	63 ± 16	2.5 ± 1.4 y	Overall	93 ± 5% at 1 y 62 ± 8% at 3 y 26 ± 10% at 5 y
					Subgroups:	
					V_{max} less than 3–4 m per second	84 ± 16% at 2 y
					V_{max} 3–4 m per second	66 ± 13% at 2 y
					V_{max} greater than 3 m per second	21 ± 18% at 2 y
Rosenhek et al., 2000 (96)	128	V_{max} greater than 4.0 m per second	60 ± 18	22 ± 18 mo	Overall	67 ± 5% at 1 y 56 ± 55% at 2 y 33 ± 5% at 4 y
					Subgroups:	
					No or mild Ca^{2+}	75 ± 9% at 4 y
					Moderate-severe Ca^{2+}	20 ± 5% at 4 y
Amato et al., 2001 (117)	66	AVA 1.0 cm^2 or greater	18–80 (50 ± 15)	15 ± 12 mo	Overall	57% at 1 y 38% at 2 y
					Subgroups:	
					AVA 0.7 cm^2 or greater	72% at 2 y
					AVA less than 0.7 cm^2	21% at 2 y
					Negative exercise test	85% at 2 y
					Positive exercise test*	19% at 2 y
Das et al., 2005 (118)	125	AVA less than 1.4 cm^2	56–74 (mean 65)	12 mo	Subgroups: AVA 1.2 cm^2 or greater AVA 0.8 cm^2 or less	 100% at 1 y 46% at 1 y
					No symptoms on exercise test	89% at 1 y
					Symptoms on exercise test	49% at 1 y
Pellikka et al., 2005 (116)	622	V_{max} 4.0 m per second or greater	72 ± 11	5.4 ± 4.0 y	Overall	82% at 1 y 67% at 2 y 33% at 5 y

Bonow RO, Carabello BA, Chatterjee K, et al. 2008 Focused update incorporated into the ACC/AHA 2006 guidelines for the management of patients with valvular heart disease: a report of the American College of Cardiology/American Heart Association Task Force on Practice Guidelines (Writing Committee to Revise the 1998 Guidelines for management of patients with Valvular Heart Disease). J Am Coll Cardiol 2008:52:e1-142.

Aortic Stenosis
Observation



Roberts WC, Vowels TJ, Filardo G, et al. Natural History of Unoperated Aortic Stenosis during a 50-year period of Cardiac Valve Replacement. Am J Cardiol 2013;112:541-553.

Aortic Stenosis
Observation

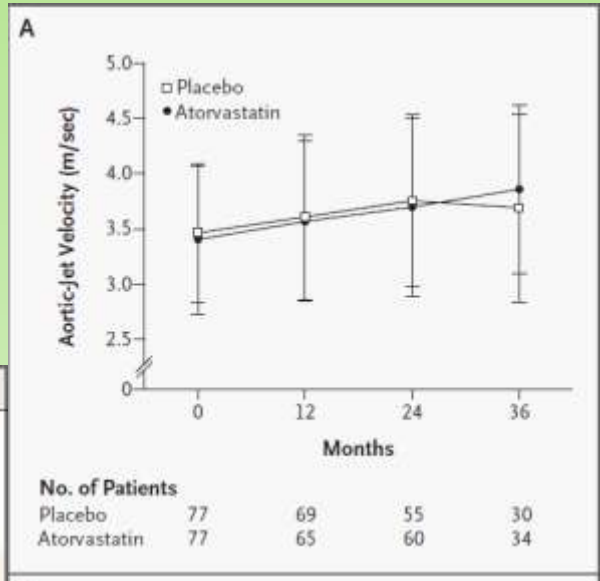
Class I

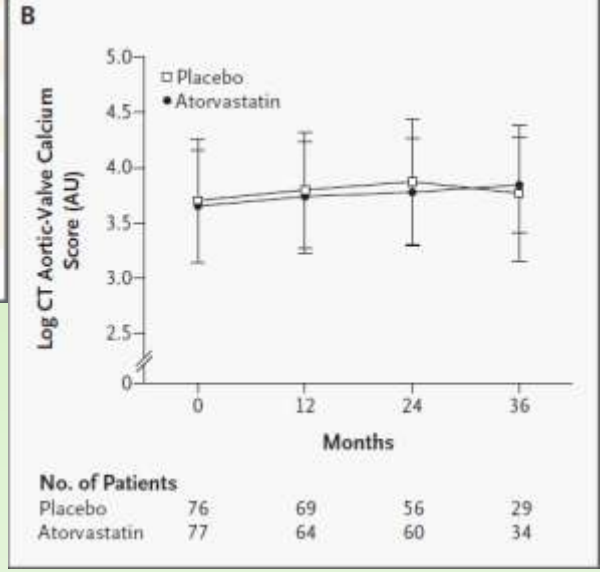
1. **Repeat echo in asymptomatic patients *(B)***
   - **Severe yearly**
   - **Moderate 1-2 years**
   - **Mild 3-5 years**

Aortic Stenosis
Medical therapy

Table 2. Progression from Baseline of Aortic-Valve Stenosis on Echocardiography and Computed Tomography.*

Variable	All Patients	Atorvastatin	Placebo	Adjusted Difference: Atorvastatin – Placebo (95% CI)	P Value
Echocardiography					
No. of patients	134	65	69		
Change in aortic-jet velocity (m/sec/yr)	0.201±0.208	0.199±0.210	0.203±0.208	0.002 (–0.066 to 0.070)	0.95
Increase in peak gradient (mm Hg/yr)	6.52±7.24	6.48±7.43	6.56±7.10	0.21 (–2.02 to 2.45)	0.85
Change in aortic-valve area (cm^2/yr)	–0.081±0.107	–0.079±0.107	–0.083±0.107	0.007 (–0.026 to 0.040)	0.68
Computed tomography					
No. of patients	133	64	69		
Absolute change in aortic-valve calcium score (AU/yr)	1608±1865	1564±1956	1648±1790	85 (–554 to 723)	0.80
Change in log aortic-valve calcium score (per yr)	0.20±0.16	0.20±0.16	0.20±0.15	0.00 (–0.05 to 0.05)	0.93





Cowell SJ, Newby DE, Prescott RJ, et al. A randomized trial of intensive lipid lowering therapy in aortic stenosis. N Engl J Med 2005; 352:2389-97.

Aortic Stenosis
Medical therapy

"Patients with symptoms need surgery, not medical therapy."

Aortic Stenosis
Invasive assessment

Class I

1. **Coronary angiography prior to AVR *(B)***
2. **Hemodynamic assessment when**
   - **Inconclusive noninvasive testing**
   - **Discrepency between noninvasive testing and clinical findings *(C)***

Aortic Stenosis
Invasive assessment

Class III

1. **Do not cross the valve if noninvasive testing is adequate and concordant with clinical findings *(C)***

Aortic Stenosis
Surgical intervention

Class I

1. **Severe AS and symptoms *(B)***
2. **Severe AS and EF < 50% *(C)***
3. **Severe AS and undegoing CABG, other valve surgery**

Aortic Stenosis
Surgical intervention

Class IIb

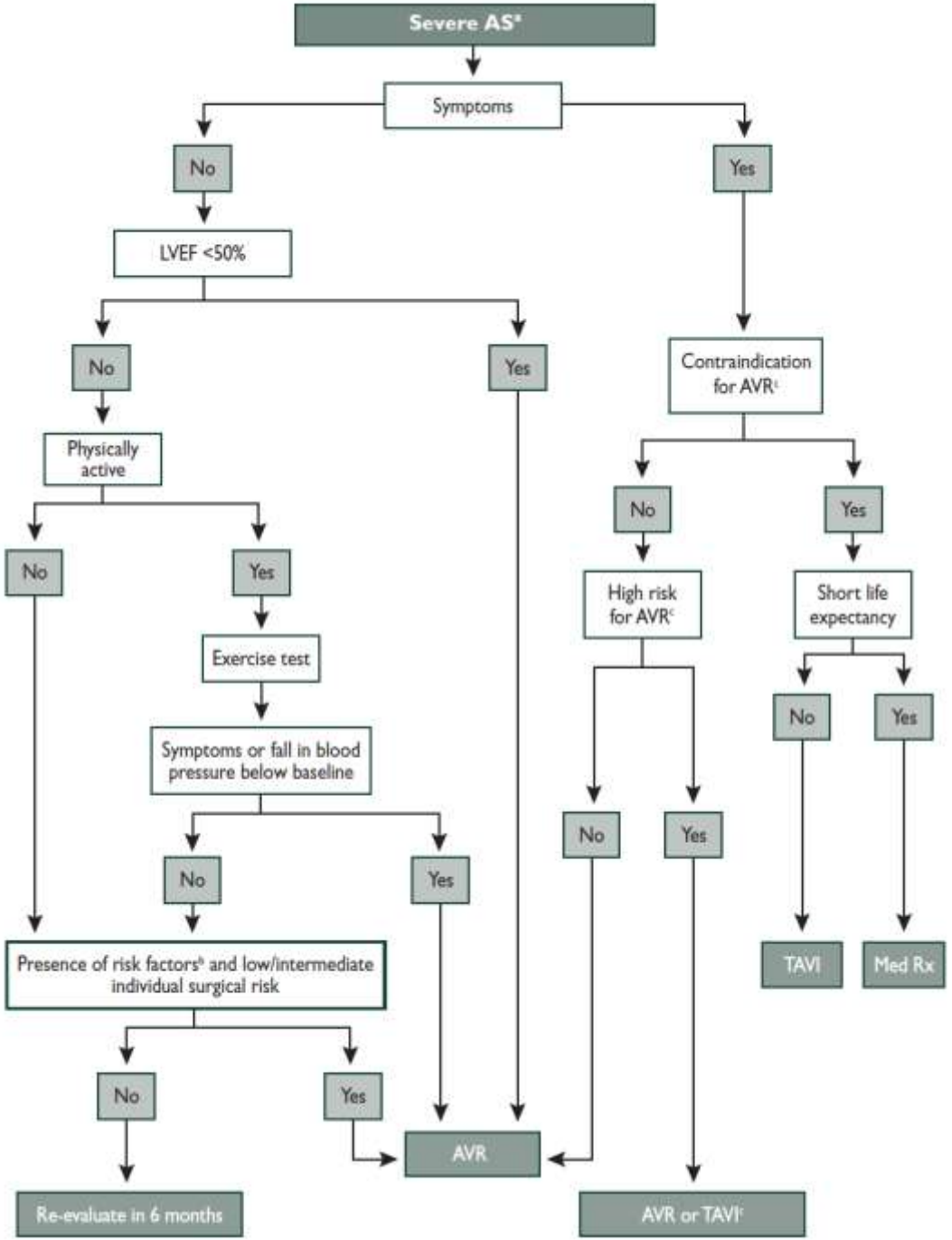
Severe AS, asymptomatic

- **Abnormal exercise response**
- **High likelihood of rapid progression**
- **"Extremely severe" AS**
  - **AVA < 0.6 cm^2**
  - **Mean gradient > 60 mmHg**
  - **Peak velocity > 5 m/sec**

2012

ESC

Guidelines



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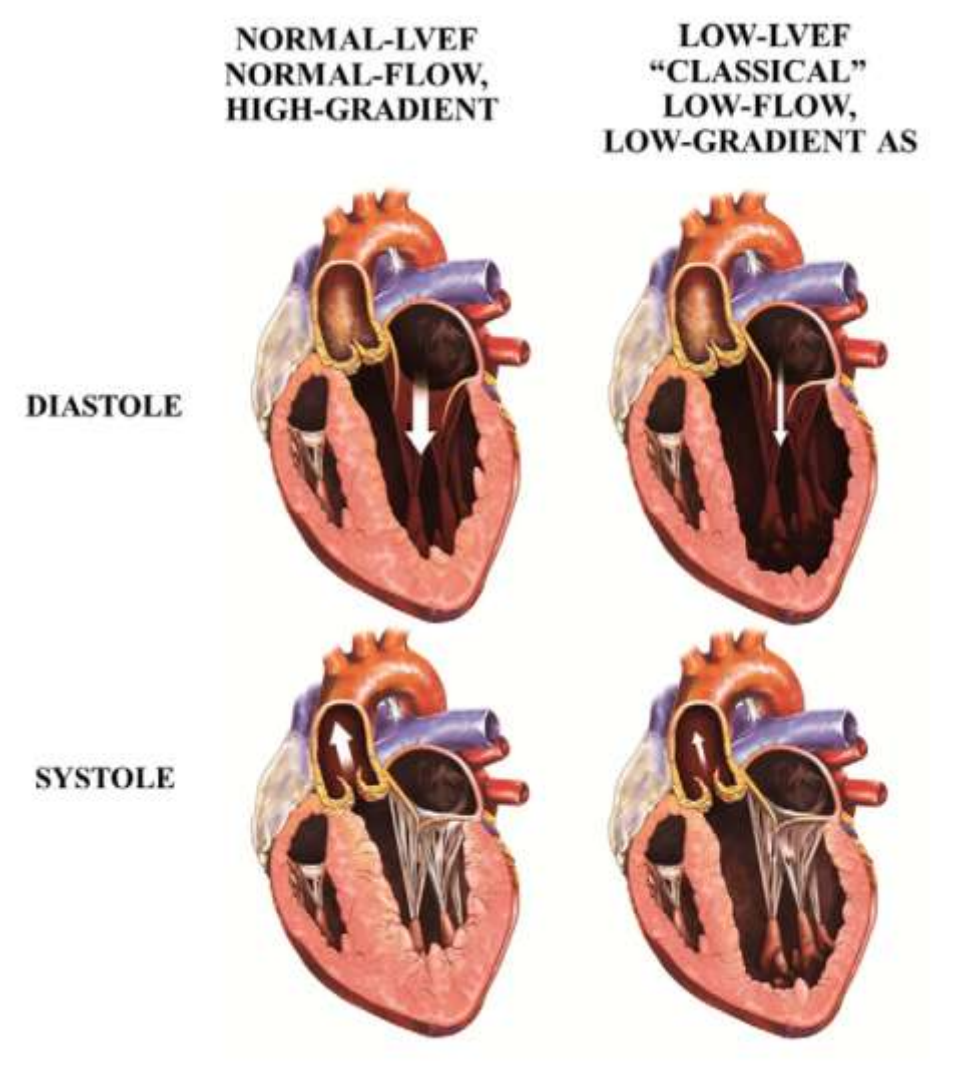
Aortic Stenosis

Low-flow, Low-gradient



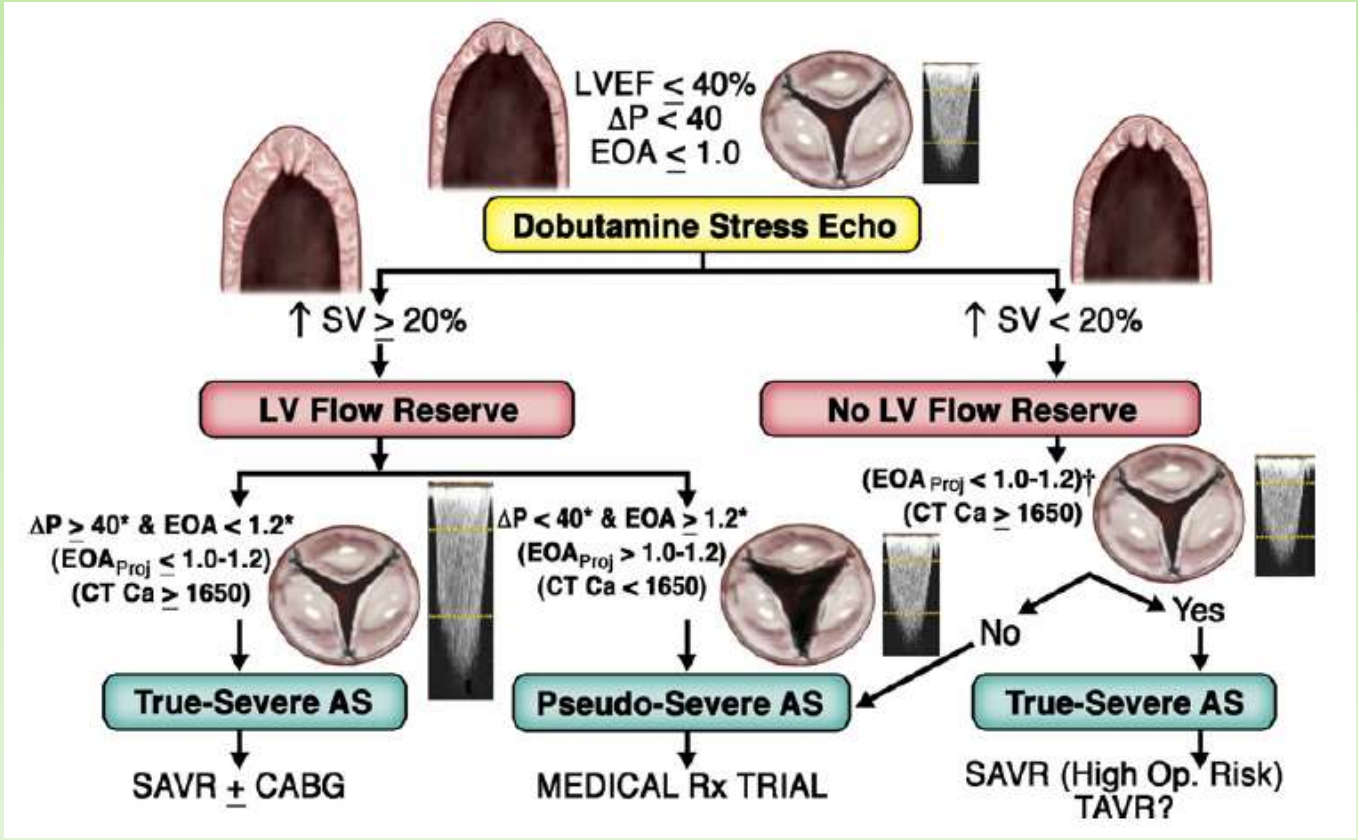
Pibarot P, Dumesnil JG. Low-flow, low-gradient aortic stenosis with normal and depressed left ventricular ejection fraction. J Am Coll Cardiol 2012;60:1845-53.

Low-flow, Low-gradient Aortic Stenosis

Low LVEF

Class IIa

- **Dobutamine stress echo, catheterization**

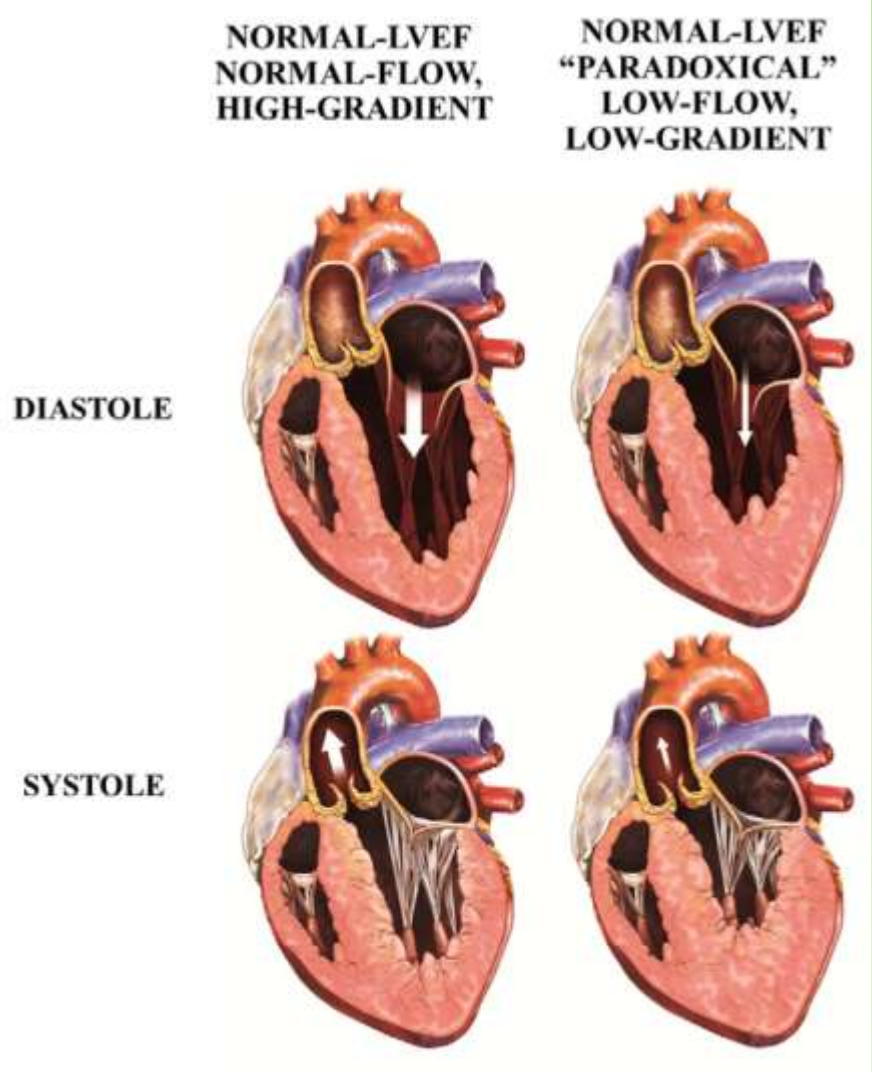


Pibarot P, Dumesnil JG. Low-flow, low-gradient aortic stenosis with normal and depressed left ventricular ejection fraction. J Am Coll Cardiol 2012;60:1845-53.

Low-flow, Low-gradient Aortic Stenosis
Normal LVEF

"Paradoxical"

- **Elderly**
- **Small LV size**
- **Marked LVH**
- **HTN**



Pibarot P, Dumesnil JG. Low-flow, low-gradient aortic stenosis with normal and depressed left ventricular ejection fraction. J Am Coll Cardiol 2012;60:1845-53.

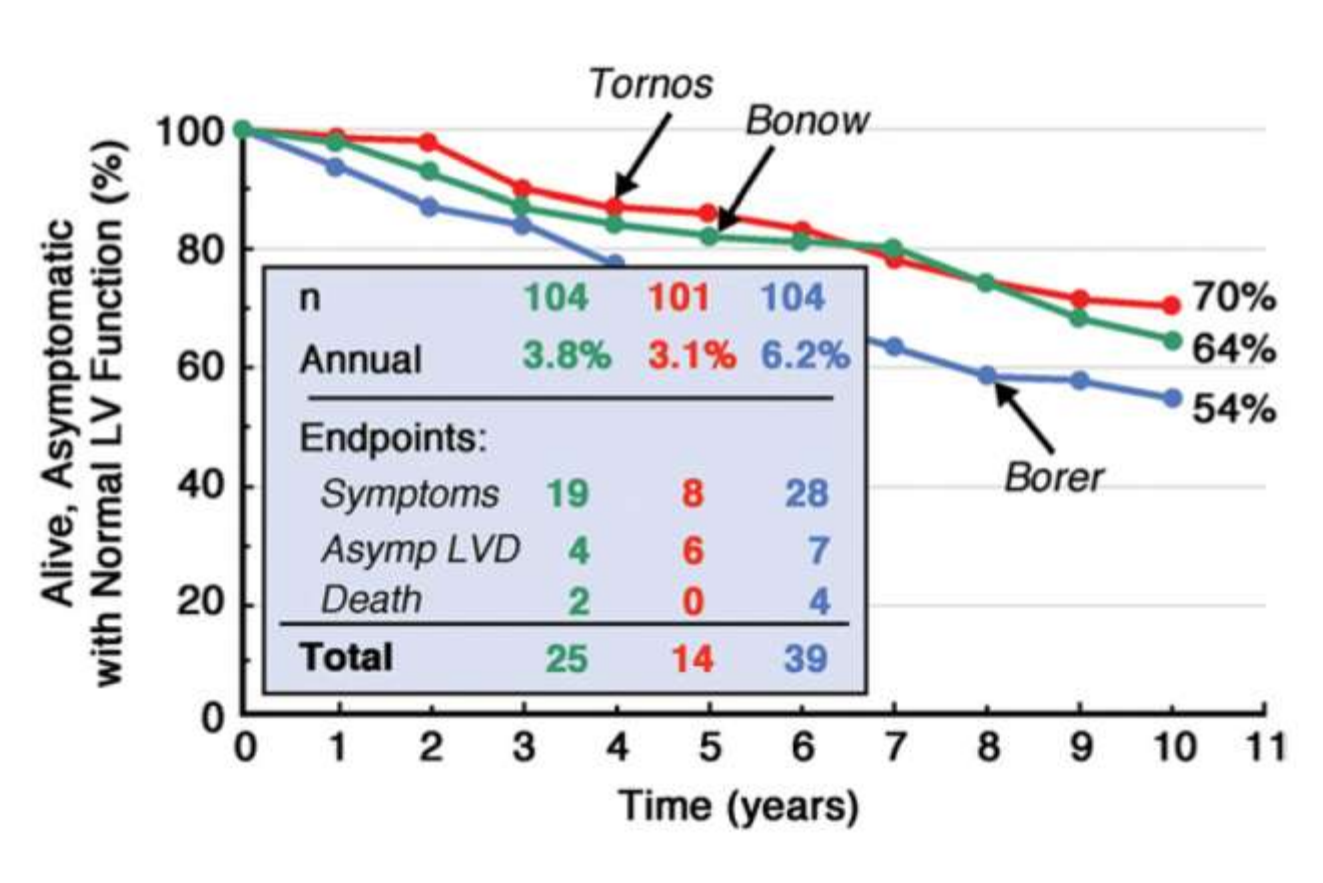
Aortic Regurgitation

Etiology

- Aorta dilation
- Bicuspid AV
- Calcific degeneration
- Rheumatic
- Endocarditis
- Aortic dissection
- Hypertension

Roberts WC, Vowels TJ, Filardo G, et al. Natural History of Unoperated Aortic Stenosis during a 50-year period of Cardiac Valve Replacement. Am J Cardiol 2013;112:541-553.

Aortic Regurgitation
Observation



Bonow, RO. Chronic Mitral Regurgitation and Aortic Regurgitation, Have the Indications for Surgery Changed. J Am Coll Cardiol 2013;61:693-701.

Aortic Regurgitation
Observation

Asymptomatic patients with normal LV systolic function	
Progression to symptoms and/or LV dysfunction	Less than 6% per y
Progression to asymptomatic LV dysfunction	Less than 3.5% per y
Sudden death	Less than 0.2% per y
Asymptomatic patients with LV dysfunction	
Progression to cardiac symptoms	Greater than 25% per y
Symptomatic patients	
Mortality rate	Greater than 10% per y

Bonow RO, Carabello BA, Chatterjee K, et al. 2008 Focused update incorporated into the ACC/AHA 2006 guidelines for the management of patients with valvular heart disease: a report of the American College of Cardiology/American Heart Association Task Force on Practice Guidelines (Writing Committee to Revise the 1998 Guidelines for management of patients with Valvular Heart Disease). J Am Coll Cardiol 2008:52:e1-142.

Aortic Regurgitation
Observation

Class I

1. **Echo is indicated for "periodic" re-evaluation of LV size and function in asymptomatic severe AR (*B*)**

Aortic Regurgitation
Observation

Mild AR

- **Echo every 2-3 years**

Severe AR

- **Echo every 6-12 months**

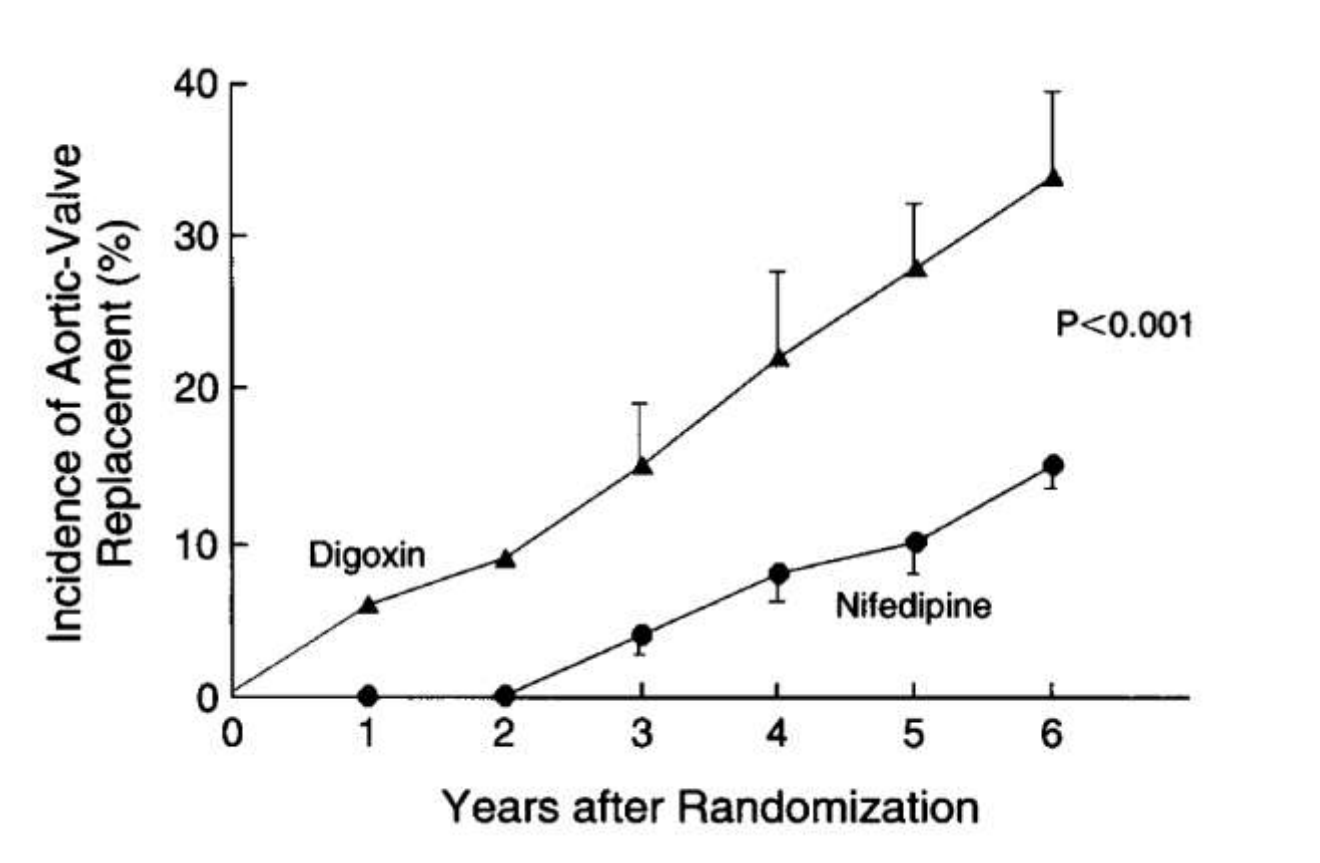
Aortic Regurgitation
Observation

Class IIa

Exercise stress testing

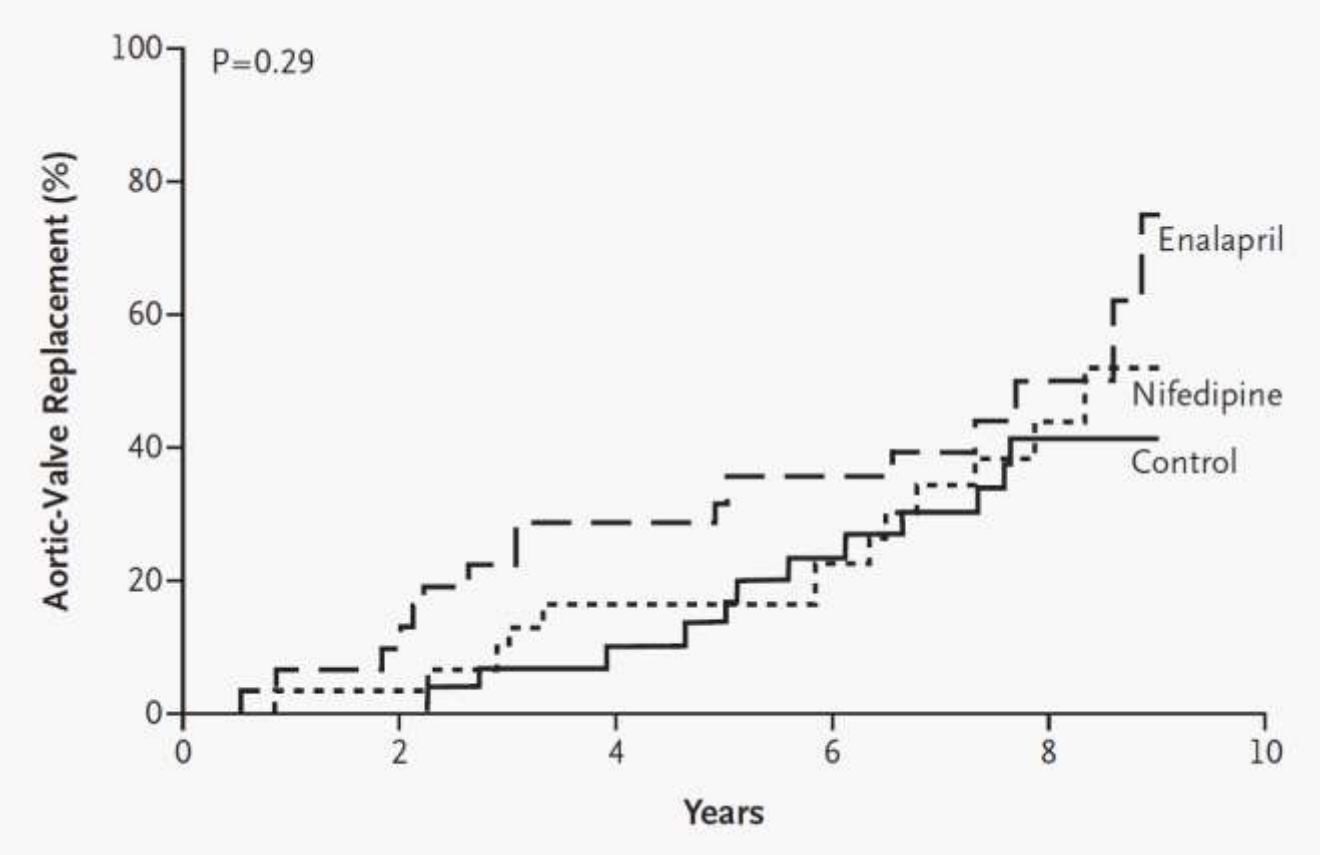
- **Equivocal symptoms *(B)***
- **Participation in athletics *(C)***

Aortic Regurgitation
Medical Therapy



Scognamiglio R, Rahmtoola SH, Fasoli G. Nifedipine in Asymptomatic Patients with Severe Aortic Regurgitation and Normal Left Ventricular Function. N Engl J Med 1994;331:689-94.

Aortic Regurgitation
Medical Therapy



Evangelista A, Tornos P, Sambola A, et al. Long-term Vasodilator Therapy in Patients with Severe Aortic Regurgitation. N Engl J Med 2005;353:1342-9.

Severe Aortic Regurgitation
Medical therapy

- **Use vasodilators only to treat hypertension**

Aortic Regurgitation
Medical Therapy

Class III

1. **Do not use vasodilators in asymptomatic patients with mild to moderate AR *(B)***

Aortic Regurgitation
Invasive assessment

Class I

1. **Coronary angiography prior to AVR *(C)***
2. **Aortic root angiography and Hemodynamic assessment when**
   - **Inconclusive noninvasive testing**
   - **Discrepency between noninvasive testing and clinical findings *(B)***

Severe Aortic Regurgitation
Surgical Intervention

Class I

1. **Symptoms, any LV function**
2. **Asymptomatic, EF < 50%**

Severe Aortic Regurgitation
Surgical Intervention

Class IIa

- **Asymptomatic,**
- **EF > 50%,**
- **EDD > 75 mm or ESD > 55 mm *(B)***

Severe Aortic Regurgitation
Surgical Intervention

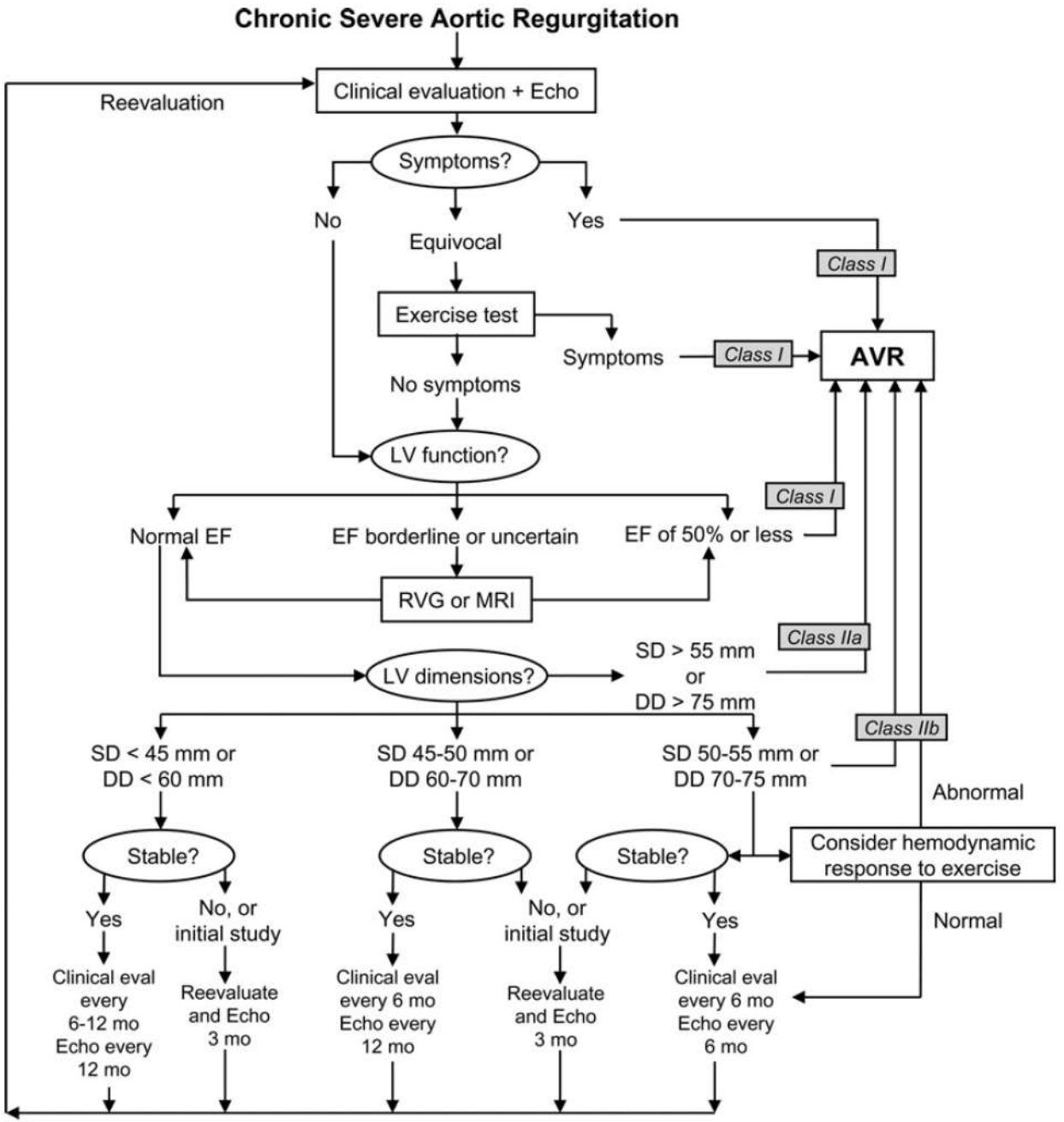
Class III

- **Asymptomatic,**
- **EF > 50%,**
- **EDD < 70 mm or ESD < 50 mm *(B)***

2008

ACC

Guidelines



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2008 ACC Guidelines

Indicator	Mild	Moderate	Severe
	Aortic Stenosis		
Jet velocity (m per s)	Less than 3.0	3.0–4.0	Greater than 4.0
Mean gradient (mm Hg)*	Less than 25	25–40	Greater than 40
Valve area (cm^2)	Greater than 1.5	1.0–1.5	Less than 1.0
Valve area index (cm^2 per m^2)			Less than 0.6
	Mitral Stenosis		
	Mild	**Moderate**	**Severe**
Mean gradient (mm Hg)*	Less than 5	5–10	Greater than 10
Pulmonary artery systolic pressure (mm Hg)	Less than 30	30–50	Greater than 50
Valve area (cm^2)	Greater than 1.5	1.0–1.5	Less than 1.0
	Aortic Regurgitation		
	Mild	**Moderate**	**Severe**
Qualitative			
Angiographic grade	1+	2+	3–4+
Color Doppler jet width	Central jet, width less than 25% of LVOT	Greater than mild but no signs of severe AR	Central jet, width greater than 65% LVOT
Doppler vena contracta width (cm)	Less than 0.3	0.3–0.6	Greater than 0.6
Quantitative (cath or echo)			
Regurgitant volume (ml per beat)	Less than 30	30–59	Greater than or equal to 60
Regurgitant fraction (%)	Less than 30	30–49	Greater than or equal to 50
Regurgitant orifice area (cm^2)	Less than 0.10	0.10–0.29	Greater than or equal to 0.30
Additional essential criteria			
Left ventricular size			Increased
	Mitral Regurgitation		
	Mild	**Moderate**	**Severe**
Qualitative			
Angiographic grade	1+	2+	3–4+
Color Doppler jet area	Small, central jet (less than 4 cm^2 or less than 20% LA area)	Signs of MR greater than mild present but no criteria for severe MR	Vena contracta width greater than 0.7 cm with large central MR jet (area greater than 40% of LA area) or with a wall-impinging jet of any size, swirling in LA
Doppler vena contracta width (cm)	Less than 0.3	0.3–0.69	Greater than or equal to 0.70
Quantitative (cath or echo)			
Regurgitant volume (ml per beat)	Less than 30	30–59	Greater than or equal to 60
Regurgitant fraction (%)	Less than 30	30–49	Greater than or equal to 50
Regurgitant orifice area (cm^2)	Less than 0.20	0.20–0.39	Greater than or equal to 0.40
Additional essential criteria			
Left atrial size			Enlarged
Left ventricular size			Enlarged

Bonow RO, Carabello BA, Chatterjee K, et al. 2008 Focused update incorporated into the ACC/AHA 2006 guidelines for the management of patients with valvular heart disease: a report of the American College of Cardiology/American Heart Association Task Force on Practice Guidelines (Writing Committee to Revise the 1998 Guidelines for management of patients with Valvular Heart Disease). J Am Coll Cardiol 2008;52:e1-142.

Vahanian A, Alfieri O, Andreotti F, et al. Guidelines on the management of valvular heart disease (version 2012): the Joint Task Force on the Management of valvular Heart Disease of the European Society of Cardiology (ESC) and the European Association for Cardio-Thoracic Surgery (EACTS). Eur Heart J 2012;33:2451-96.