Improving Risk Stratification in AsymptomaticMitral Regurgitation

Watchful Waiting?

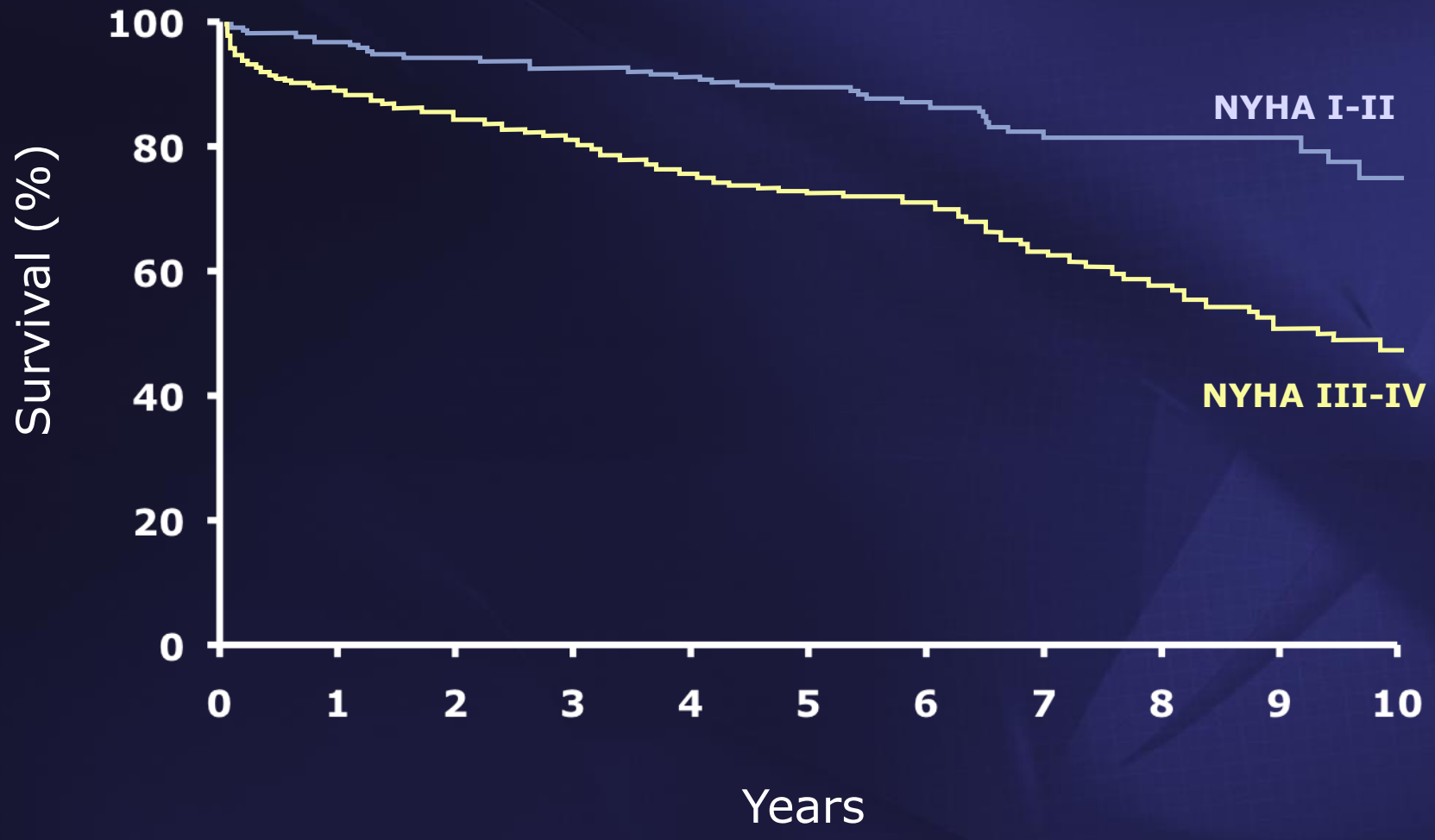
Raphael Rosenhek

Department of Cardiology
Medical University of Vienna

Eurovalve 2016
Brussels, March 11th, 2016

Timing of Intervention in Mitral Regurgitation

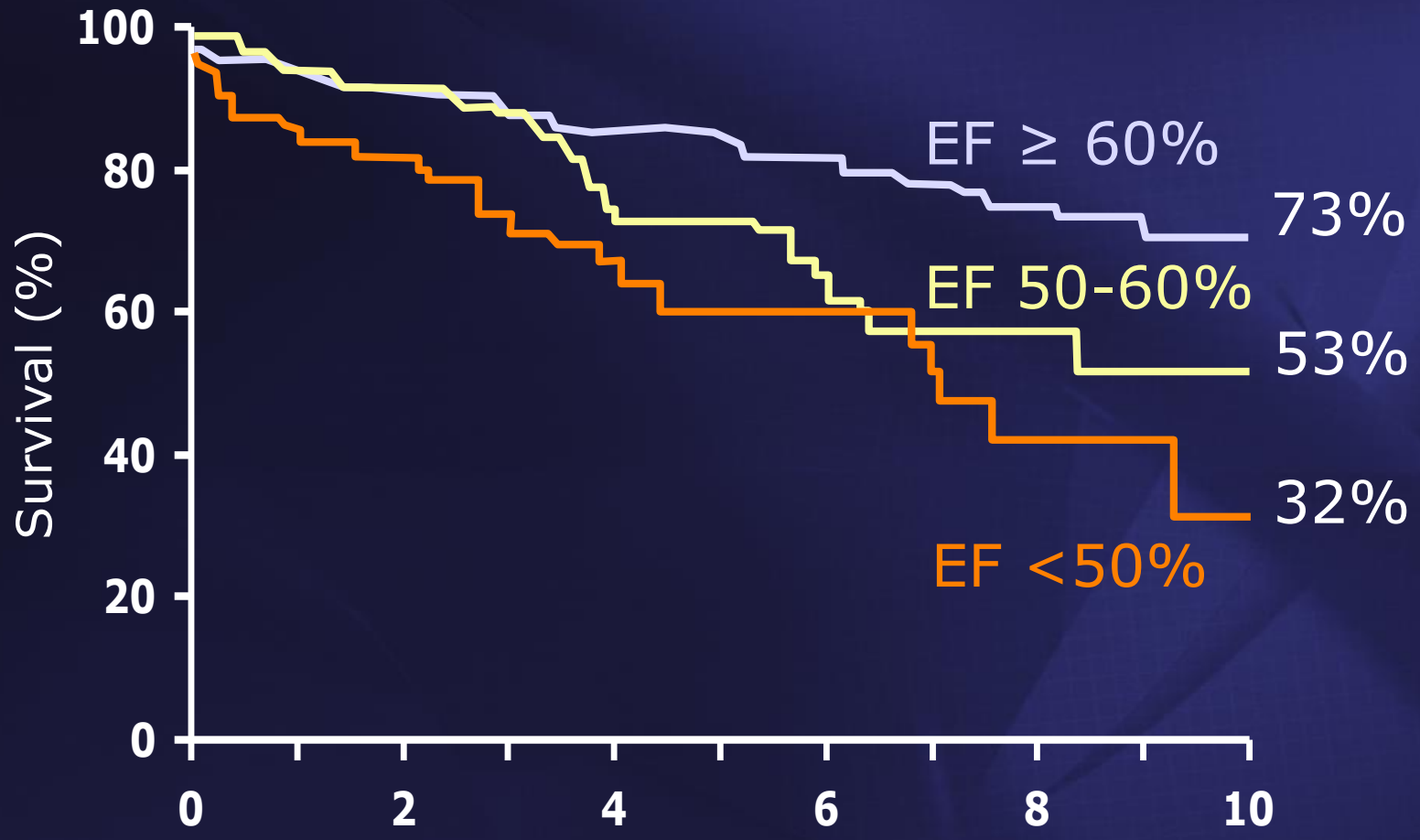
Impact of Preoperative Symptoms on Survival



Tribouilloy C et al. Circulation 1999;99:400

Timing of Intervention in Mitral Regurgitation

Impact of Preoperative EF on Survival

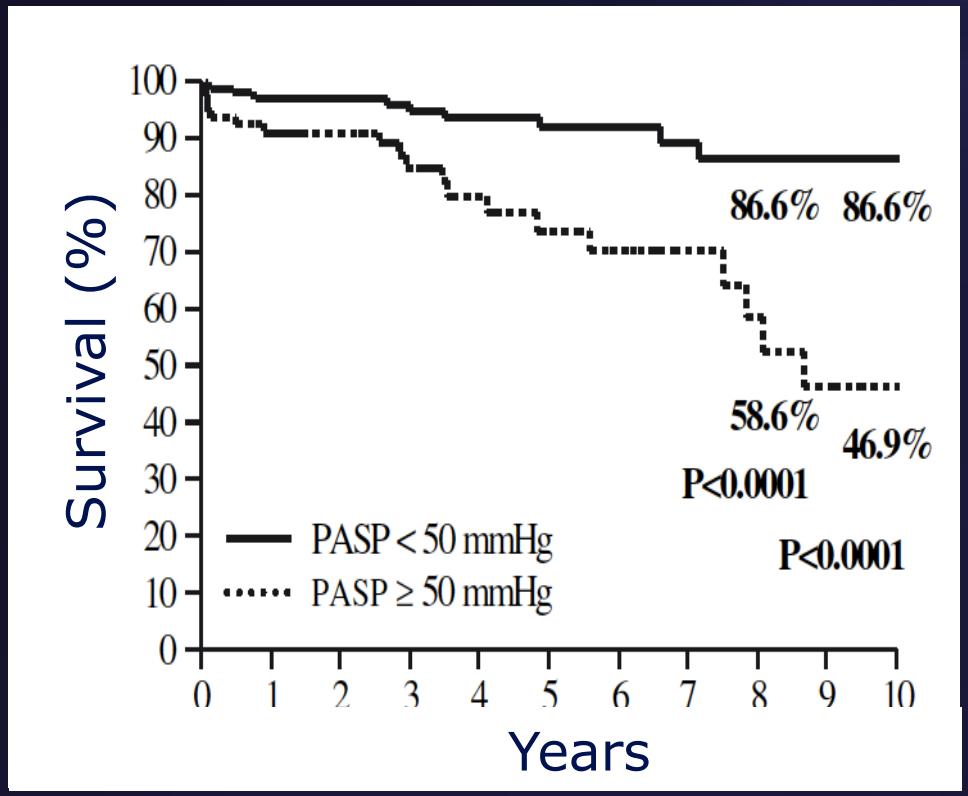


Enriquez-Sarano et al. Circulation 1994;90:830-837.

Risk Stratification in Asymptomatic MR

Pulmonary Hypertension

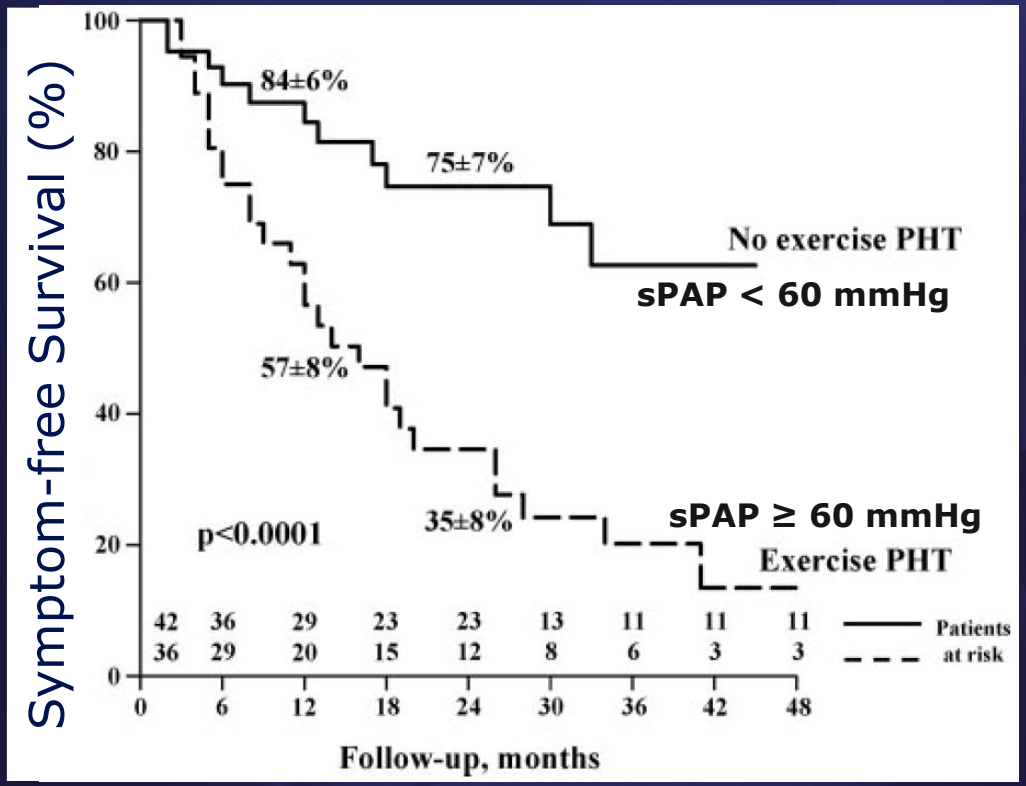
Postoperative survival



* 37% in NYHA classes III and IV

Le Tourneau et al. Heart 2010;96:1311-1317

Event-free survival

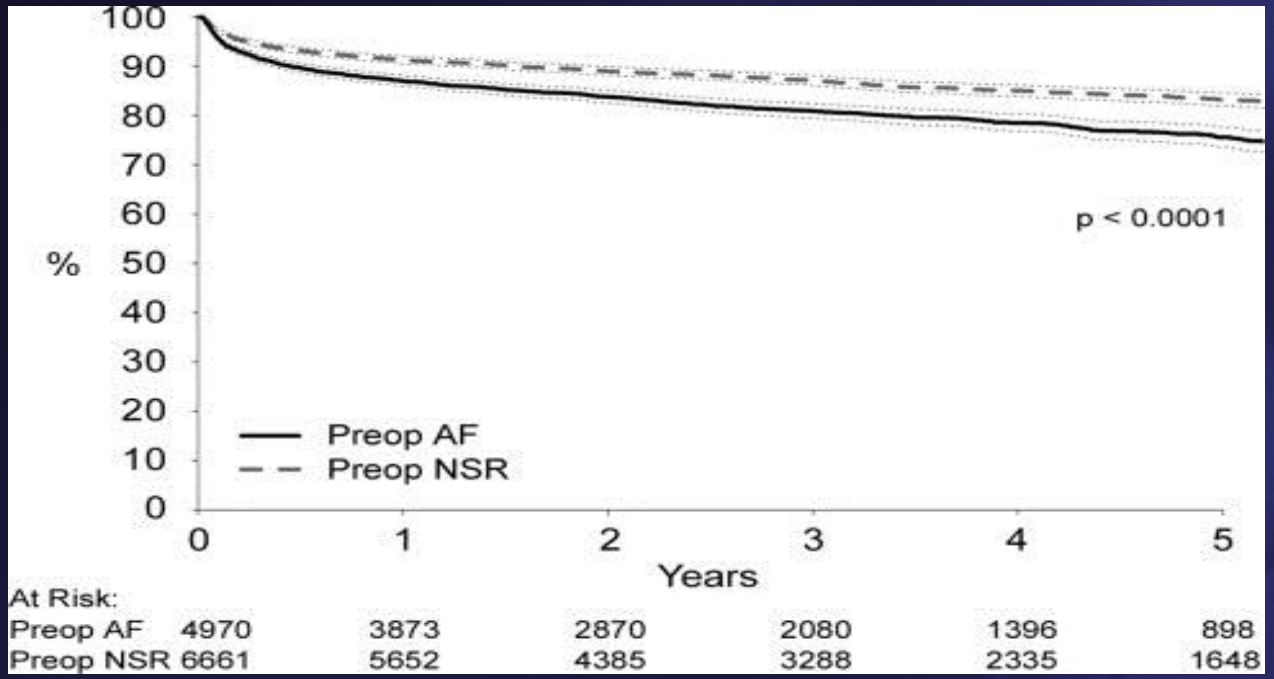


Magne J et al. Circulation 2010;122:33-41

Outcome of Mitral Valve Surgery

Impact of Preoperative Atrial Fibrillation

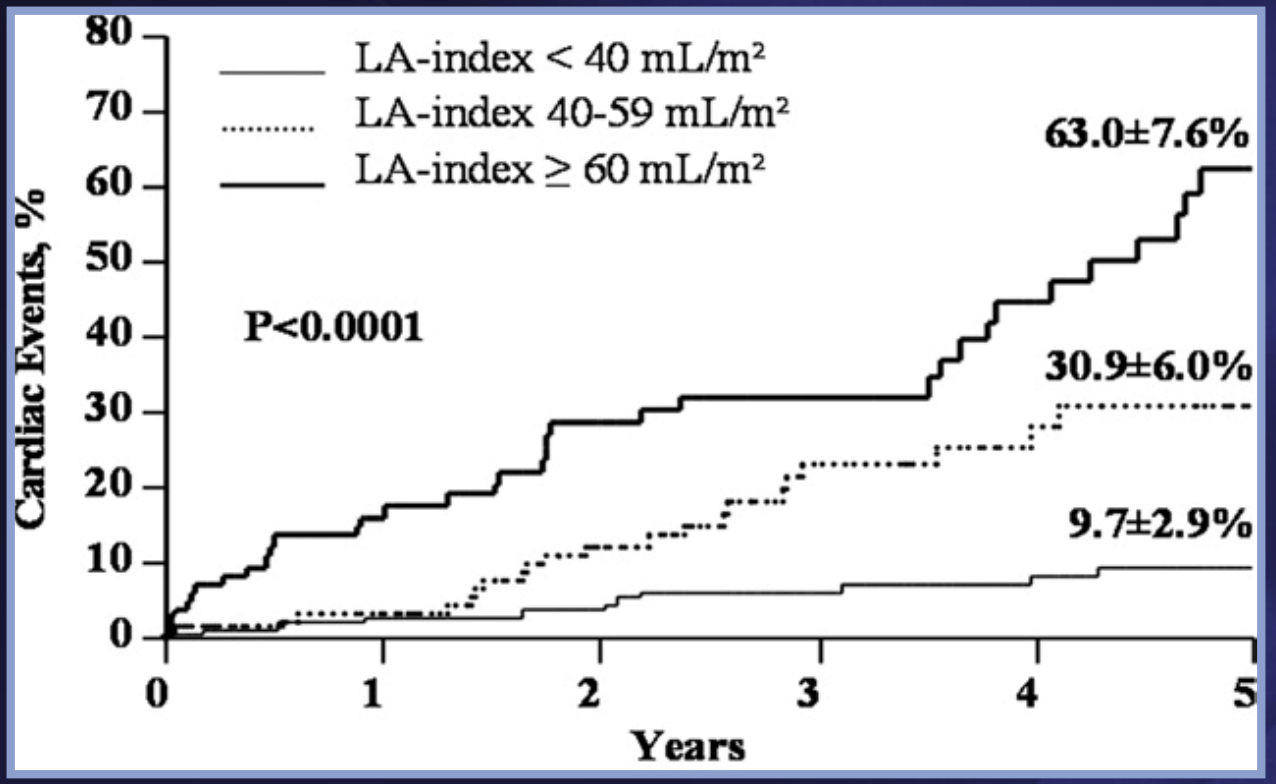
STS database 14604
mitral repair procedures 1991-2007



Badhwar et al.
Ann Thor Surg 2012;94:1870-1877

Risk Stratification in Asymptomatic MR

Event-free Survival: **LA-Size**



Le Tourneau T. et al. J Am Coll Cardiol 2010;56:570-8

Timing of Intervention in Mitral Regurgitation

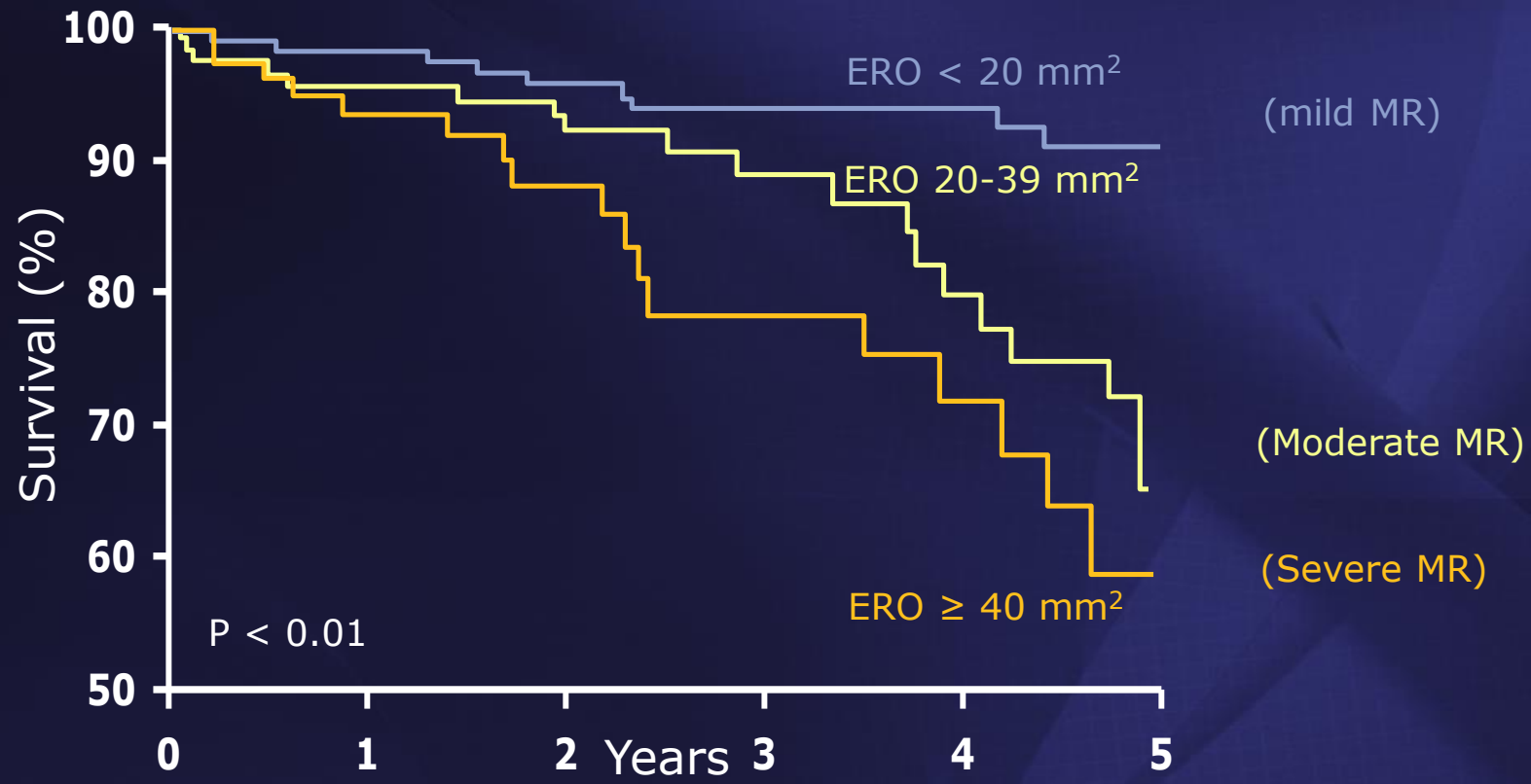
Sudden Death in MR due to flail leaflet

- 348 pts with flail leaflet
- Mean follow-up 48±41 months
- 99 deaths / 25 sudden deaths
- Risk factors: NYHA III-IV, EF < 60%
- Annual sudden death rate
  - NYHA III-IV 7.8%
  - NYHA I-II and EF > 60% 0.8%

Grigioni F et al. J Am Coll Cardiol 1999;34:2078

Timing of Intervention in Mitral Regurgitation

Predictive Value of ERO in MR

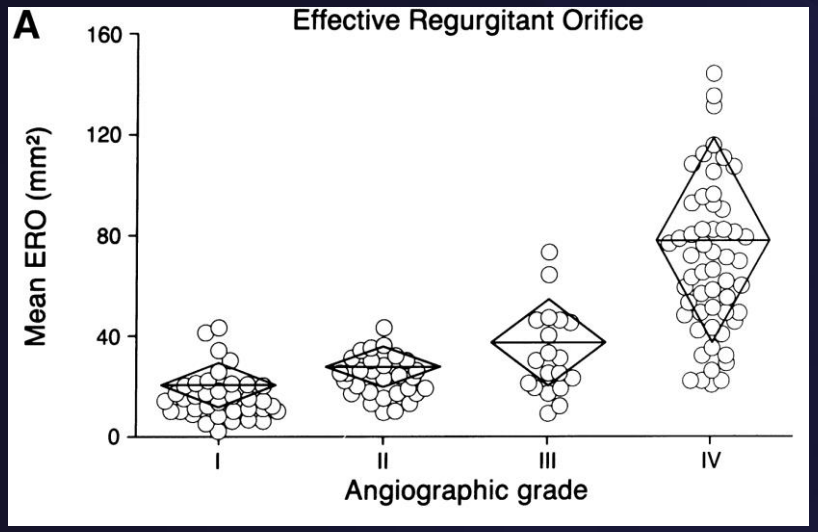


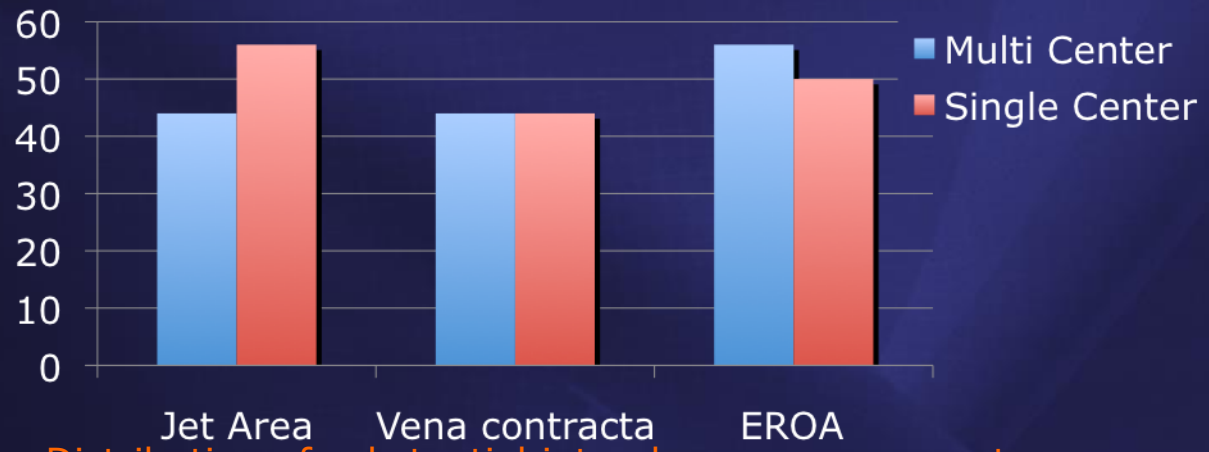
- Prospectively enrolled, Quantitative
- No regular follow-up exams
- Inclusion of patients with an EF 50-60%

Enriquez-Sarano, M. et al. N Engl J Med 2005;352:875-883

Timing of Intervention in Mitral Regurgitation

Predictive Value of ERO in MR





Distribution of substantial interobserver agreement

N= 84 functional/ischemic
96 organic MR
Time between echo and angio 34±8 days

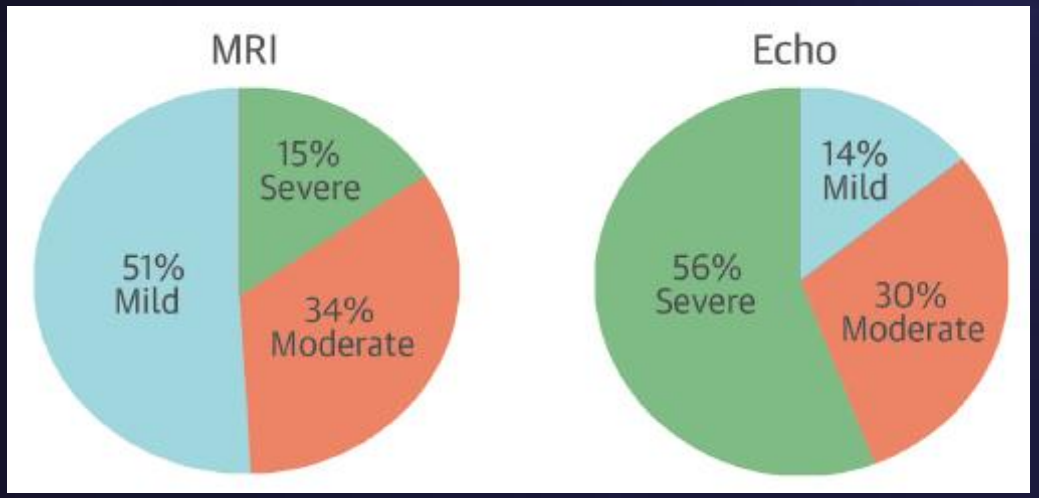
Dujardin, KS. et al.
Circulation 1997;96:3409-3415

Biner S. et al. JACC Cardiovasc Imaging 2010;3:235-43

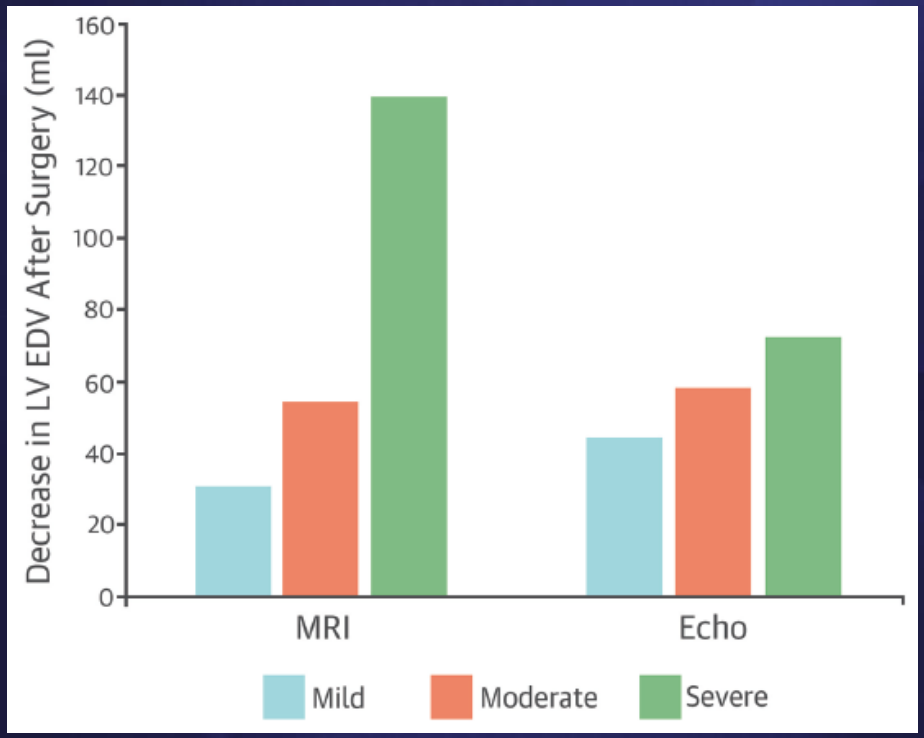
Timing of Intervention in Mitral Regurgitation

MR Quantification

Quantification of Mitral Regurgitation



Ventricular Response to Mitral Surgery



Uretzky S. et al. JACC 2015;65:1078-88

Mitral Regurgitation Quantification
Integrative Approach

Table 8 **Grading the severity of primary MR**

Parameters	Mild	Moderate	Severe
Qualitative			
MV morphology	Normal/abnormal	Normal/abnormal	Flail leaflet/ruptured PMs
Colour flow MR jet	Small, central	Intermediate	Very large central jet or eccentric jet adhering, swirling and reaching the posterior wall of the LA
Flow convergence zone[a]	No or small	Intermediate	Large
CW signal of MR jet	Faint/parabolic	Dense/parabolic	Dense/triangular
Semi-quantitative			
VC width (mm)	<3	Intermediate	≥7 (>8 for biplane)[b]
Pulmonary vein flow	Systolic dominance	Systolic blunting	Systolic flow reversal[c]
Mitral inflow	A wave dominant[d]	Variable	E-wave dominant (>1.5 m/s)[e]
TVI mit /TVI Ao	<1	Intermediate	>1.4
Quantitative			
EROA (mm^2)	<20	20–29; 30–39[g]	≥40
R Vol (mL)	<30	30–44; 45–59[g]	≥60
+ LV and LA size and the systolic pulmonary arterial pressure[f]			

Lancellotti et al. EHJCI 2013;14:611-44

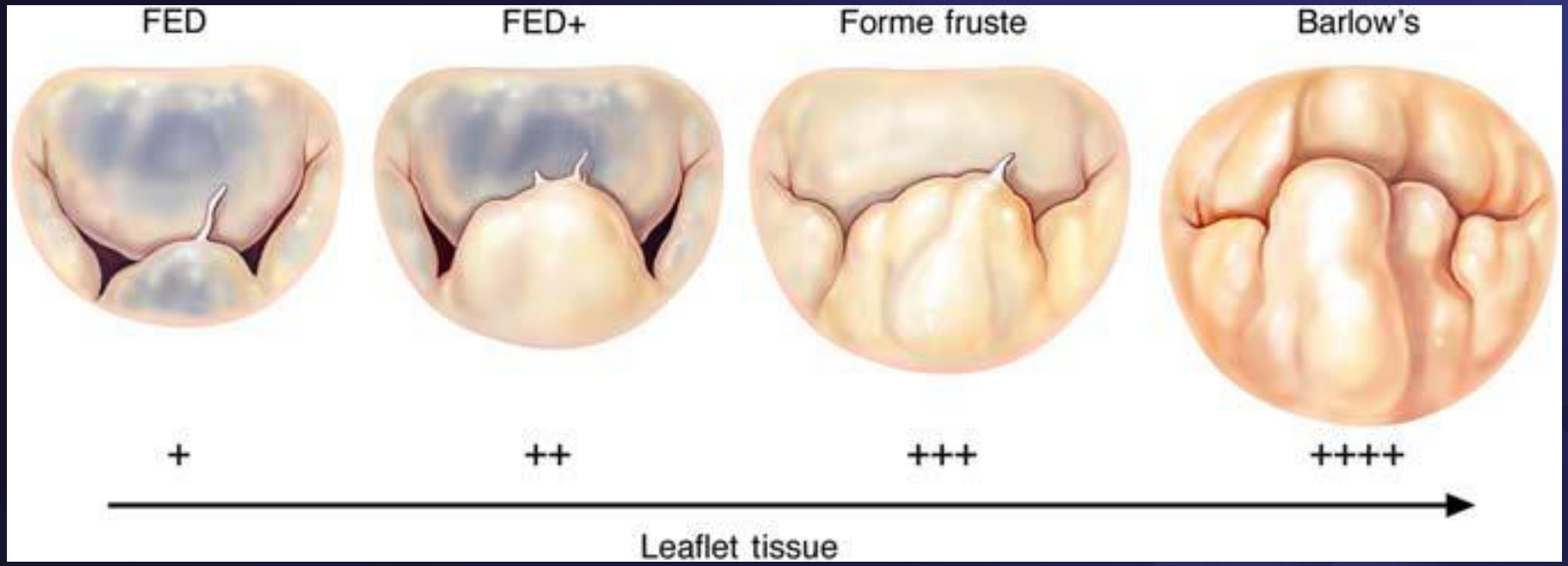
Asymptomatic Severe Mitral Regurgitation

The Temptation of Early Surgery

- Surgical Risk close to 0%
- Repair rate close to 100%

Degenerative Mitral Regurgitation

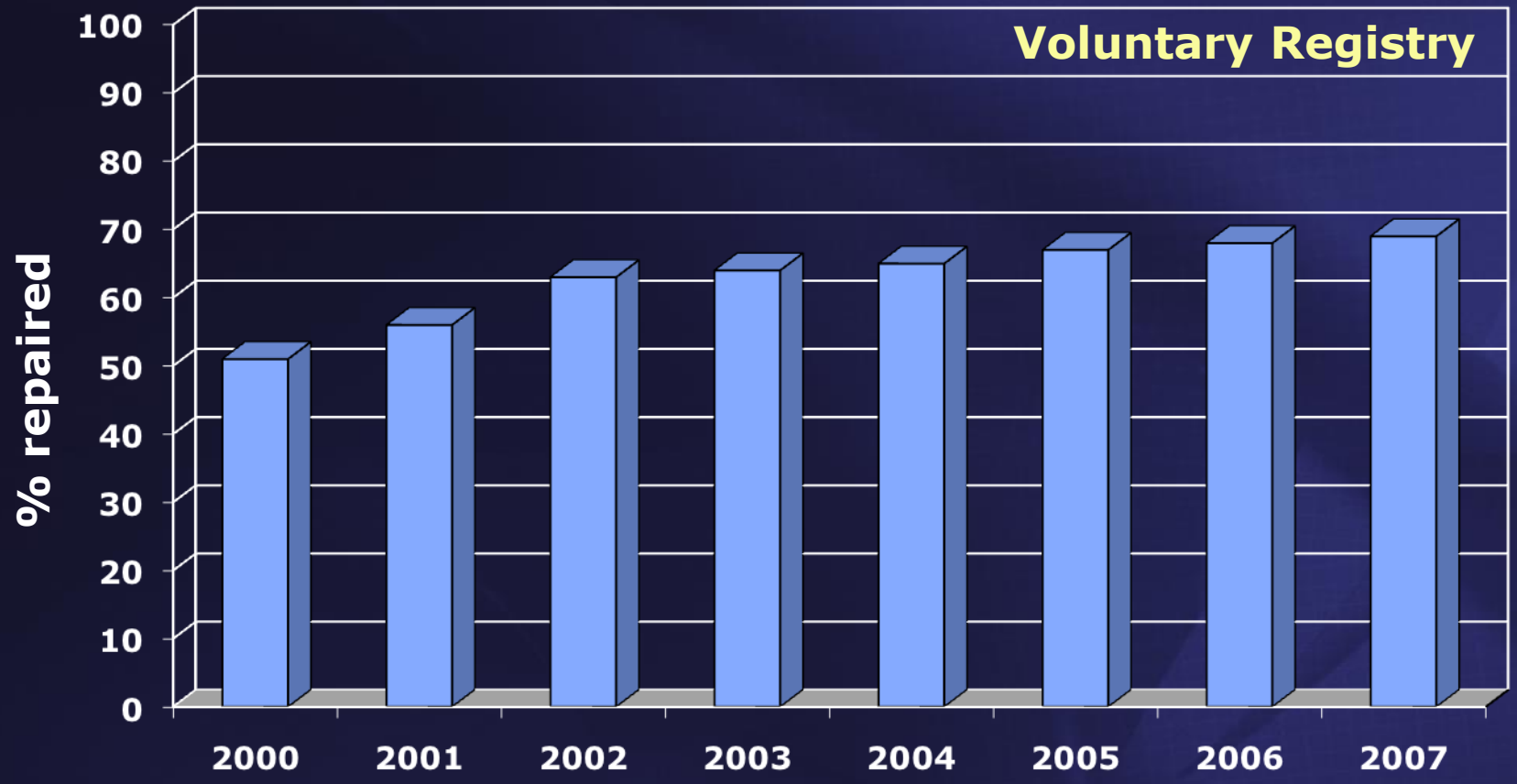
Variable Morphologic Presentation



Adams D, Rosenhek R and Falk V. Eur Heart J 2010;31:1958-67.

Timing of Intervention in Mitral Regurgitation

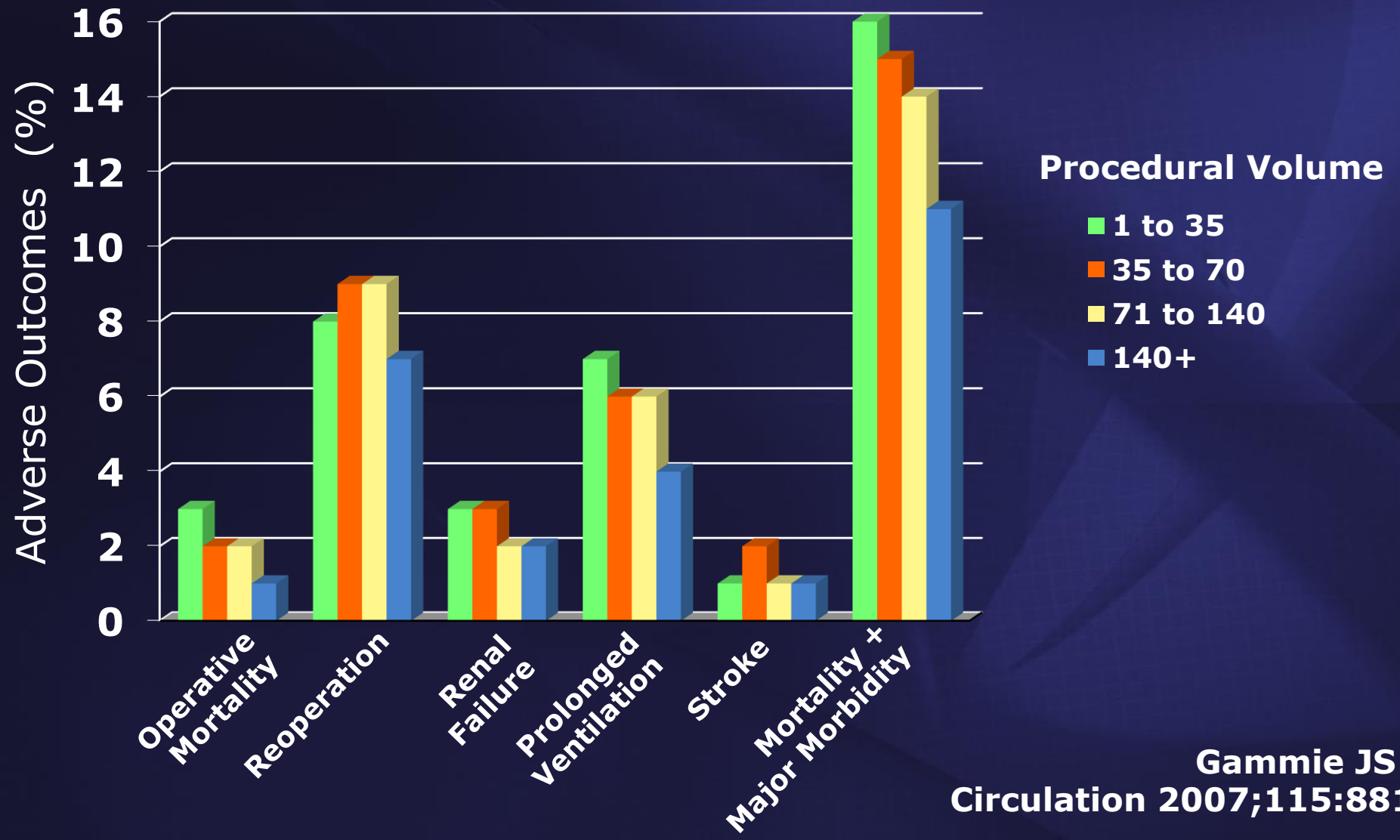
STS - MV Repair Rate for Isolated Primary MR



Gammie JS et al. Ann Thorac Surg.2009;87:1431-1437

Timing of Intervention in Mitral Regurgitation

Influence of Hospital Procedural Volume



Gammie JS et al.
Circulation 2007;115:881-887

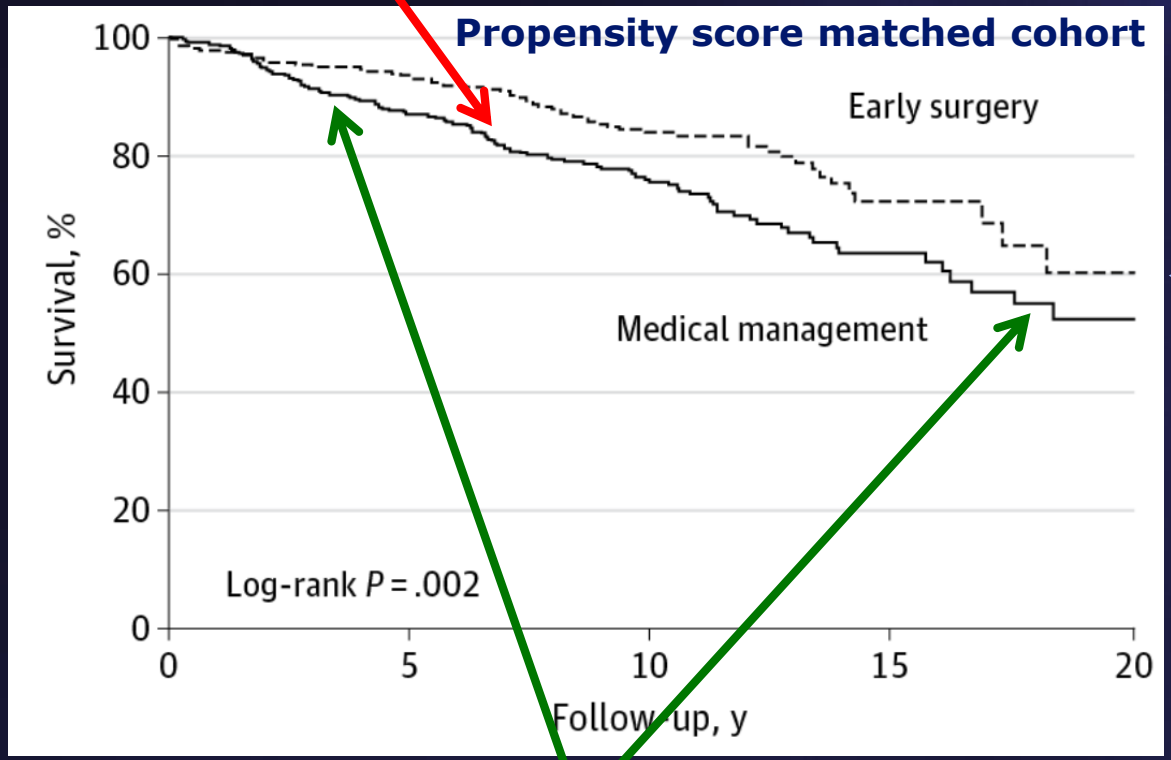
MIDA: Outcome in Severe Flail MR

Early Surgery vs „Watchful Waiting“

Retrospective registry

19% with class II indication (AFib 10%, PHT 11.8%)

6 centers – 24 years (1980-2004)
1021 of 2097 pts without a class I indication for surgery



Arbitrary Cutoff:
Early surgery defined as
“within 3 months of diagnosis”

Watchful Waiting?: „Each patient had follow-up visits with a physician within each participating center or elsewhere“

Suri RM. et al. JAMA 2013;310:609-16

Mitral Regurgitation Quantification

MIDA (1980-2004)

Methodology of MR quantification:

mensions. The severity of mitral regurgitation was assessed semiquantitatively on a scale from 1 to 4 by Doppler echocardiography according to American Society of Echocardiography criteria.[18] Diagnosis of flail leaflet was based on failure of

Table 1 Qualitative and quantitative parameters useful in grading mitral regurgitation severity

	Mild	Moderate	Severe
Structural parameters			
LA size	Normal*	Normal or dilated	Usually dilated**
LV size	Normal*	Normal or dilated	Usually dilated**
Mitral leaflets or support apparatus	Normal or abnormal	Normal or abnormal	Abnormal/ Flail leaflet/ Ruptured papillary muscle
Doppler parameters			
Color flow jet area‡	Small, central jet (usually < 4 cm^2 or $< 20\%$ of LA area)	Variable	Large central jet (usually > 10 cm^2 or $> 40\%$ of LA area) or variable size wall-impinging jet swirling in LA
Mitral inflow –PW	A wave dominant‖	Variable	E wave dominant‖ (E usually 1.2 m/s)
Jet density –CW	Incomplete or faint	Dense	Dense
Jet contour –CW	Parabolic	Usually parabolic	Early peaking–triangular
Pulmonary vein flow	Systolic dominance§	Systolic blunting§	Systolic flow reversal†
Quantitative parameters¶			
VC width (cm)	< 0.3	0.3-0.69	≥ 0.7
R Vol (ml/beat)	< 30	30-44 / 45-59	≥ 60
RF (%)	< 30	30-39 / 40-49	≥ 50
EROA (cm^2)	< 0.20	0.20-0.29 / 0.30-0.39	≥ 0.40

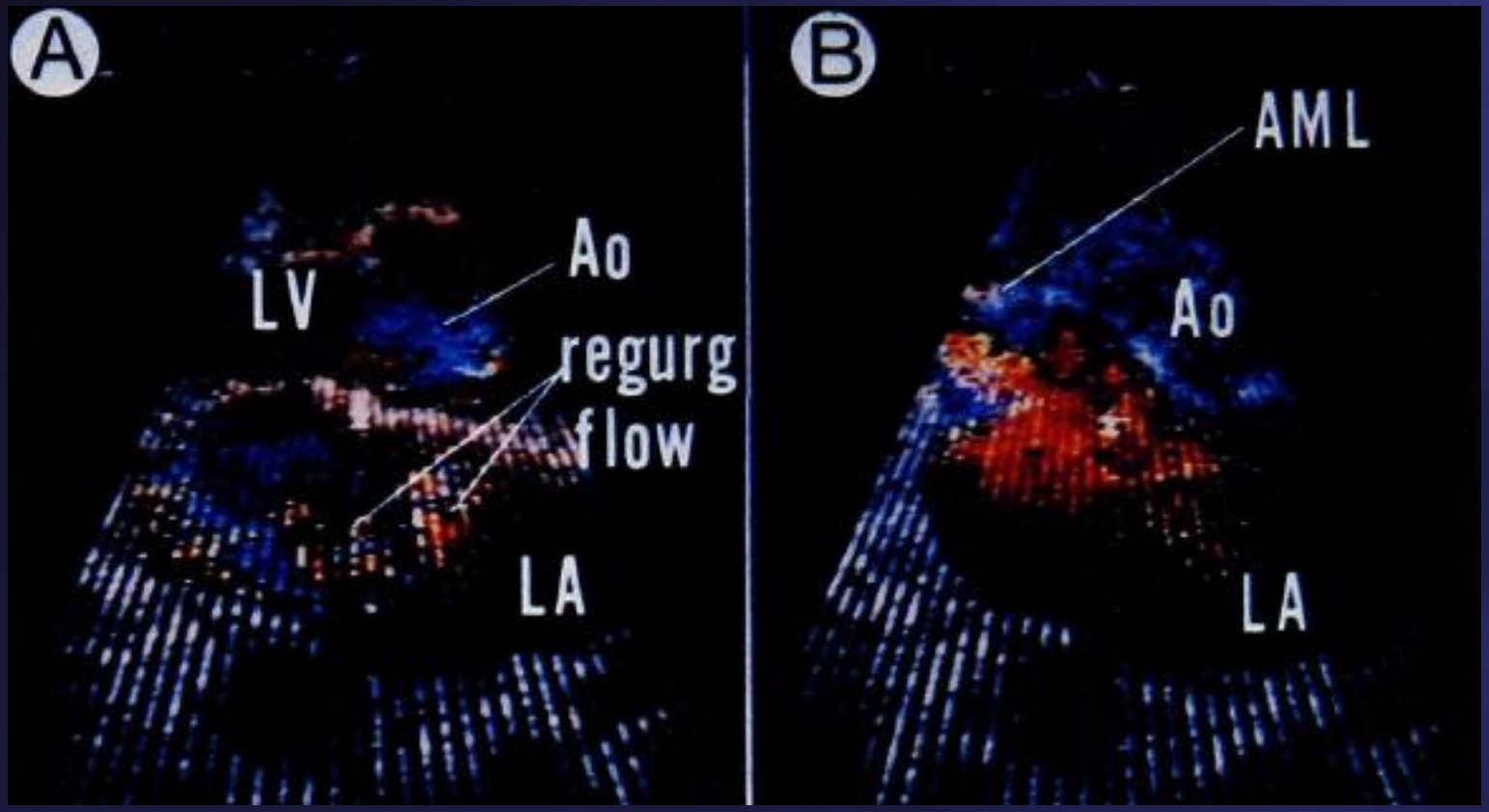
18. Agricola E, Oppizzi M, De Bonis M, et al. Multiplane transesophageal echocardiography performed according to the guidelines of the American Society of Echocardiography in patients with mitral valve prolapse, flail, and endocarditis. *J Am Soc Echocardiogr*. 2003;16(1):61-66.

Suri RM. et al. JAMA 2013;310:609-16

Mitral Regurgitation by Color Doppler 1984

MIDA (1980-2004)

"The Development of Real-Time 2D Echocardiography and its Clinical Significance in Acquired Valvular Diseases"



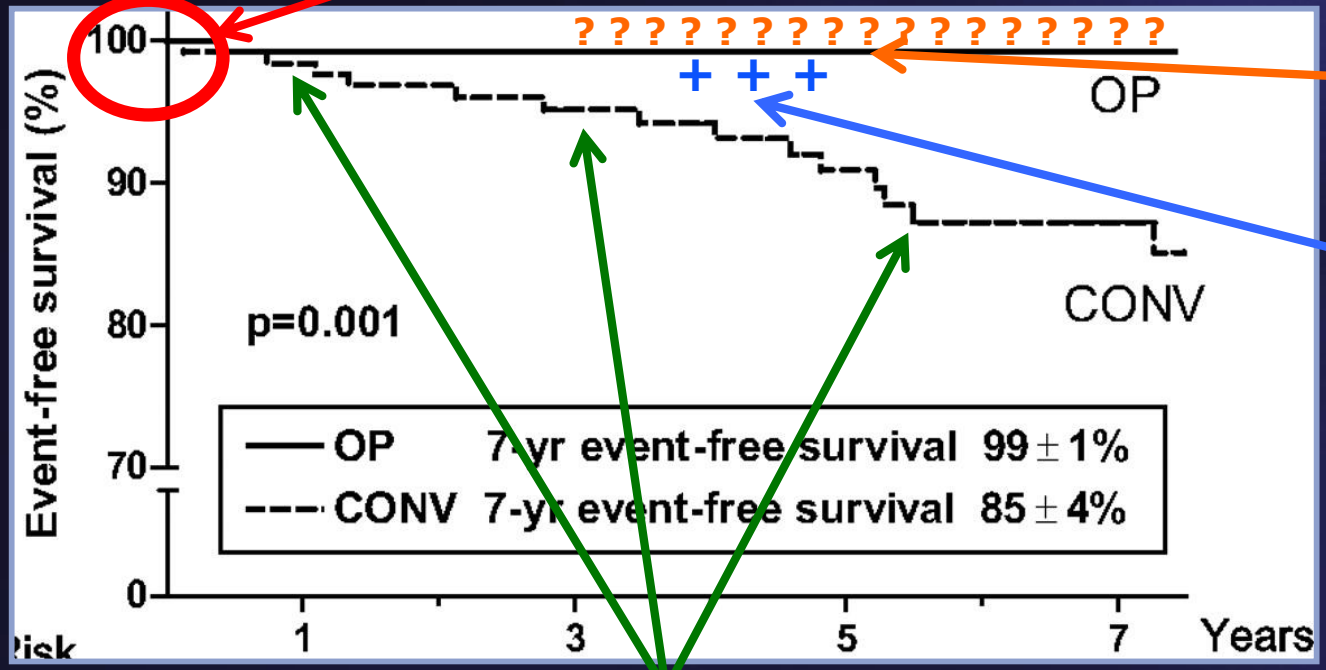
Omoto R. et al. Jpn Heart J 1984;25:325-340

Severe but Asymptomatic MR

Early Surgery vs „Waiting for Symptoms"

Registry

No surgical mortality neither in the OP nor in the CONV group



17 pts lost to follow-up
apparently all in the OP group

3 unaccounted deaths in the surgical group
2 strokes,
1 infection considered "Noncardiac deaths"

No conclusive benefit of either strategy demonstrated

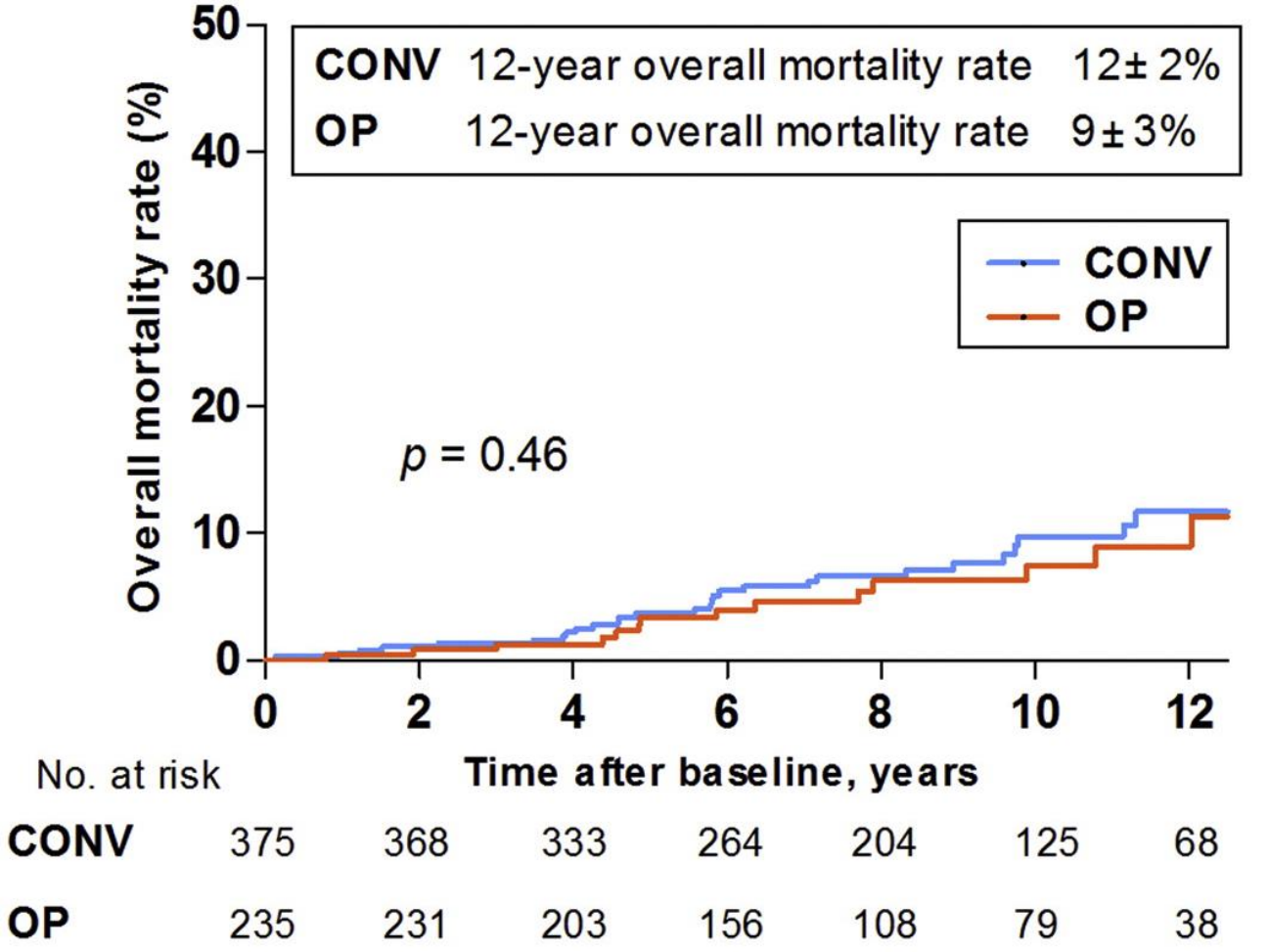
Events in the "conventional" group:
- 22 heart failure (trigger for surgery)
- 5 congestive heart failure deaths in pts refusing surgery
- 1 sudden death in a patient who became symptomatic

Kang, D.-H. et al. Circulation 2009;119:797-804

Severe but Asymptomatic MR

Early Surgery vs „Waiting for Symptoms"

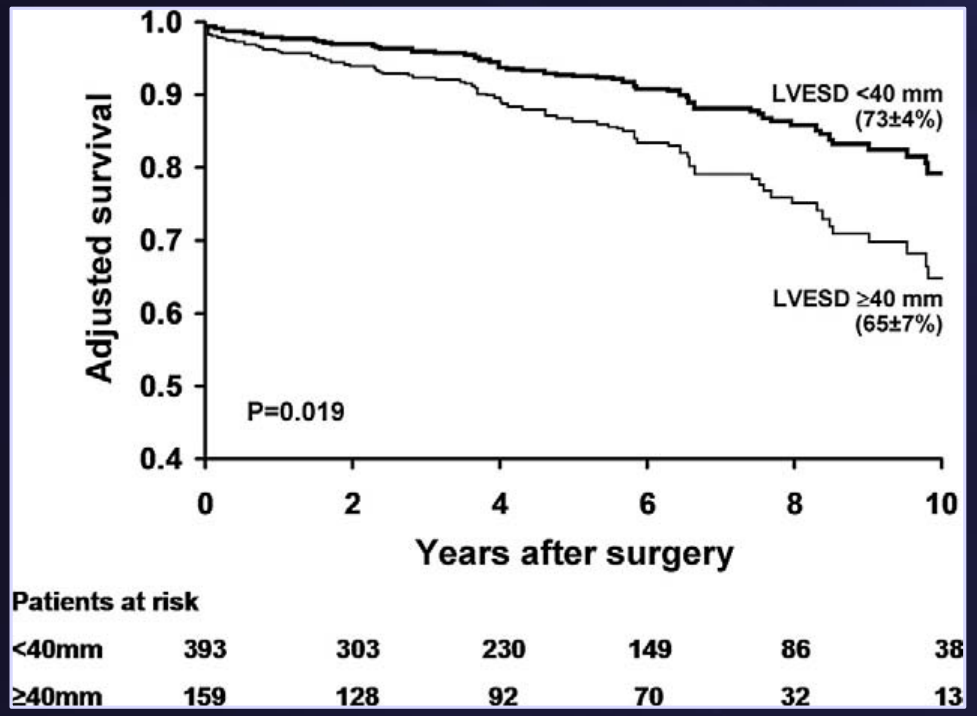
Registry



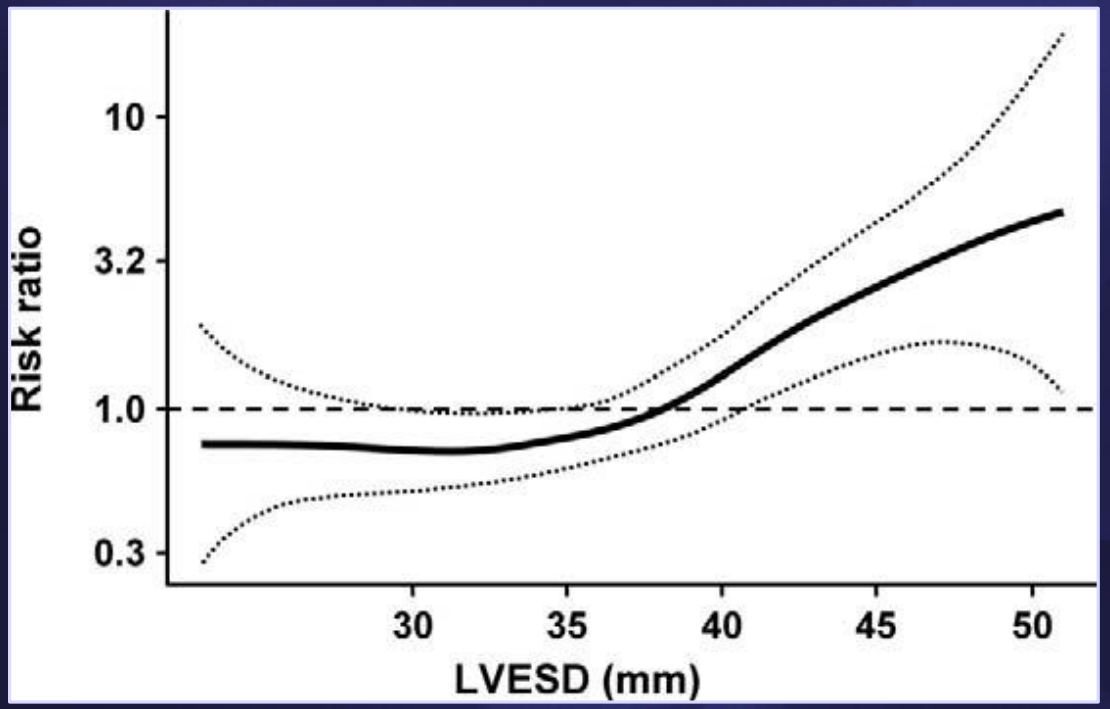
Lower rate of cardiac mortality and of cardiac events only in pts ≥ 50 yrs

Kang DH et al. J Am Coll Cardiol 2014;63:2398-2407

MIDA: Outcome in Severe MR
Left Ventricular Endsystolic Diameter



Adjusted Post-Operative Overall Survival according to LVESD

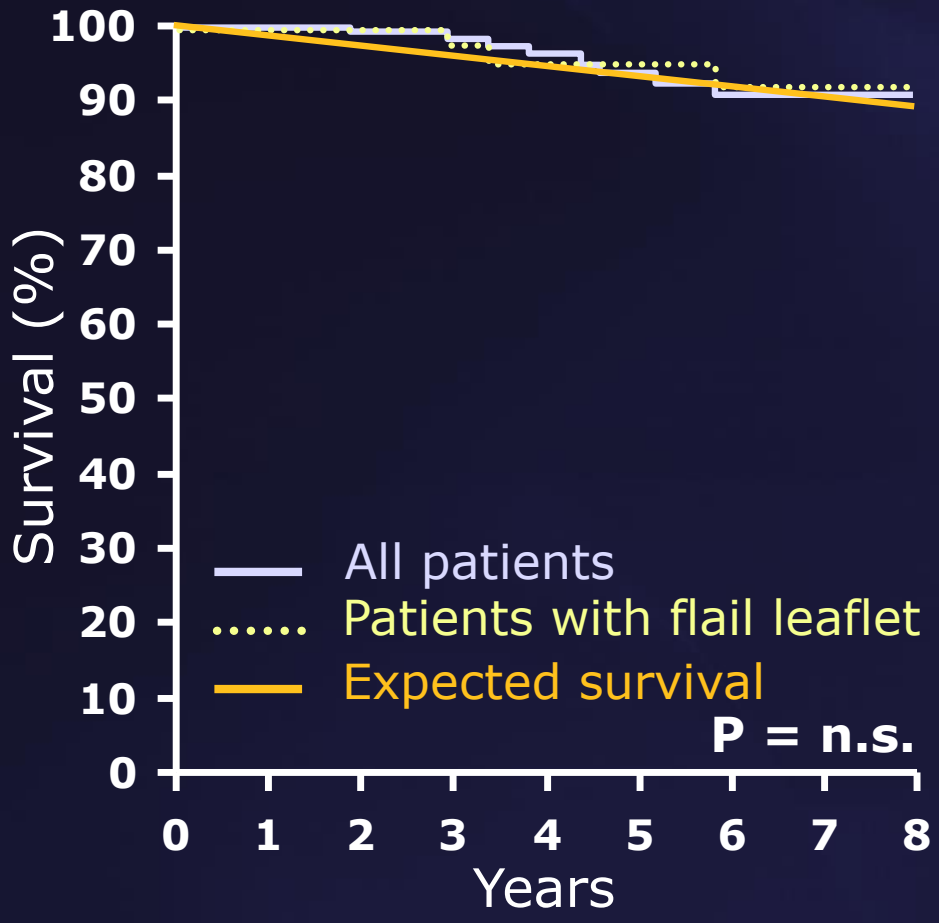


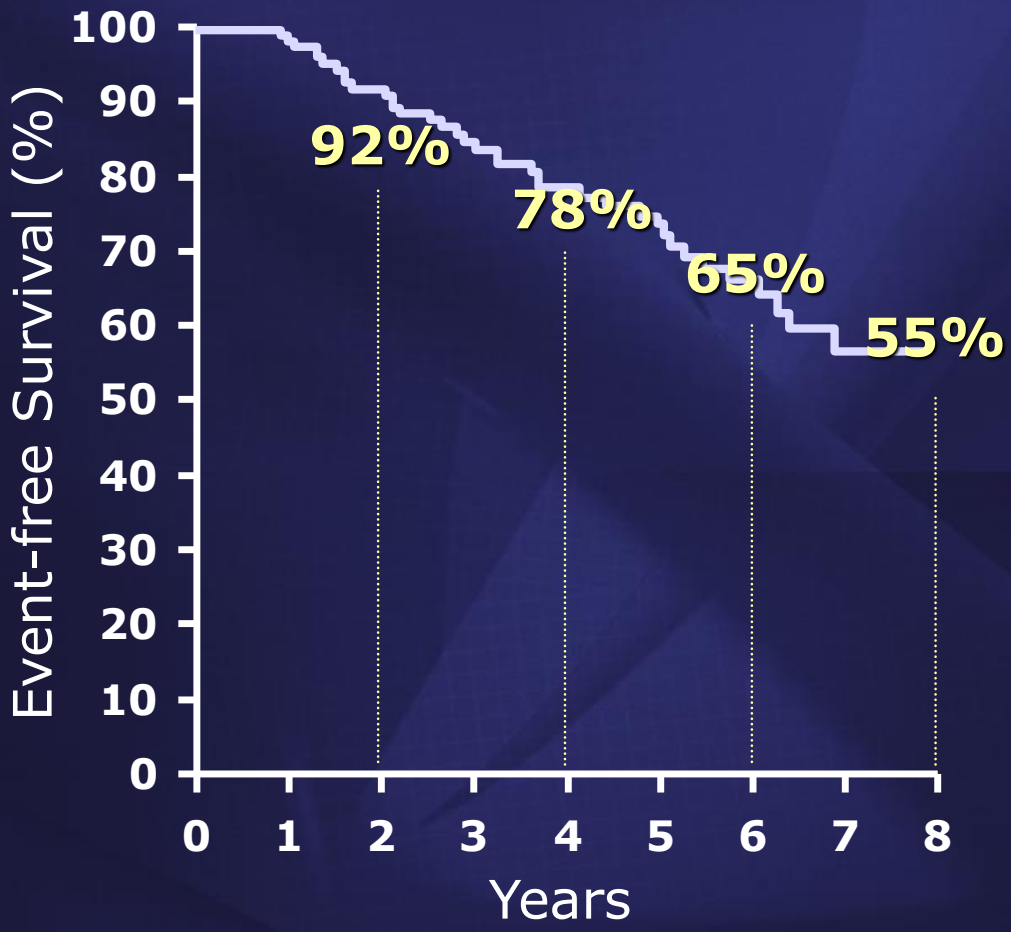
LVESD and the Risk of Overall Mortality under Conservative Management

Tribouilloy, C. et al. J Am Coll Cardiol 2009;54:1961-8

Asymptomatic Severe Mitral Regurgitation

Survival - Watchful Waiting Strategy

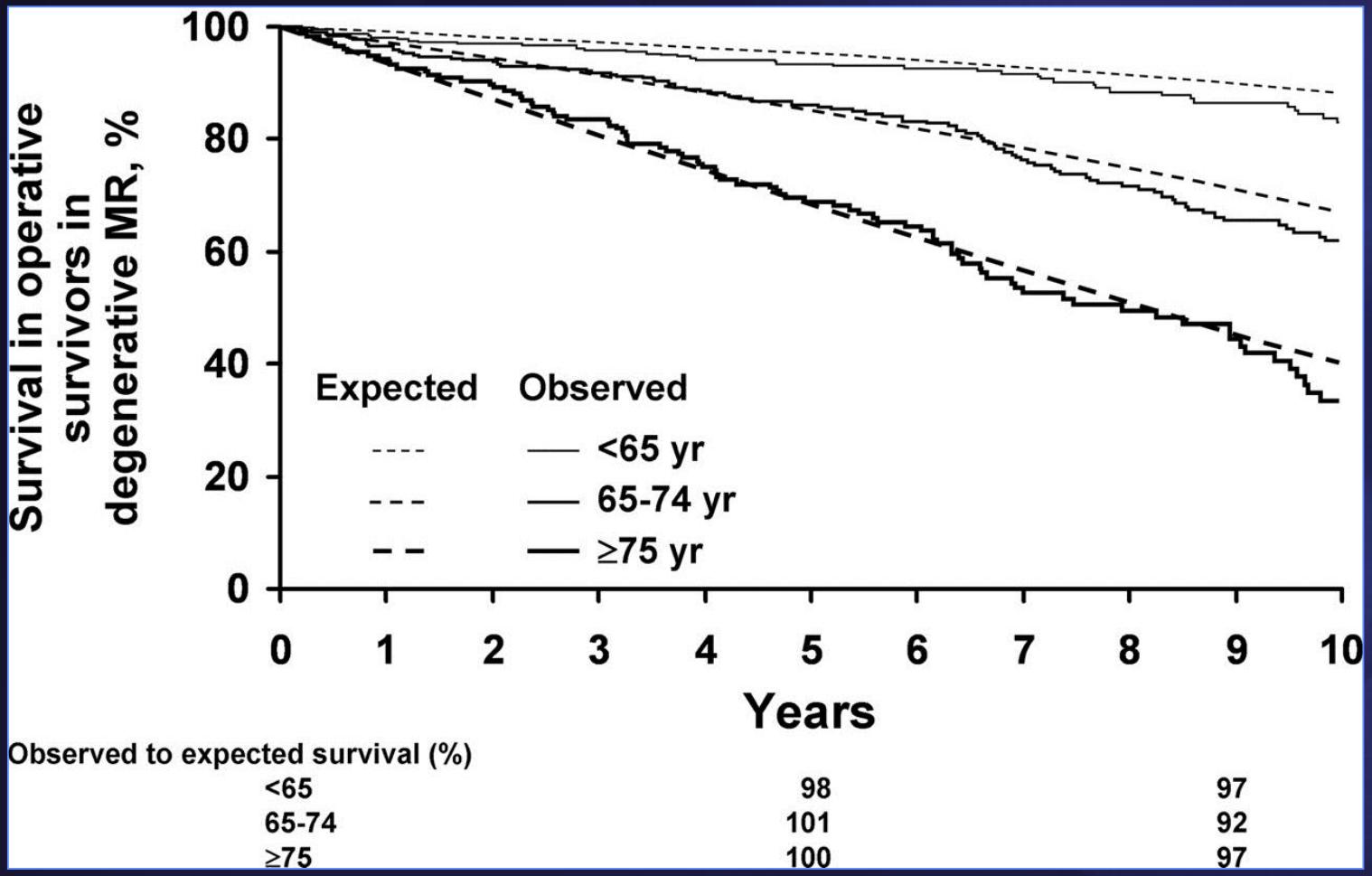




Rosenhek et al. Circulation 2006;113:2238-2244.

Degenerative Mitral Regurgitation

„Restoring Life Expectancy“ with Mitral Surgery



Observed to expected survival (%)

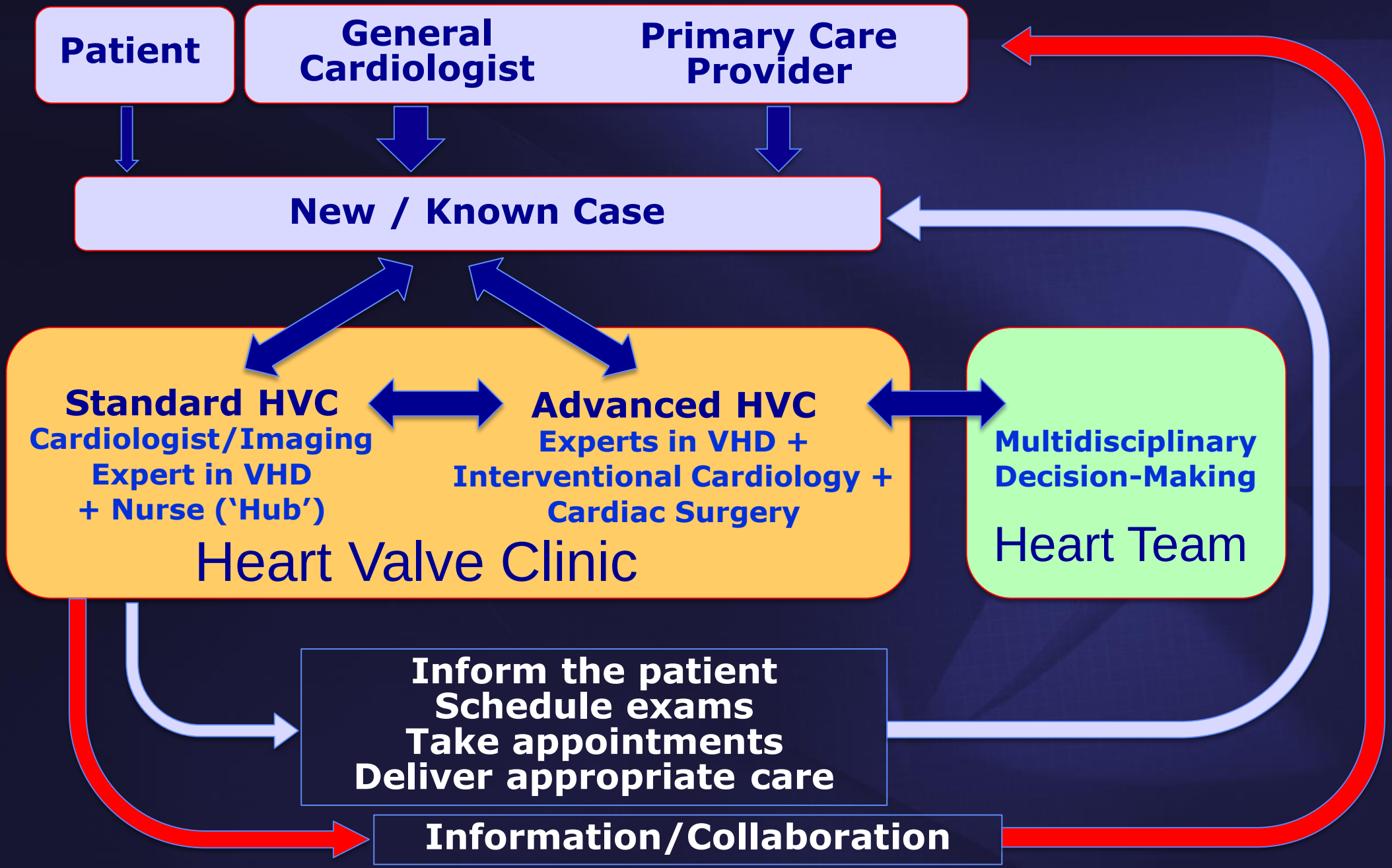
<65	98	97
65-74	101	92
≥75	100	97

- NYHA III-IV 57%
- Afib 40%
- EF 58±13%

Detaint, D... Enriquez Sarano M. Circulation 2006;114:265-272

Heart Valve Clinic Concept

Lancellotti P, Rosenhek R et al.
Eur Heart J 2013;34:1597-1606



Mitral Valve

Historical Perspective

Leonardo Da Vinci