



# Surgical and interventional management of mitral valve regurgitation: a position statement from the European Society of Cardiology Working Groups on Cardiovascular Surgery and Valvular Heart Disease

## Summary statements: primary mitral regurgitation

- Surgery remains the first option in primary MR with very low operative mortality and established efficacy and durability in high volume centres.
- Percutaneous EE repair is an alternative in symptomatic inoperable and high-risk patients. Early mortality following percutaneous treatment in this high-risk subgroup has been high (up to 9%)<sup>4,24,30</sup> and >50% of patients have been left with residual or recurrent  $\geq 2/4$  MR at 1 year.<sup>5,24</sup>
- Properly designed randomized studies are needed to establish the best therapeutic option in this high-risk subset.

# Quando candidare il paziente al trattamento chirurgico?



## ESC/EACTS guidelines on VHD management 2012

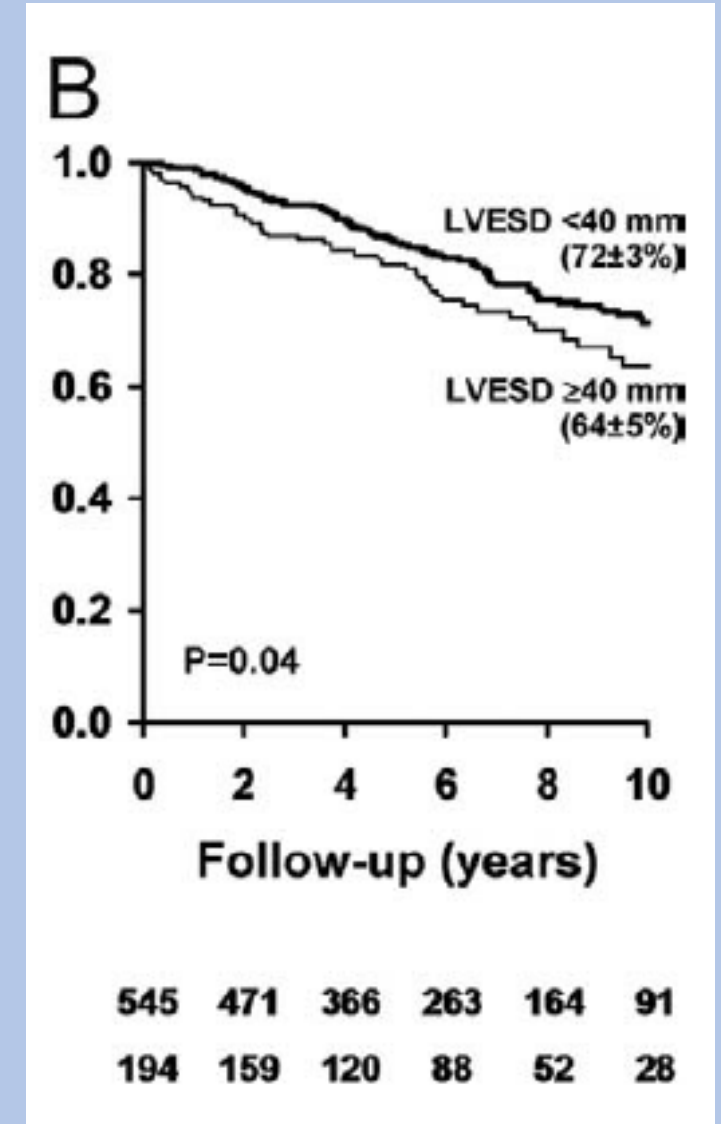
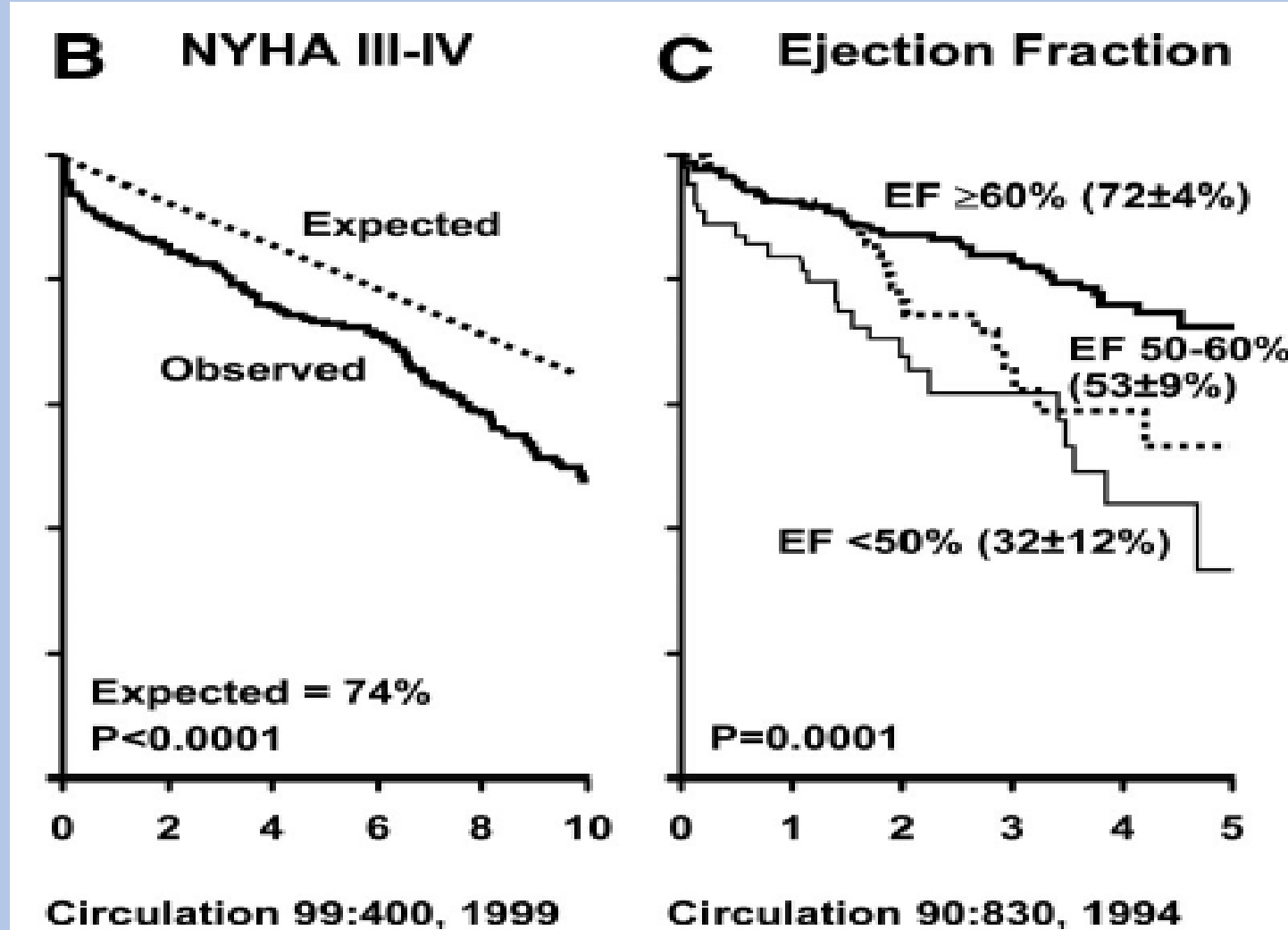
Surgery should be considered in asymptomatic patients with preserved LV function, high likelihood of durable repair, low surgical risk and flail leaflet and LVEDD $\geq$ 40 mm.	<b>IIa</b>	<b>C</b>
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<b>Class IIa</b>		<i>Weight of evidence/opinion is in favour of usefulness/efficacy.</i>
<b>Level of evidence B</b>	<b>Data derived from a single randomized clinical trial or large non-randomized studies.</b>	
<b>Level of evidence C</b>	<b>Consensus of opinion of the experts and/or small studies, retrospective studies, registries.</b>	

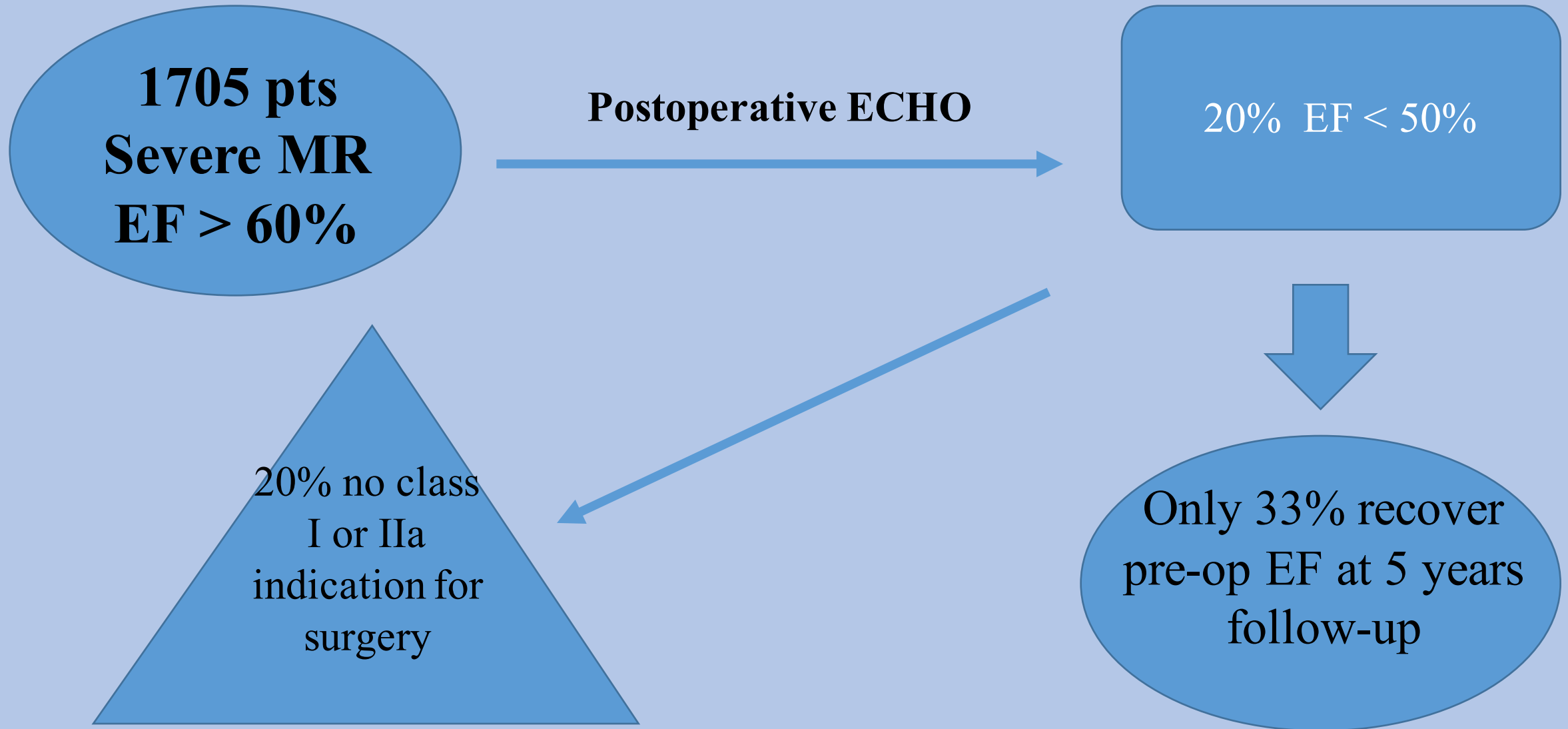
## AHA/ACC Guidelines on VHD management 2014

MV repair is reasonable in asymptomatic patients with chronic severe primary MR (stage C1) with preserved LV function (LVEF $>$ 60% and LVEDD $<$ 40 mm) in whom the likelihood of a successful and durable repair without residual MR is $>$ 95% with an expected mortality rate of $<$ 1% when performed at a Heart Valve Center of Excellence	<b>IIa</b>	<b>B</b>
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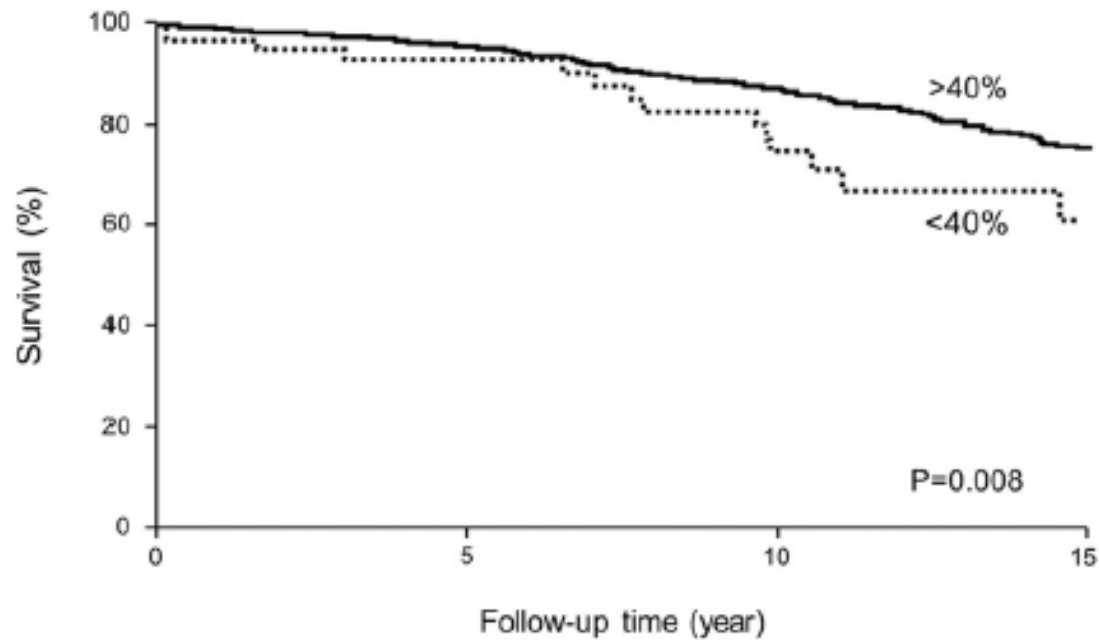
# Le indicazioni di classe I



# Predictive value of pre-op EF



# Postoperative LV dysfunction and survival



Postop EF <40					
No	1634	954	523	175	
Yes	71	43	28	10	

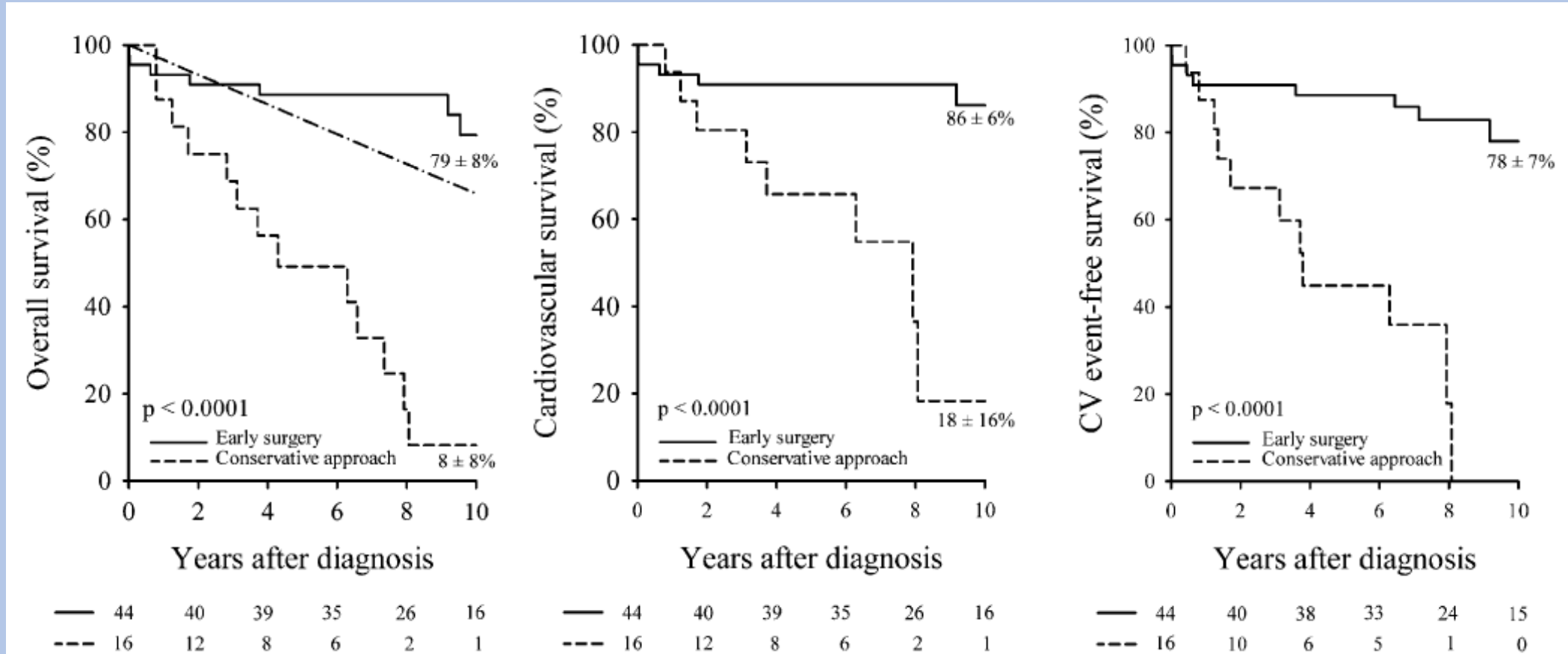
TABLE 6. Preoperative predictors of early postoperative LVEF < 40%

Preoperative data	Univariate analysis		Multivariate model	
	OR (95% CI)	P value	OR (95% CI)	P value
Greater LV mass	1.01 (1.01-1.01)	<.001		
Greater LAD	1.07 (1.03-1.11)	<.001		
Greater LVEDD	1.19 (1.14-1.25)	<.001		
NYHA class III or IV	1.94 (1.2-3.14)	.007		
Atrial fibrillation	2.66 (1.32-5.35)	.006		
RVSP > 49 mm Hg	4.57 (2.54-8.23)	<.001	4.40 (2.35-8.23)	<.001
Higher ERO (PISA)	5.00 (2.4-10.4)	<.001		
LVESD > 36 mm Hg	5.93 (3.15-11.97)	<.001	6.46 (3.31-13.61)	<.001

OR, Odds ratio; CI, confidence interval; LV, left ventricular; LAD, left atrial diameter; LVEDD, left ventricular end-diastolic diameter; NYHA, New York Heart Association; RVSP, right ventricular systolic pressure; ERO, effective regurgitant orifice; PISA, proximal isovelocity surface area; LVESD, left ventricular end systolic diameter.

# Le indicazioni di classe II

Subgroup of patients with Afib e/o pulmonary hypertension





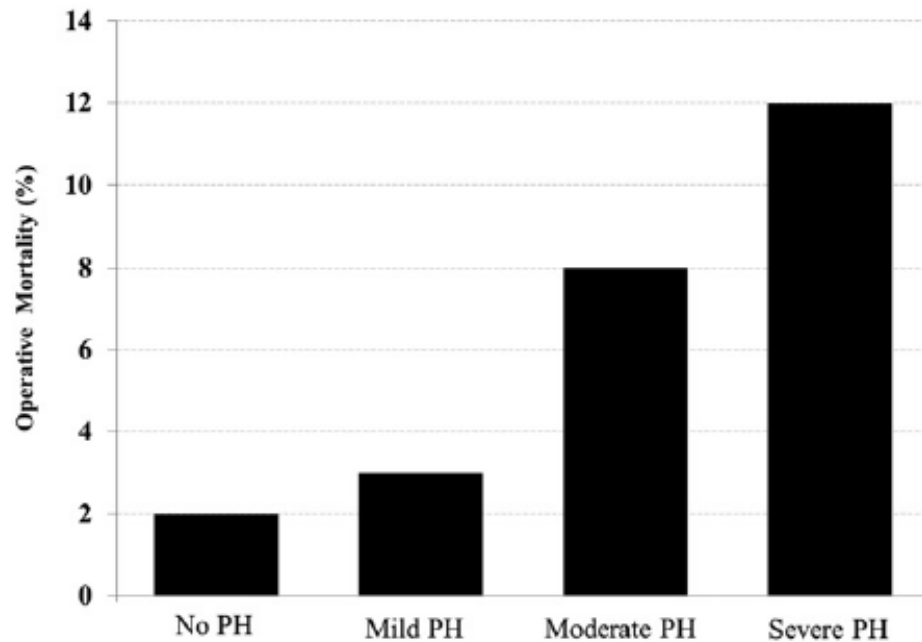


FIGURE 2. Hospital mortality according to preoperative PH grade ( $P < .0001$ ). PH, Pulmonary hypertension.

PAP mmHg

< 40 no PH

> 40 < 50 mild Ph

> 50 < 60 moderate PH

> 60 severe PH

Surgery should be considered in asymptomatic patients with preserved LV function and new onset of atrial fibrillation or pulmonary hypertension (systolic pulmonary pressure at rest >50 mmHg).

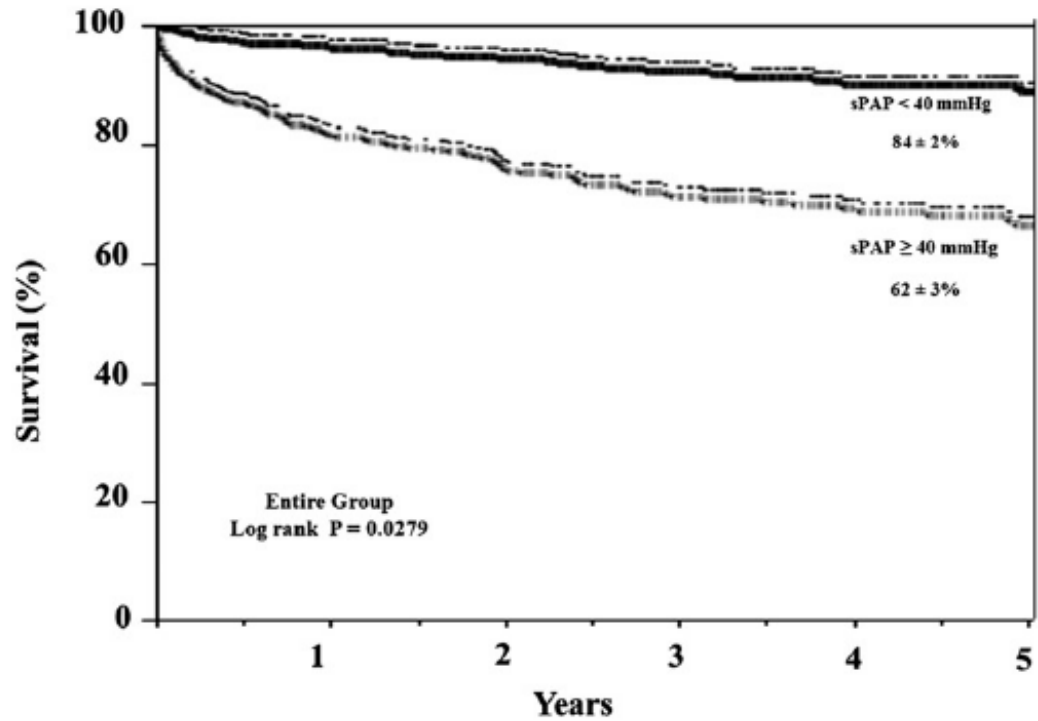
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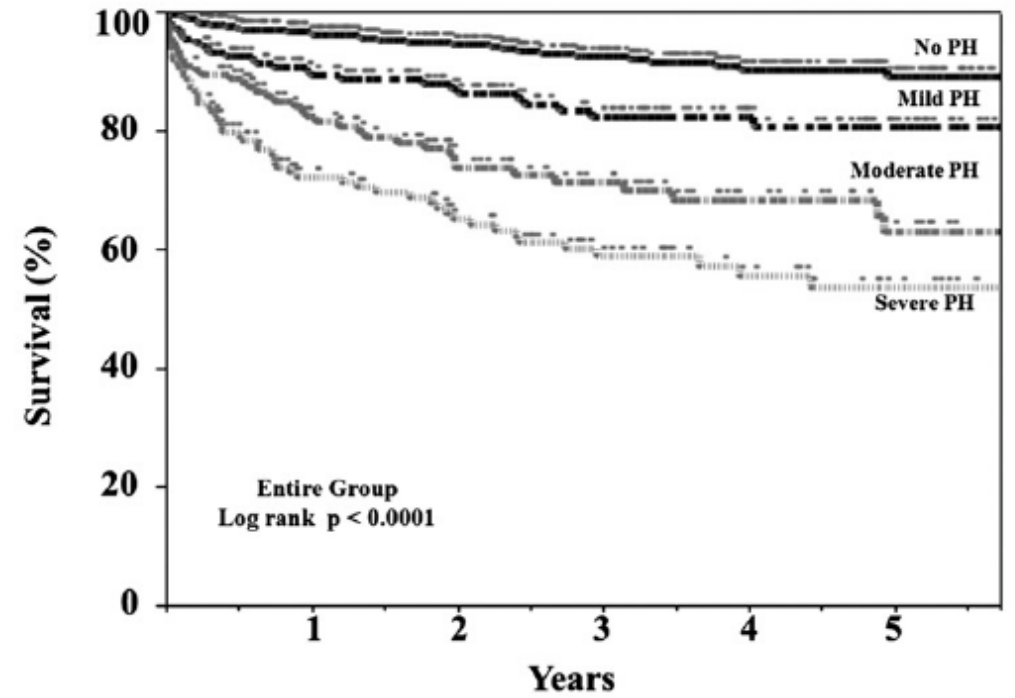
TABLE 5. Predictors of operative mortality\*

Variable	OR	95% CI	P
sPAP (per 1 mm Hg increment)	1.023	1.003–1.044	.0270
NYHA functional class III–IV	3.442	1.040–1.410	.0052
Age (per unit)	1.034	1.007–1.064	.0159
Concomitant CABG	2.133	1.041–4.464	.0395
Dialysis	4.451	1.068–1.785	.0018
IE	3.017	1.204–7.407	.0194
RV dysfunction	3.178	1.552–6.488	.0017

CABG, Coronary artery bypass graft; CI, confidence interval; IE, infective endocarditis; NYHA, New York Heart Association; OR, odds ratio; RV, right ventricle; sPAP, systolic pulmonary artery pressure. \*C-statistic = 0.854.



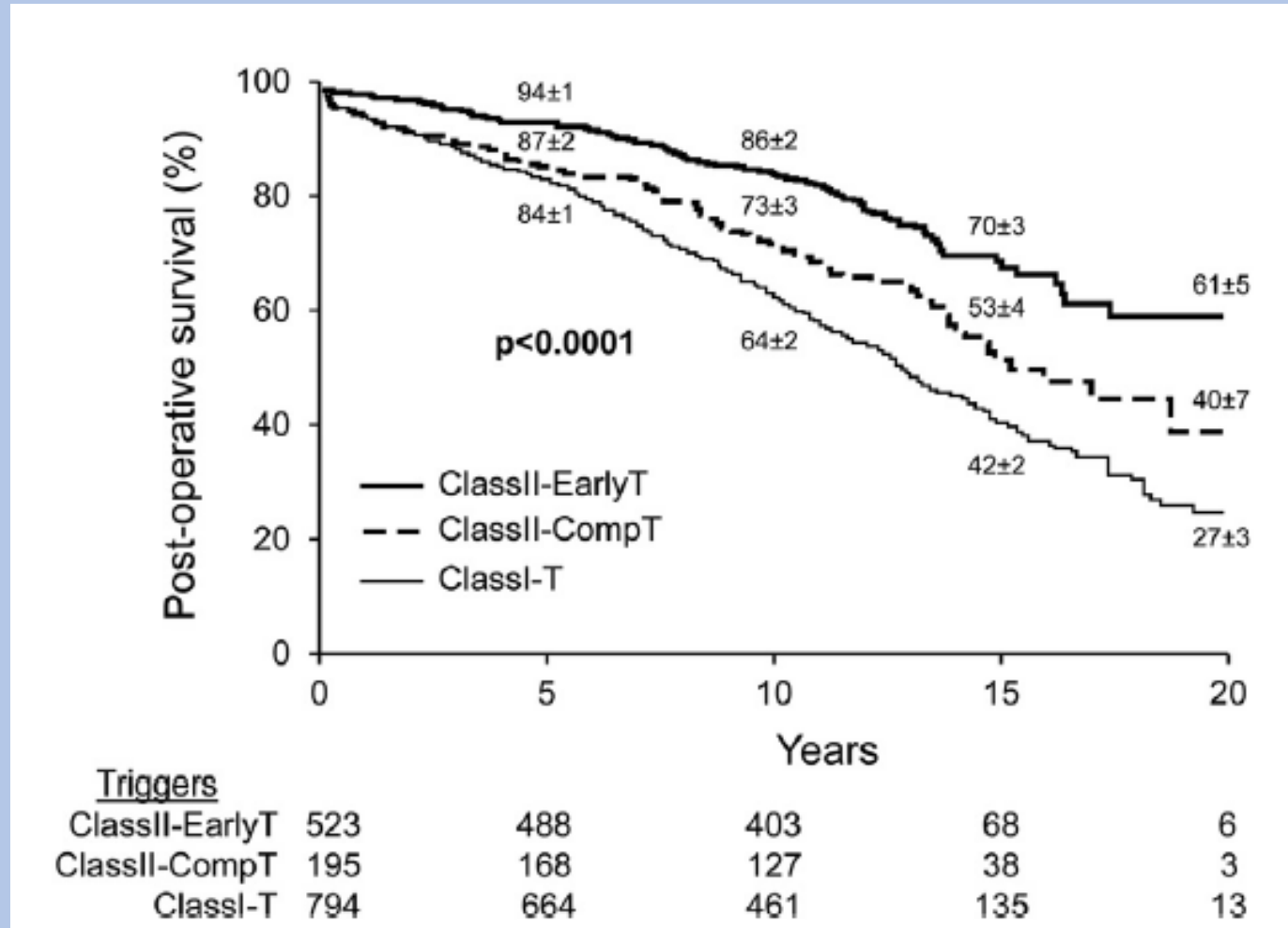
At risk	No PH	PH
	407	466
1	341	317
2	269	242
3	196	182
4	127	118
5	77	66



At risk	No PH	Mild PH	Moderate PH	Severe PH
	407	176	142	148
1	341	131	98	88
2	269	105	68	69
3	196	80	54	48
4	127	50	27	41
5	77	29	13	24

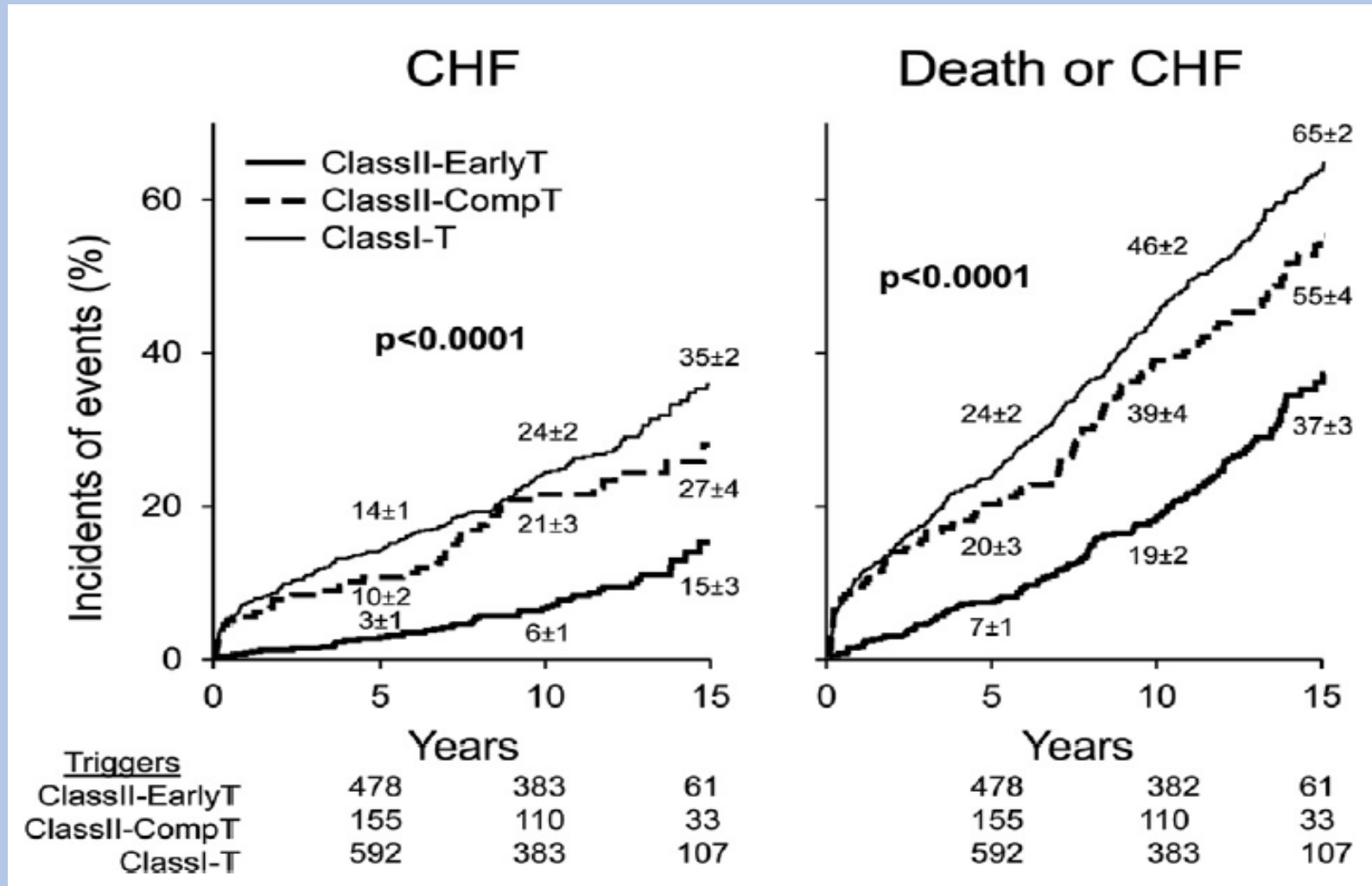
Long-term survival according to preoperative Pulmonary Artery Pressure

# Long-term results stratified by «surgical trigger»

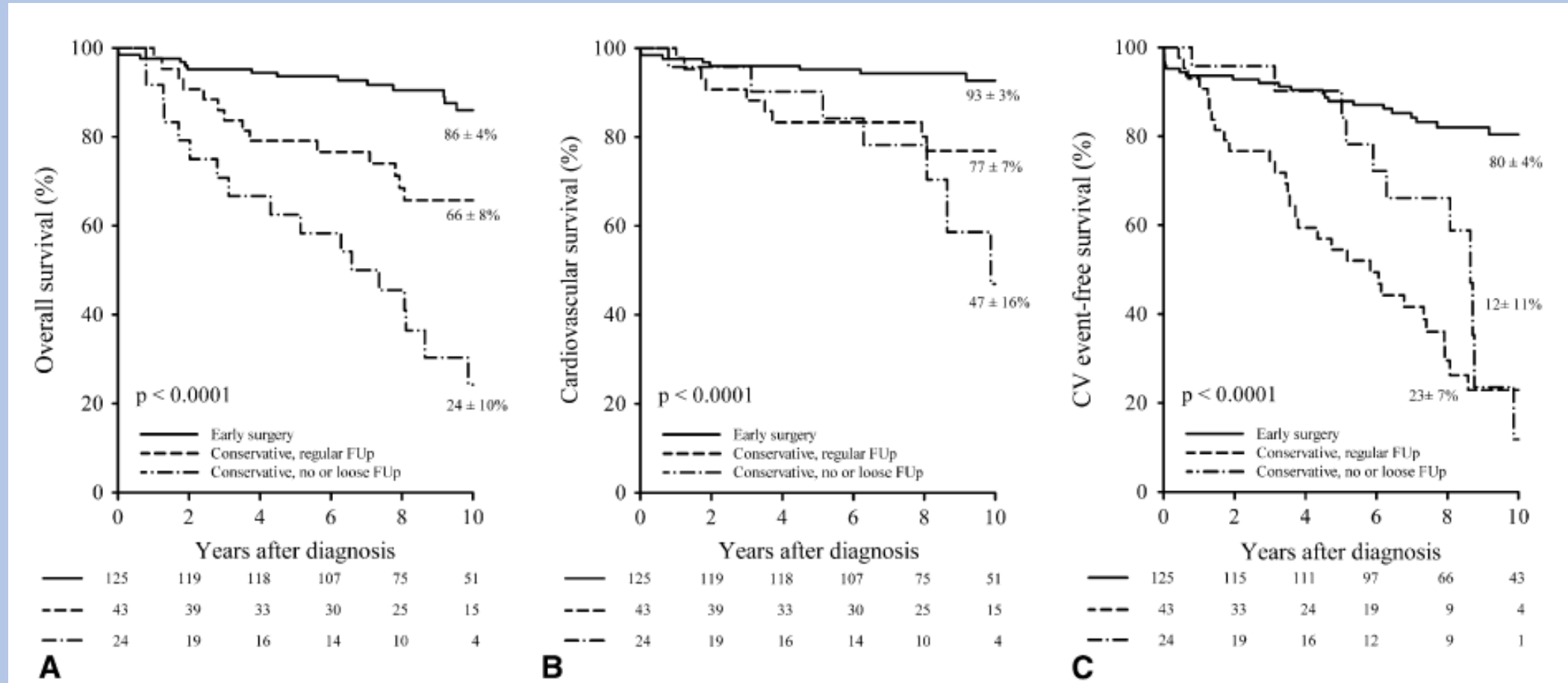


1512 pts  
between 1990-2000

# Long-term results stratified by «surgical trigger»



# Il ruolo del follow-up cardiologico



MV repair is reasonable in asymptomatic patients with chronic severe primary MR (stage C1) with preserved LV function (LVEF >60% and LVESD <40 mm) in whom the likelihood of a successful and durable repair without residual MR is >95% with an expected mortality rate of <1% when performed at a Heart Valve Center of Excellence

IIa

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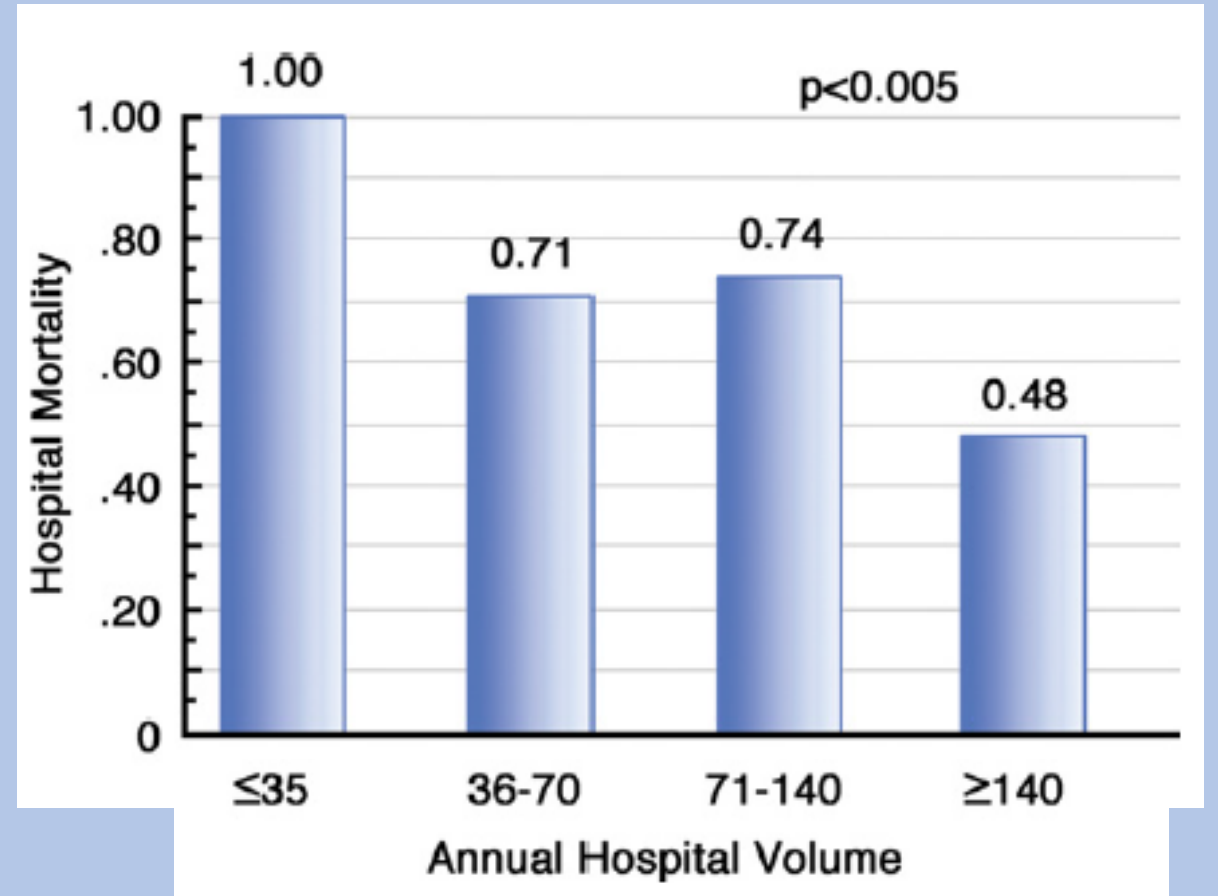
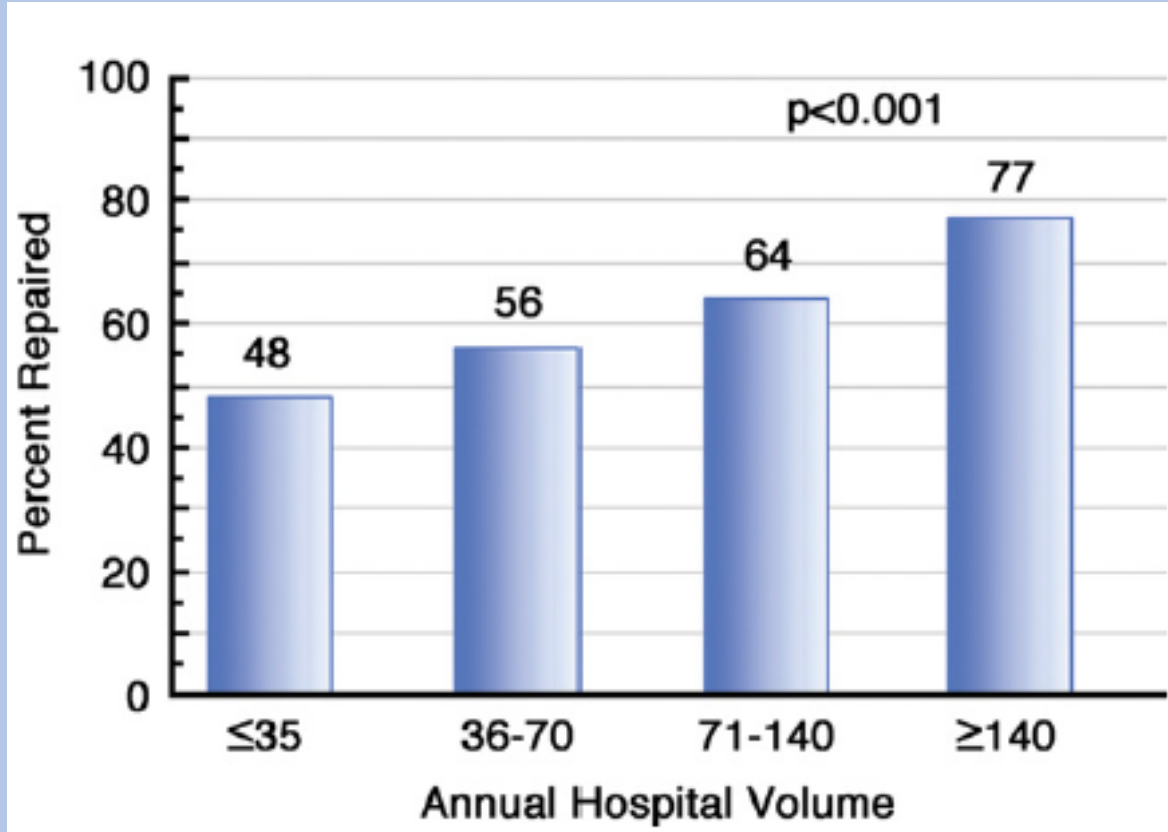
# La valvola mitrale

Sarà riparata ?

Quanto durerà la riparazione?

Quale il rischio dell'intervento?

# Volume-Outcome relationship



13,614 patients, 575 Hospitals STS Database

Gammie Circulation 2007

# Predicted probability of mitral repair by surgeon-specific annual mitral valve volume

Annual Mitral Volume	1	5	10	15	20	30	40	50	60	70	80	90	100
Predicted Probability of Repair, %	49.9	54.6	60.4	65.4	69.6	75.4	78.9	80.8	81.8	82.3	82.4	82.5	82.6





# La sede della lesione valvolare

- Lembo posteriore
- Lembo anteriore
- Patologia bilembo

# La complessità della lesione valvolare

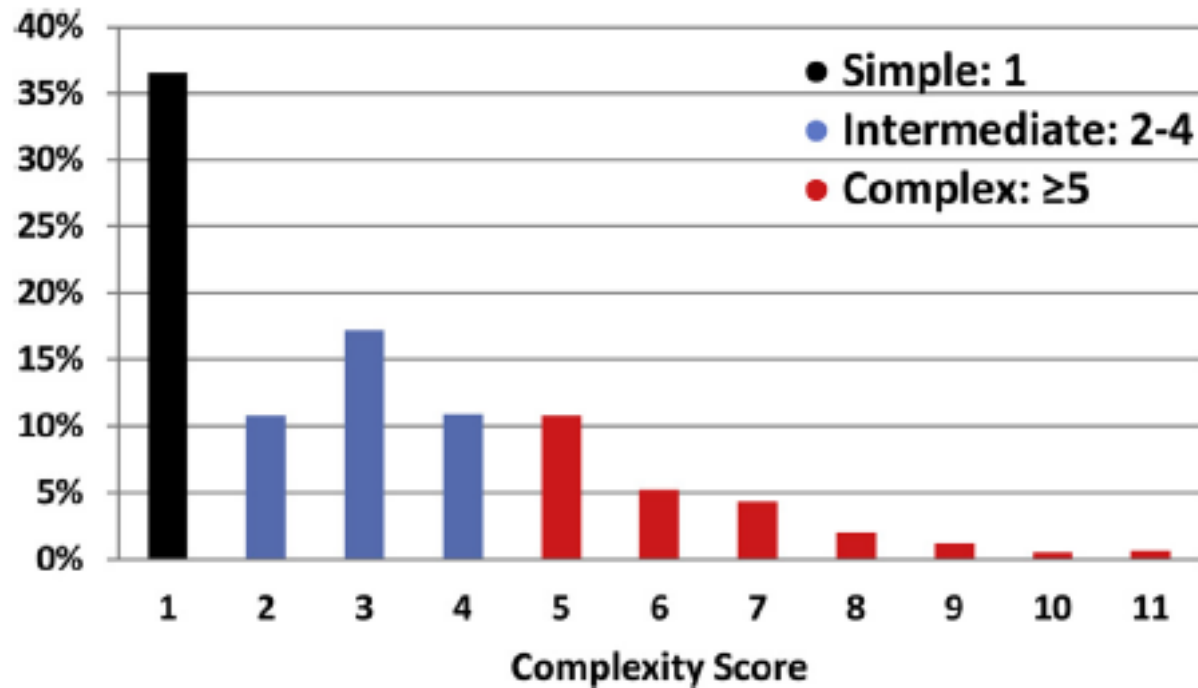


FIGURE 1. Distribution of complexity scores.

TABLE 1. Calculating the complexity score

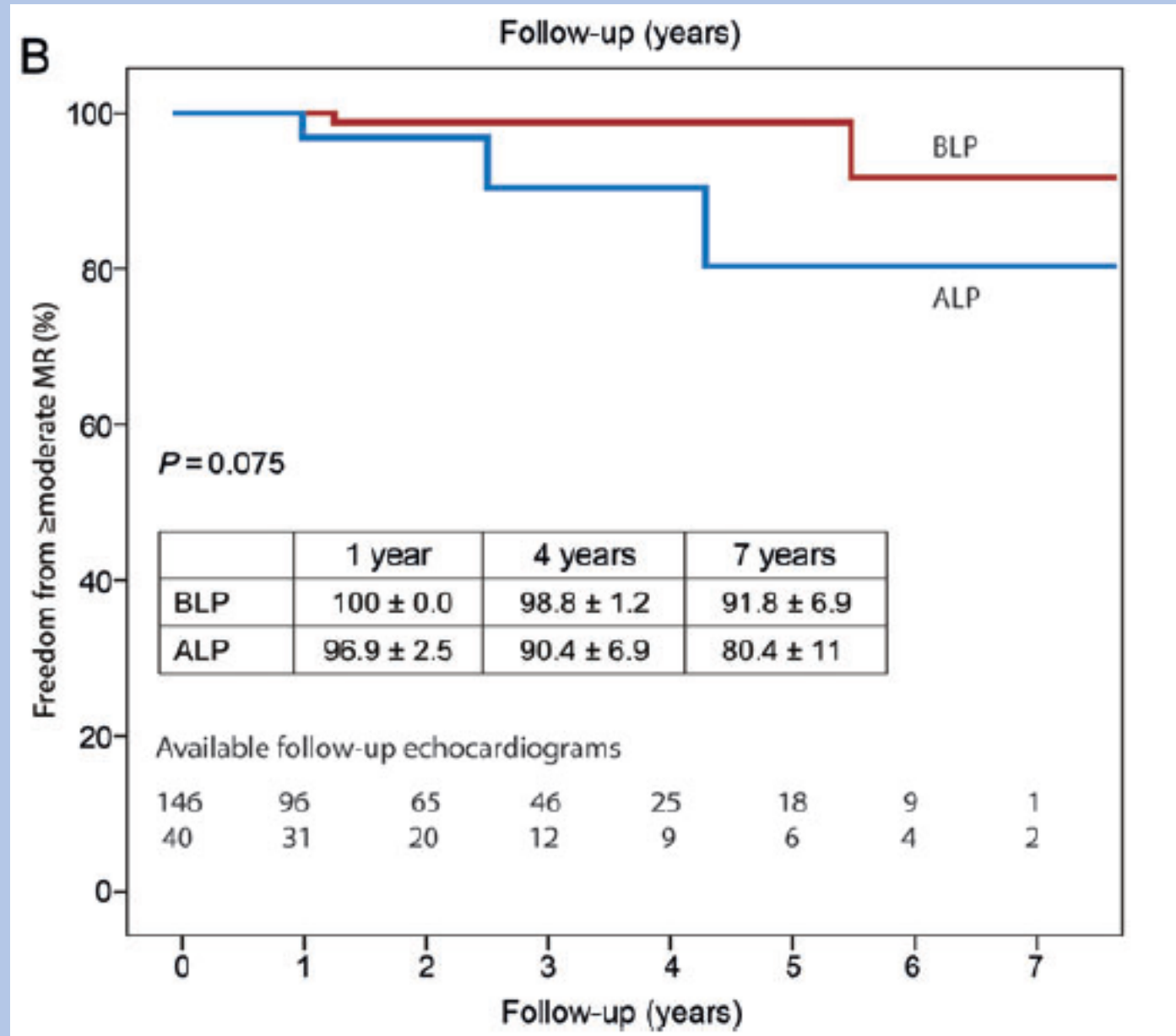
Complexity variable	Weight
Segment prolapse	
P1	1
P2	1
P3	1
A1	2
A2	2
A3	2
Anterolateral commissure prolapse	2
Posteromedial commissure prolapse	2
Any leaflet restriction	2
Papillary muscle or leaflet calcification without annular involvement	2
Annular calcification	3
Previous mitral valve repair	3

Complexity score = sum of weights. Complexity strata (by complexity score): Simple: 1; Intermediate: 2-4; Complex:  $\geq 5$ .

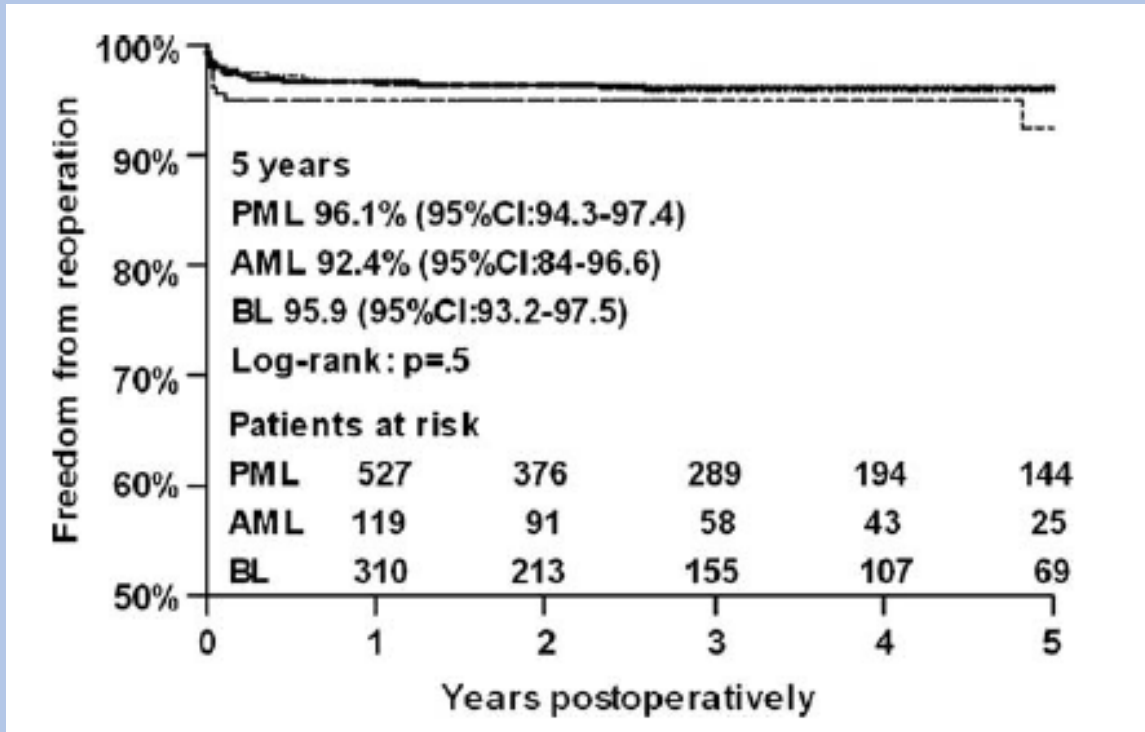
188 consecutive patients  
(all comers)

- Anterior leaflet prolapse
- Bileaflet prolapse

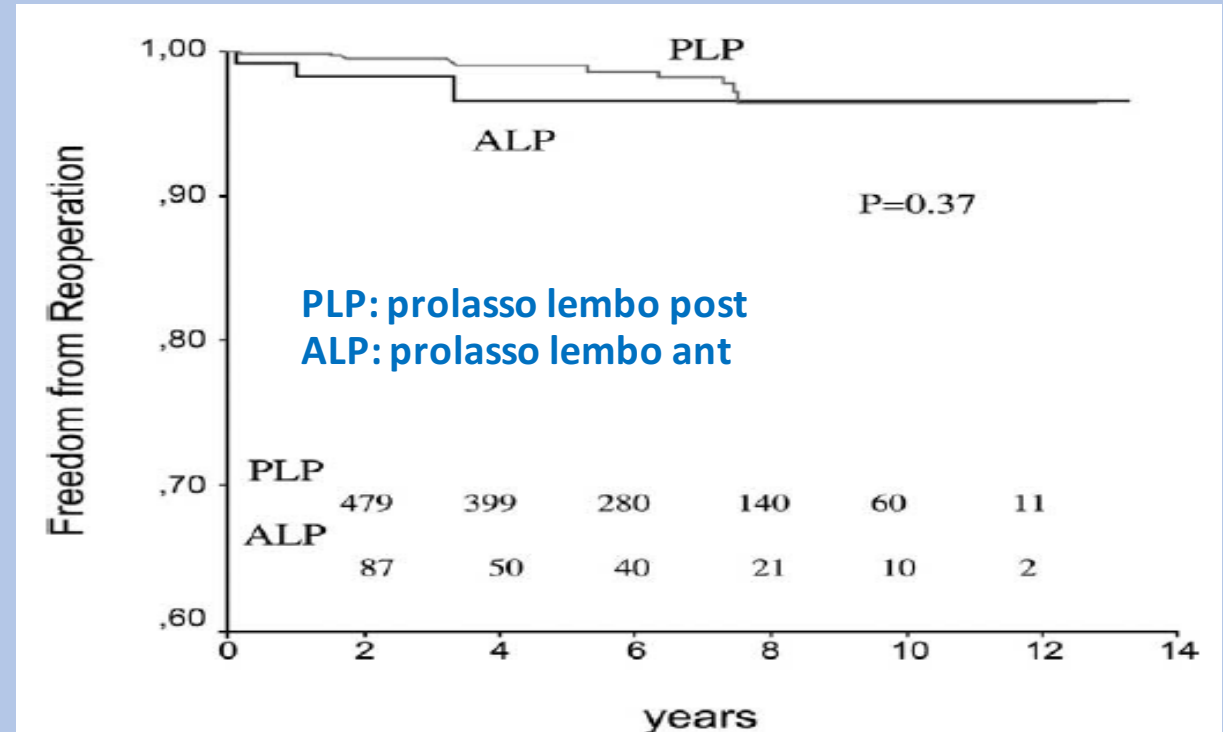
99.5% repair rate



# Meccanismo della IM outcome a distanza



Seeburger EJCTS 2009

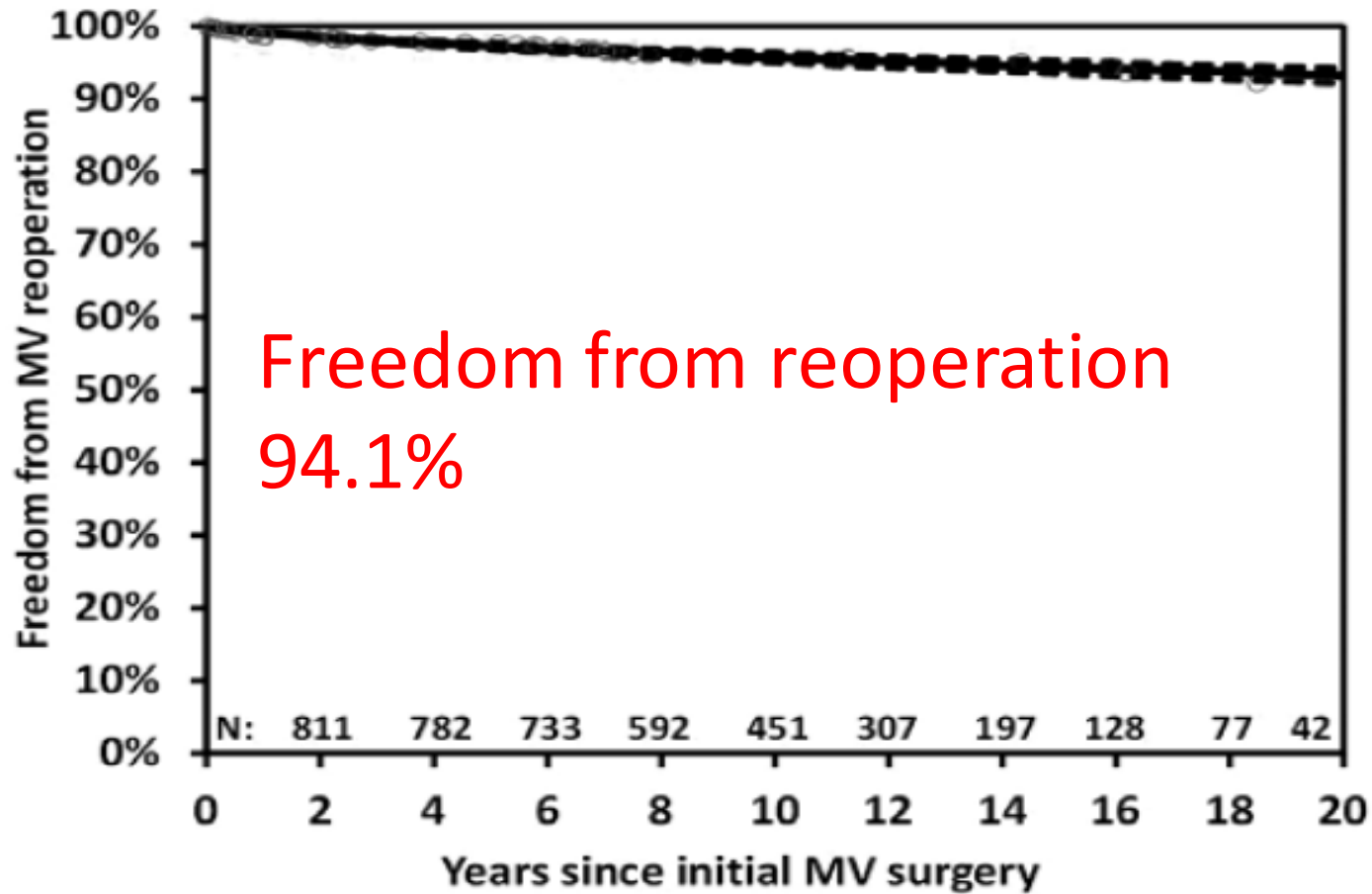


De Bonis JTCVS 2006

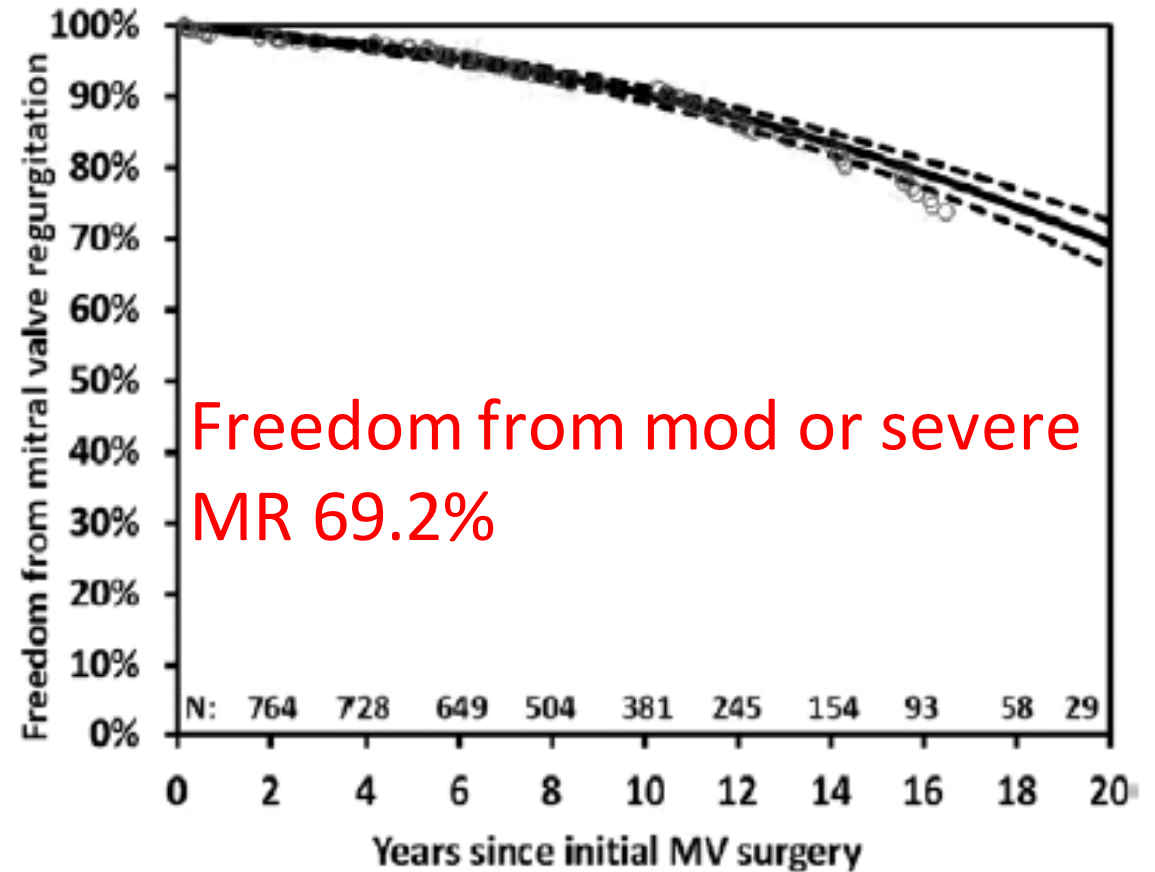
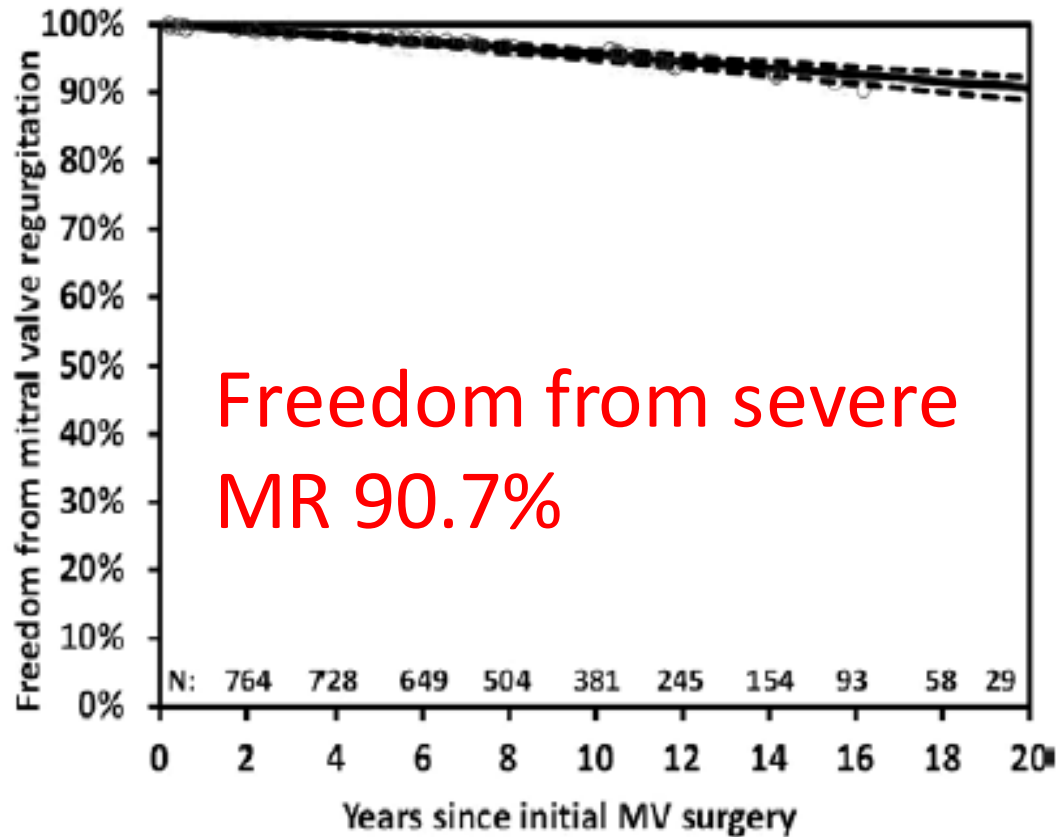
# Long term outcome of mitral repair in degenerative mitral valve disease

- 840 pts treated from 1985-2004
- Follow up medio 10.4 anni, massimo 26 aa
- Probability of reop at 20yrs 5,9%
- Freedom from severe MR a 20yrs 90.7%  
moderate or severe MR 69.2%

# I risultati a lungo termine



# I risultati a lungo termine



# Operative mortality

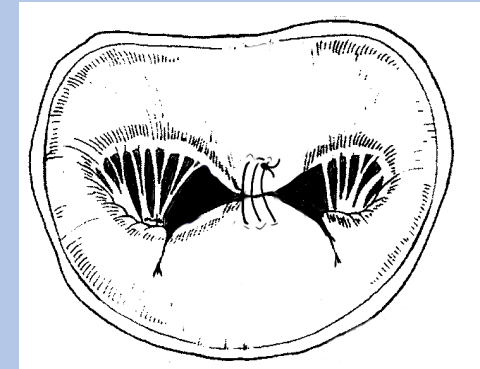
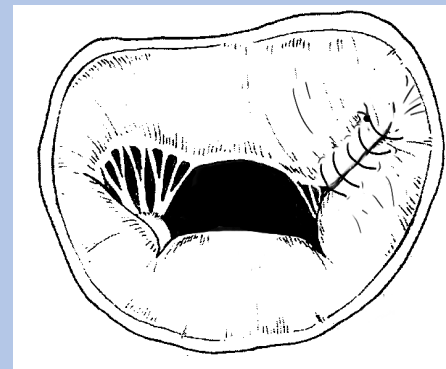
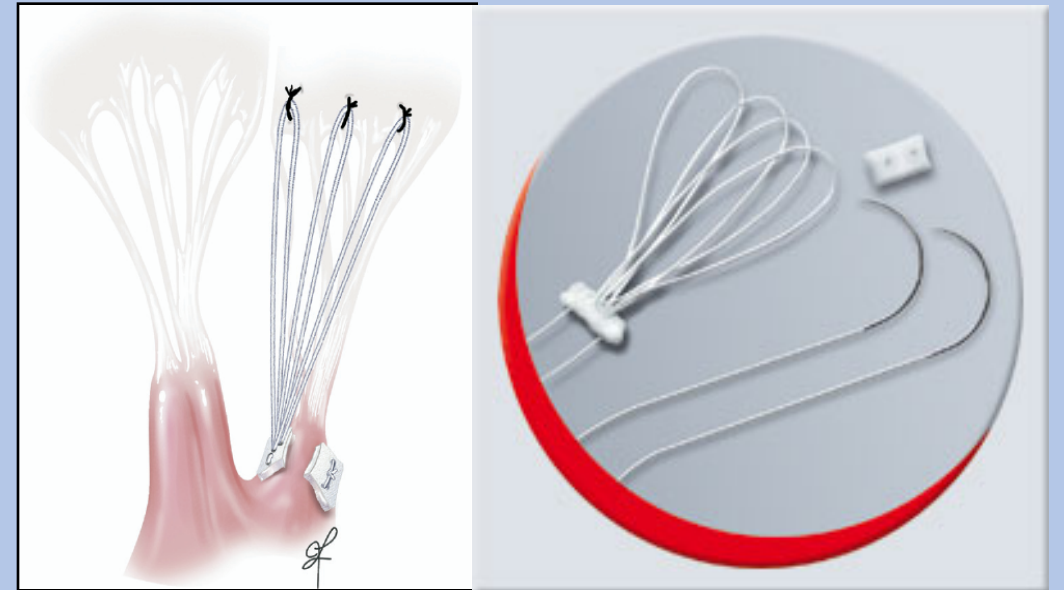
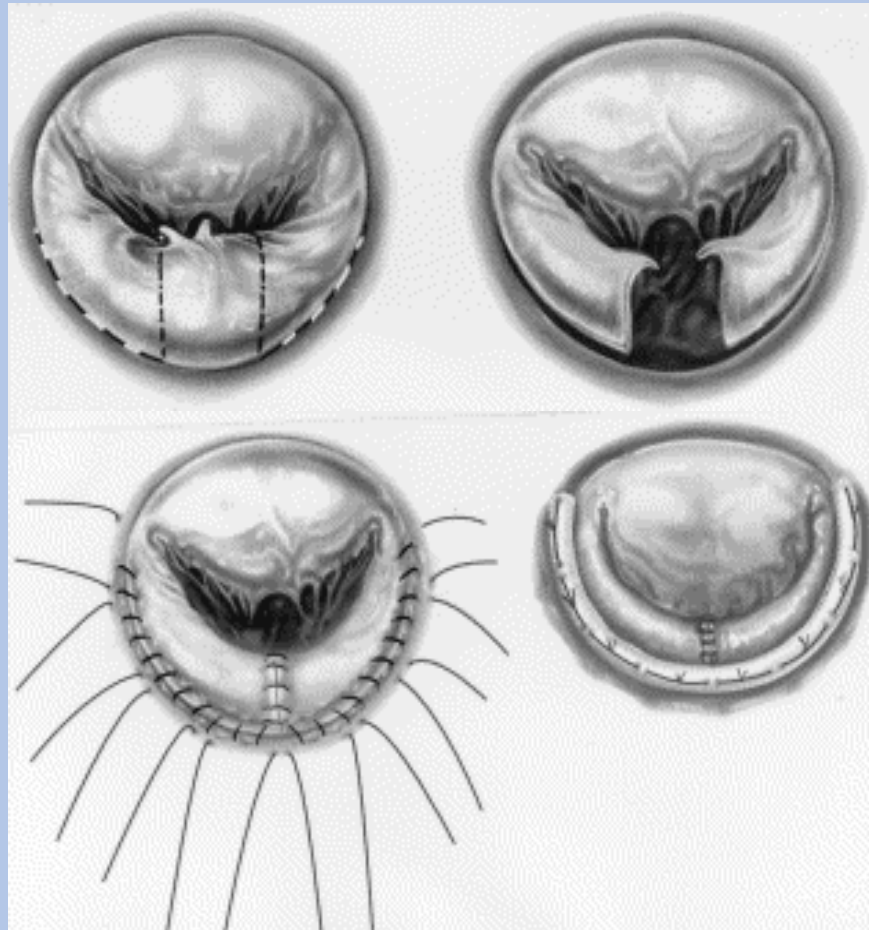
Table 4. Observed and Expected Mortality by Predicted Risk of Mortality Group, Mitral Valve Repairs

MV Repairs STS-PROM	% Total MV Repairs	Era 1, 2002–2006			Era 2, 2007–2010			p Value Observed Mortality Era 2 vs Era 1	O:E Ratio (95% CI)	p Value O:E Era 2 vs Era 1
		Observed Mortality %	Expected Mortality %	O:E Ratio (95% CI)	% Total MV Repairs	Observed Mortality %	Expected Mortality %			
0–4	93.3	0.9	0.9	1.04 (0.88–1.19)	92.4	0.9	0.9	0.827	0.98 (0.85–1.12)	0.581
4–8	5.0	7.1	5.5	1.31 (1.01–1.61)	5.0	5.8	5.5	0.210	1.06 (0.82–1.30)	0.210
8–12	1.4	9.7	9.6	1.01 (0.61–1.42)	1.4	7.9	9.7	0.466	0.82 (0.52–1.12)	0.451
12+	1.3	21.4	21.9	0.98 (0.72–1.23)	1.3	16.8	23.5	0.194	0.71 (0.54–0.89)	0.097
Total	100.0	1.5	1.4	1.08 (0.96–1.20)	100.0	1.4	1.5	0.533	0.93 (0.83–1.03)	0.063

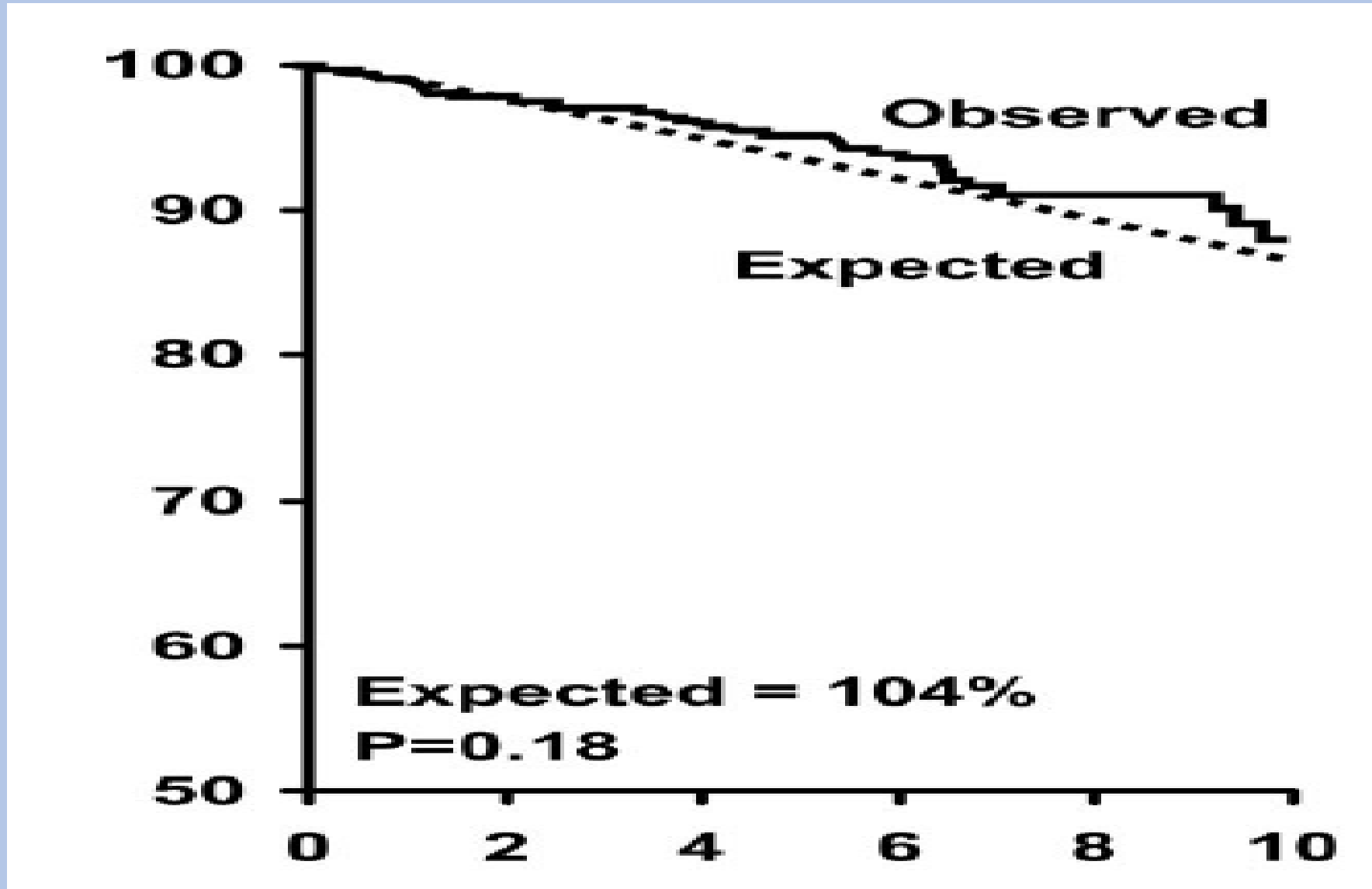
CI = confidence interval; MV = mitral valve; O:E = observed to expected; STS-PROM = The Society of Thoracic Surgeons predicted risk of mortality.



# Le tecniche chirurgiche



# Il nostro obiettivo



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**DIRETTORI**  
ANTONIO MANTERO  
GIUSEPPE TARELLI

**COORDINATORI  
ESECUTIVI**  
FRANCESCO ALAMANNI  
EMANUELE CATENA  
GIOVANNI CORRADO  
CORRADO LETTIERI



**NUOVA SEDE**

**Centro Congressi  
Palazzo delle Stelline  
Corso Magenta, 61  
20123 Milano**

**Grazie per l'attenzione**

[lucia.torracca@humanitas.it](mailto:lucia.torracca@humanitas.it)