L’Insuffcienza Mitralica Funzionale Post-Infartuale:Indicazione Chirurgica e Tecnica Operatoria

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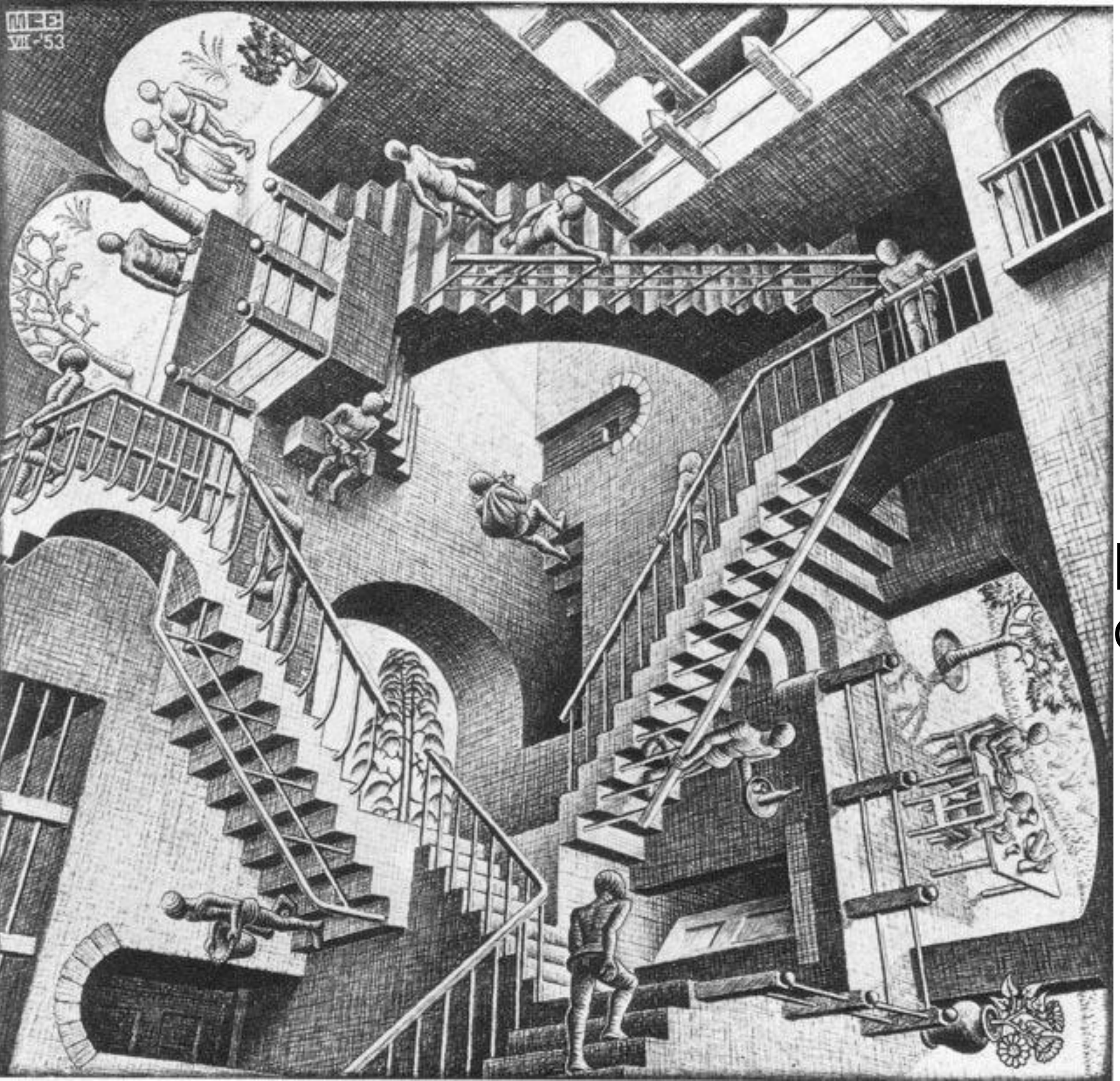


Relativity

C. Escher, 1953

Secondary or Functional MR

- leaflet and chordae are structurally normal
- IM secondary to **LV enlargement and remodeling**
- **tethering** (displacement of papillary muscles with annular dilation) and reduced closing forces due to **LV disfunction** (reduced contractility and/or dysynchrony)
- idiopathic cardiomyopathy or coronary artery disease **(IMR)**

Ischemic MR (IMR)

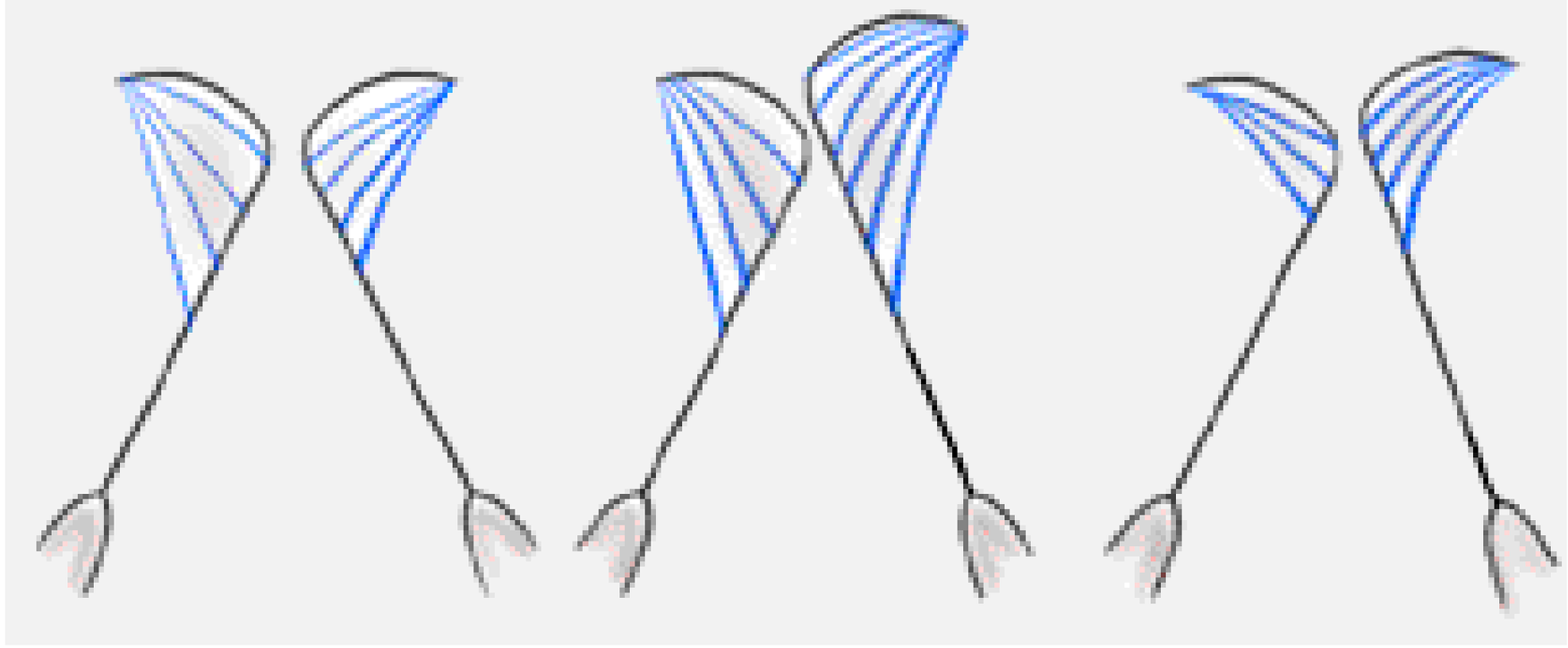
- IMR is MR due to complications of coronary artery disease
- IMR is NOT the result of organic lesions but of incomplete closure of normal leaflets

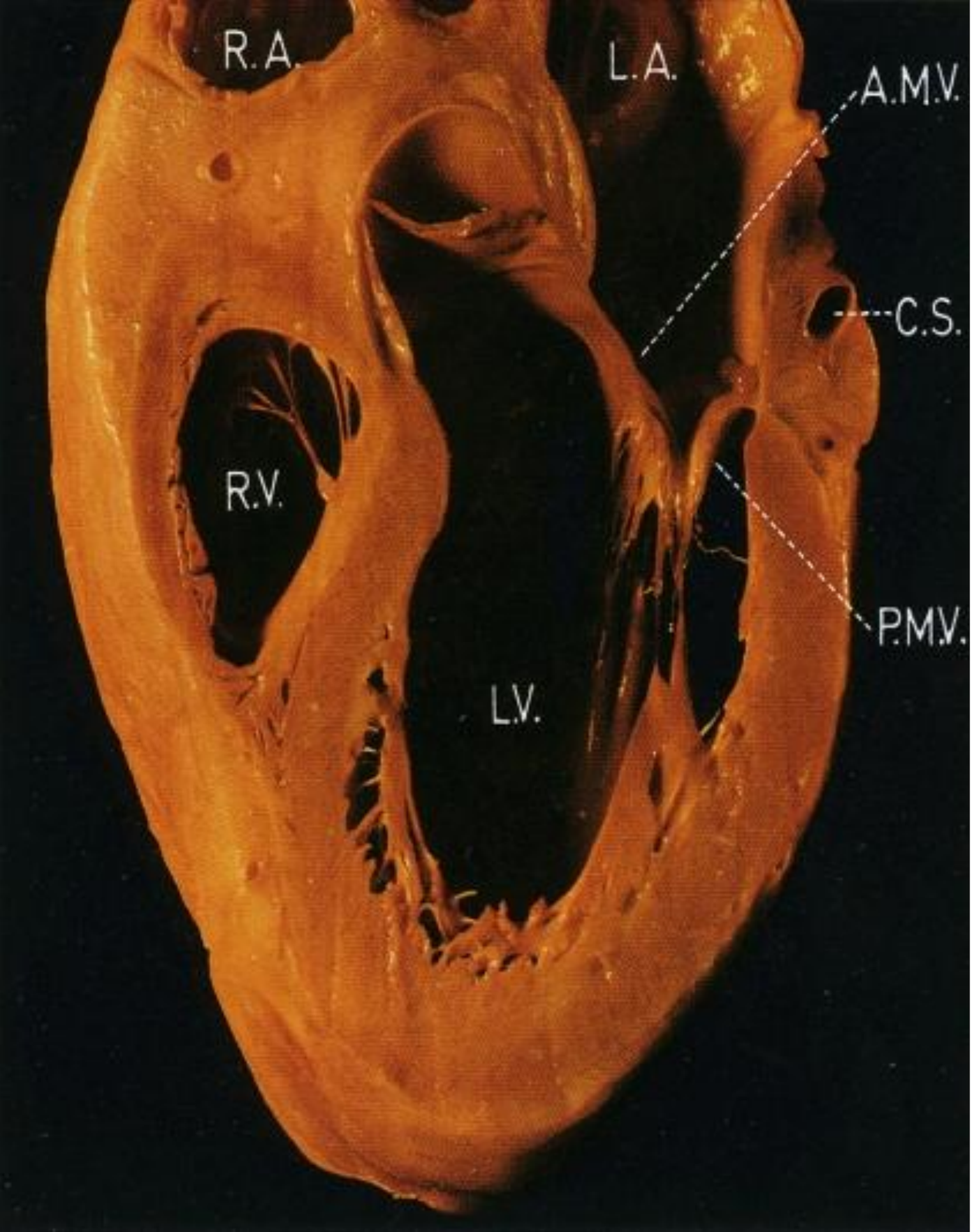
15%-20% after MI

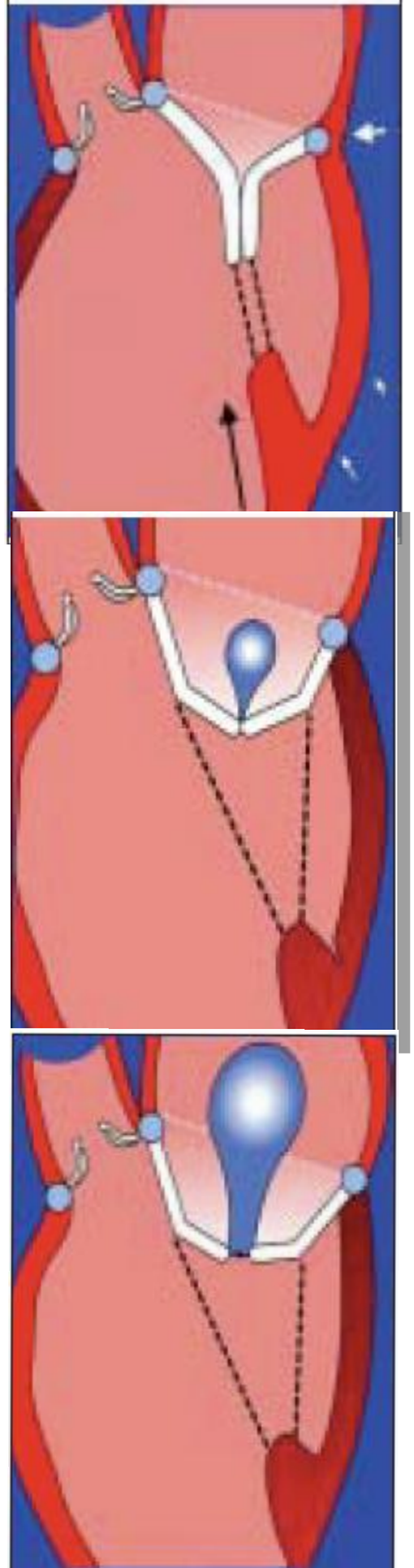
- acute ischemia (papillary muscle rupture)
- LV remodeling following MI (functional MR)

Pathophysiological Triad in Ischemic MR

Dysfunction	Lesions	Chronic / Acute
Type I	Annular dilatation	Chronic
Type II	Papillary muscle rupture	Acute
	Chordal rupture	Acute
	Papillary muscle elongation	Chronic
Type IIIb	Papillary muscle displacement	Acute or chronic
	Leaflet tethering	




R.A.
L.A.
A.M.V.
C.S.
R.V.
P.M.V.
L.V.



Survival - Stratification by MR

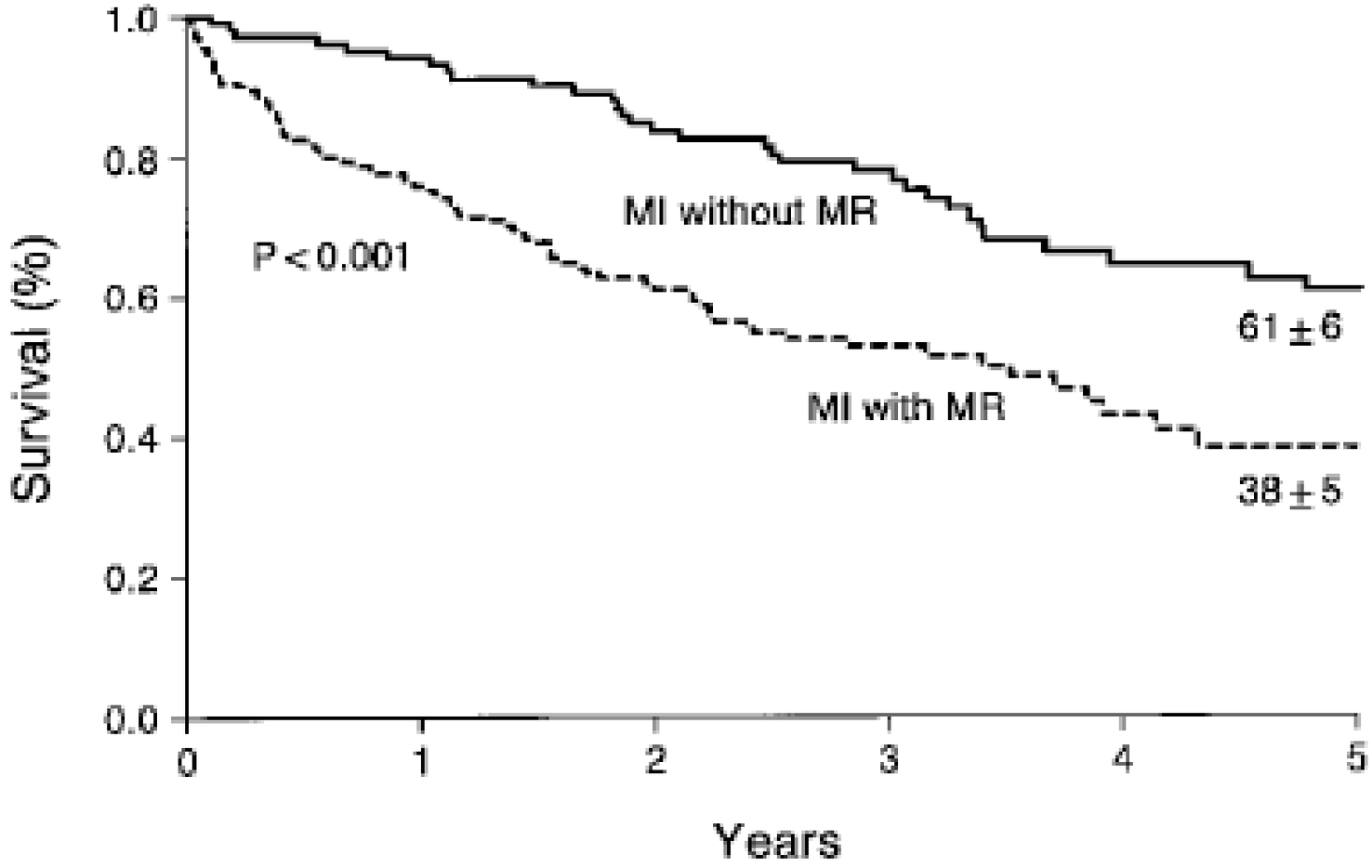


Figure 1. Survival (±SE) after diagnosis according to presence of IMR.

Ischemic Mitral Regurgitation : Long-Term Outcome and Prognostic Implications With Quantitative Doppler Assessment

Francesco Grigioni, Maurice Enriquez-Sarano, Kenton J. Zehr, Kent R. Bailey and A. Jamil Tajik

Circulation 2001;103;1759-1764
Circulation is published by the American Heart Association. 7272 Greenville Avenue, Dallas, TX 72514
 Print ISSN: 0009-7322. Online ISSN: 1524-4539

Conclusions—In the chronic phase after MI, IMR presence is associated with excess mortality independently of baseline characteristics and degree of ventricular dysfunction. The mortality risk is related directly to the degree of IMR as defined by ERO and RVol. Therefore, IMR detection and quantification provide major information for risk stratification and clinical decision making in the chronic post-MI phase. (***Circulation*****. 2001;103:1759-1764.)**

...**mortality** is related directly to the **degree of IMR** as defined by **ERO** and **RVol**

...**IMR quantification** provides major information for **risk stratification** and **clinical decision making**

Survival - Stratification by RVol

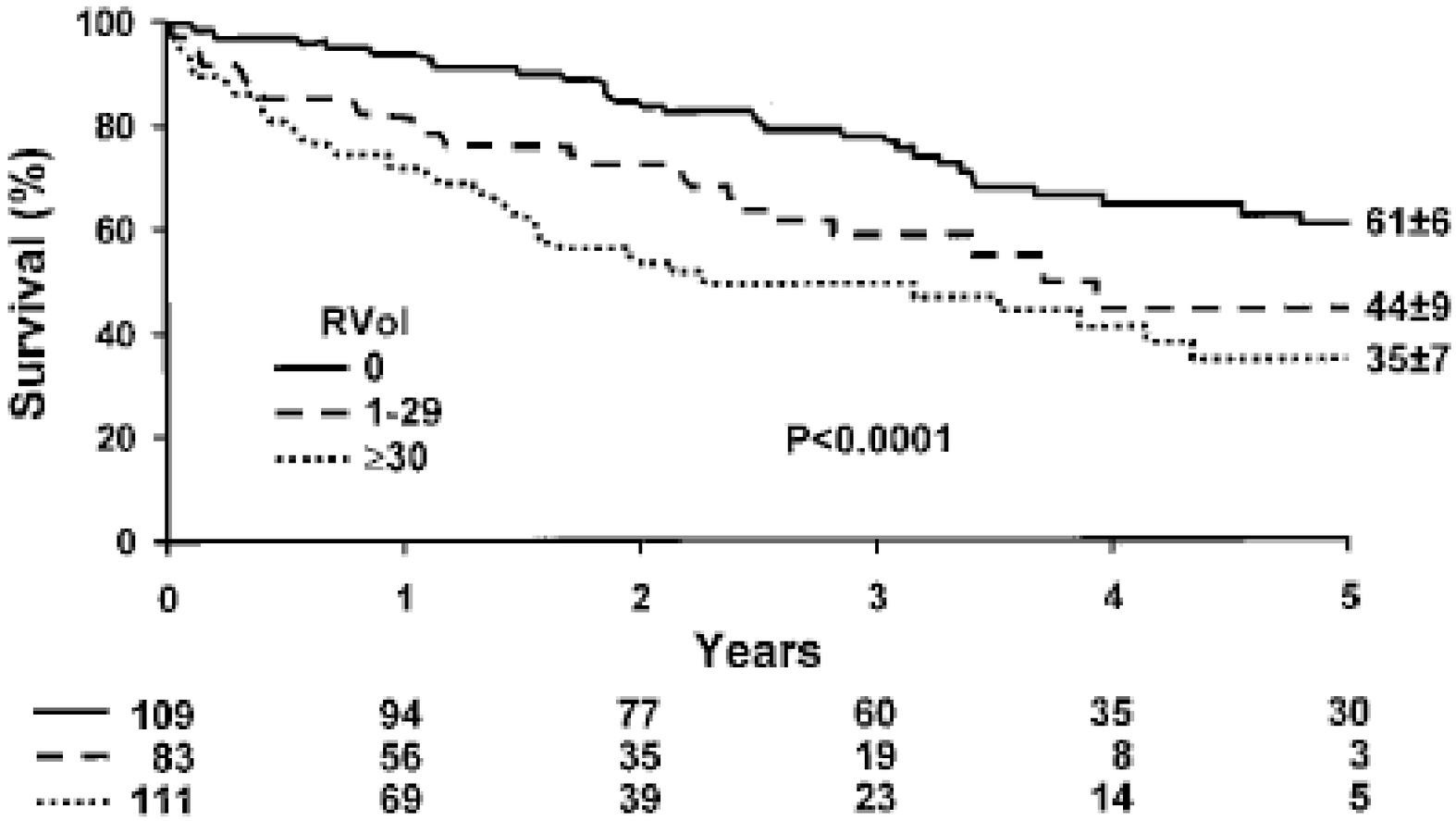


Figure 2. Survival (±SE) after diagnosis according to degree of MR as graded by RVol ≥30 mL/beat or <30 mL/beat. Numbers at bottom indicate patients at risk for each interval.

Survival - Stratification by ERO

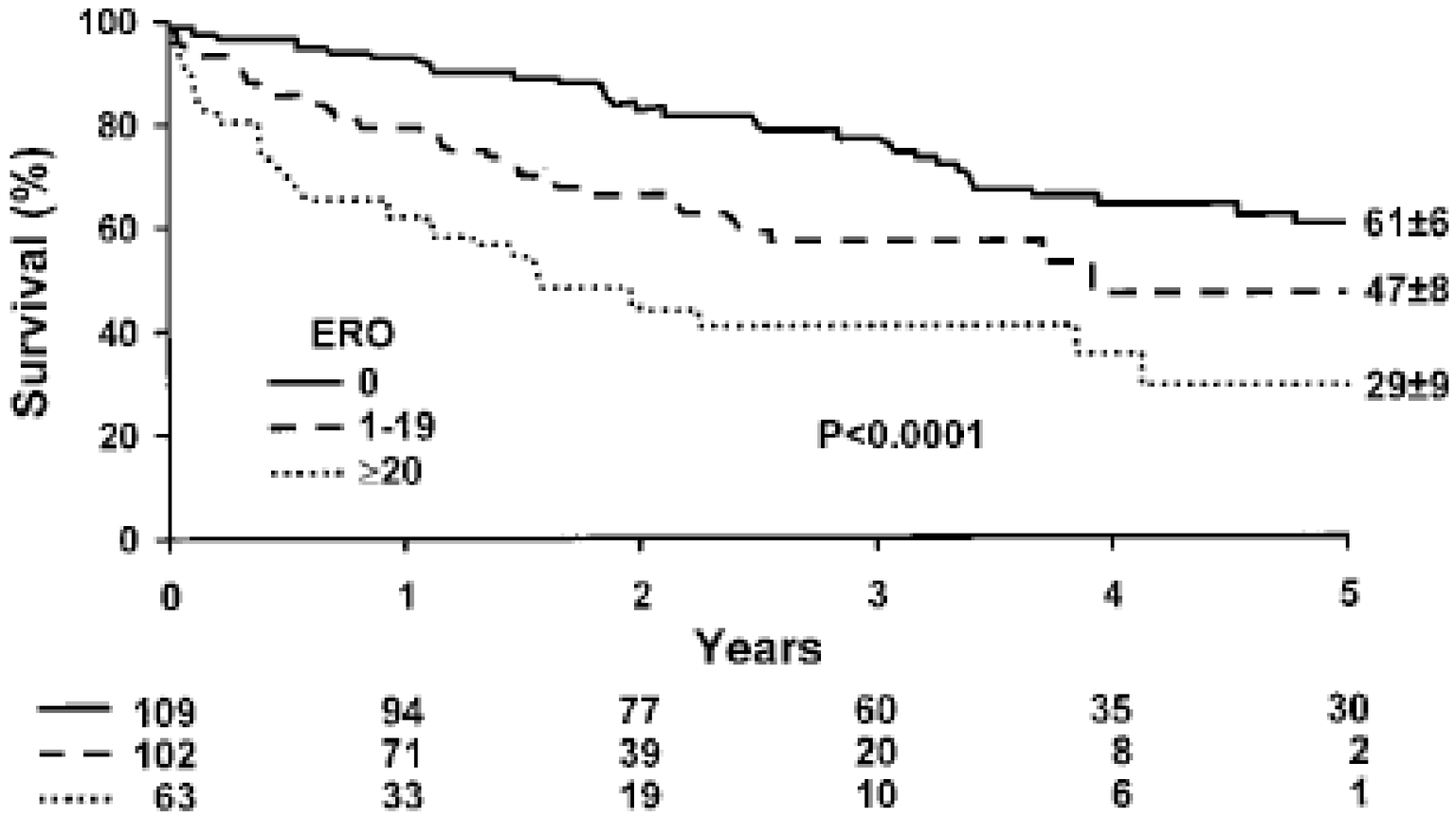


Figure 3. Survival (±SE) after diagnosis according to degree of MR as graded by ERO ≥20 mm^2 or <20 mm^2. Numbers at bottom indicate patients at risk for each interval.

Severe IMR

- RVOL $\geq$ 30 ml/beat
- EROA $\geq$ 20 mm2

- increase of $\geq$ 13 mm2 EROA during exercise echo associated with increase the relative risk of death and cardiac decompensation

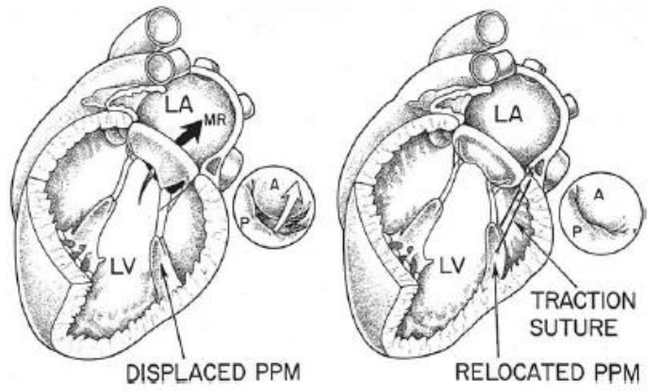
Surgical Indication IMR

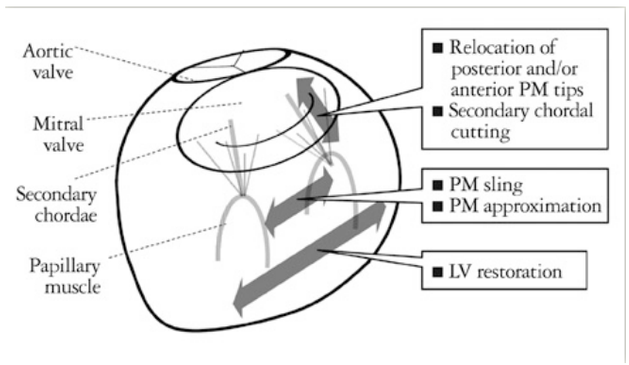
Table 13 Indications for mitral valve surgery in chronic secondary mitral regurgitation

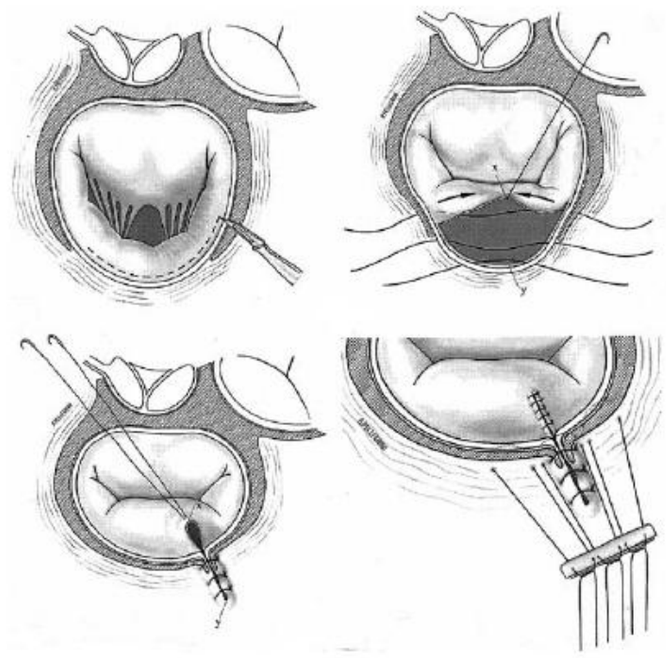
	Class [a]	Level [b]
Surgery is indicated in patients with severe MR[c] undergoing CABG, and LVEF >30%.	I	C
Surgery should be considered in patients with moderate MR undergoing CABG.[d]	IIa	C
Surgery should be considered in symptomatic patients with severe MR, LVEF <30%, option for revascularization, and evidence of viability.	IIa	C
Surgery may be considered in patients with severe MR, LVEF >30%, who remain symptomatic despite optimal medical management (including CRT if indicated) and have low comorbidity, when revascularization is not indicated.	IIb	C

Surgical Techniques

- Isolated CABG vs MV surgery and CABG
- **MV replacement**
- **undersized MV annuloplasty**
- edge-to-edge repair
- second order chordal cutting
- infarct plication
- papillary muscle embrication
- papillary muscle sling
- surgical relocation of the papillary muscles
- posterior mitral valve restoration

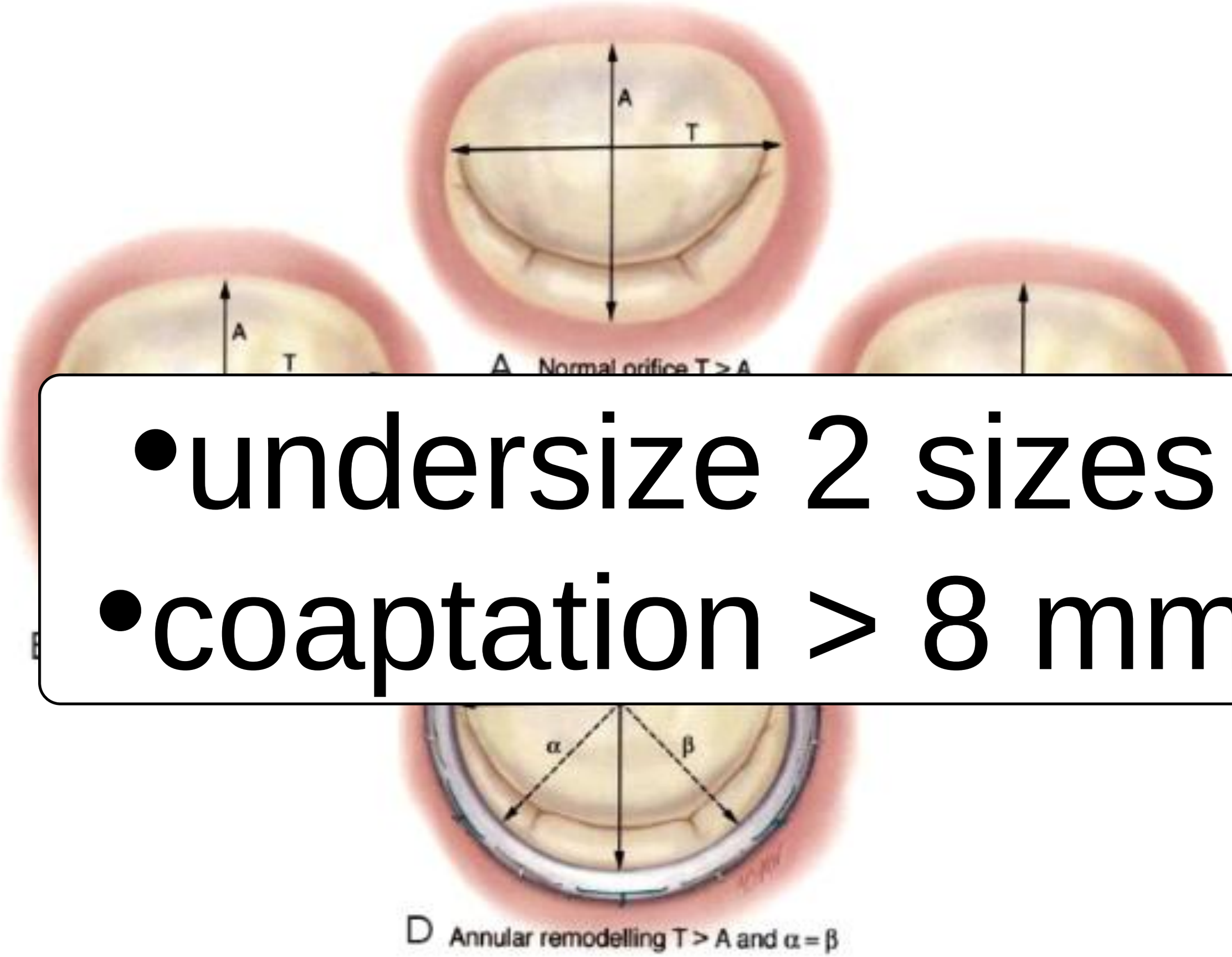






Operative Mortality

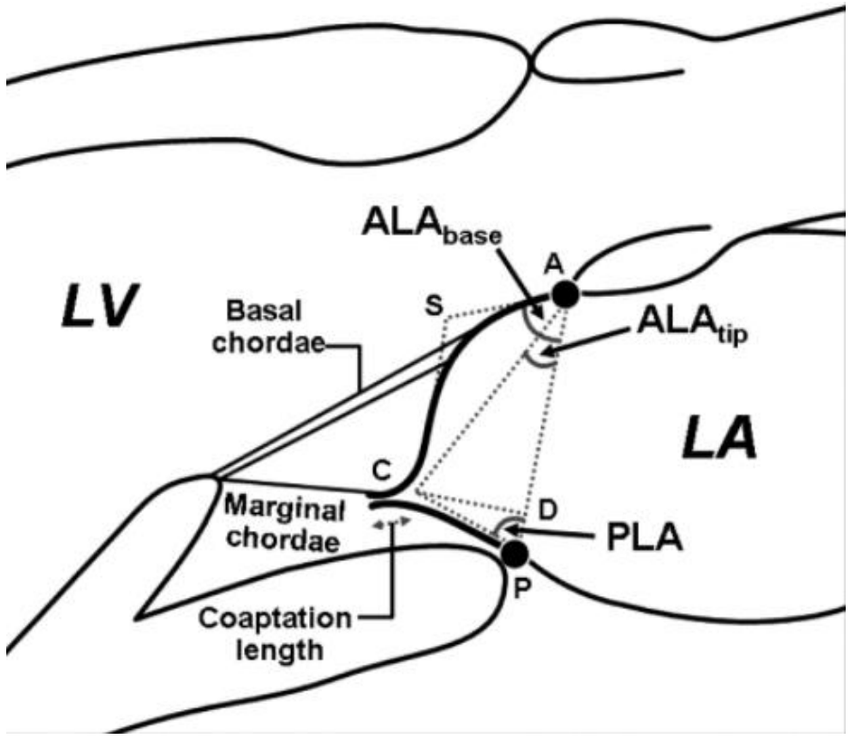
	EACTS	STS	UK	Germany
MV repair	2.1	1.6	2	2
MV repl.	4.3	6.0	6.1	7.8
MV repair + CABG	6.8	4.6	8.3	6.5
MV repl. + CABG	11.4	11.1	11.1	14.5



- undersize 2 sizes
- coaptation > 8 mm

Predictors of secondary recurrent MR

- LVEDD > 65 mm - LVESD > 50 mm
- tenting area > 2.5 cm2
- coaptation distance > 1 cm
- posterior mitral leaflet angle > 45˚

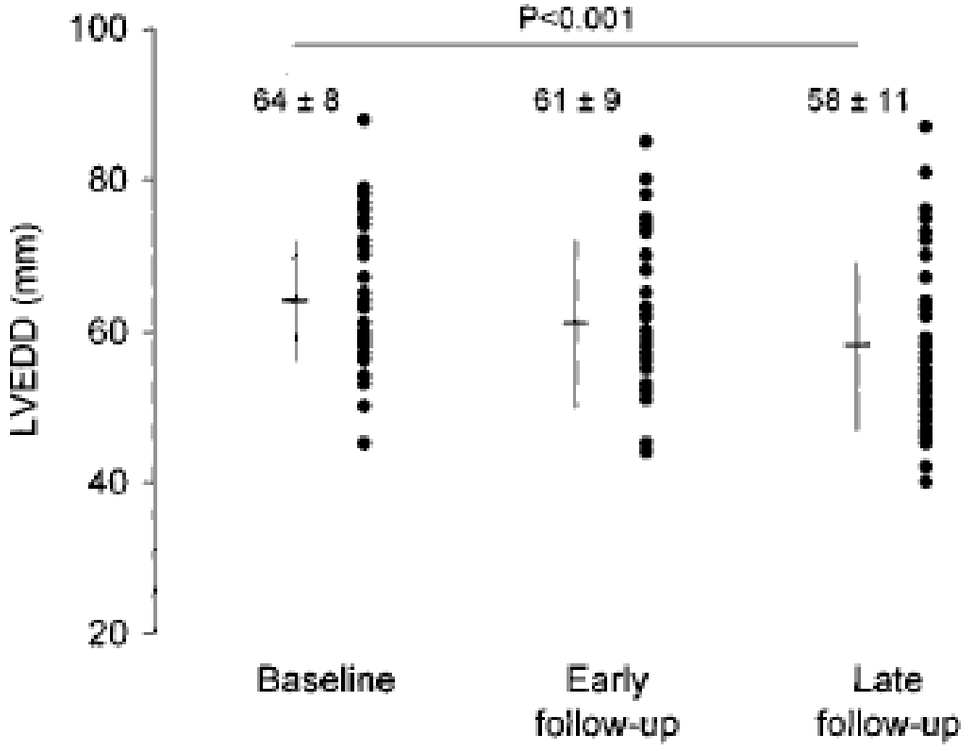


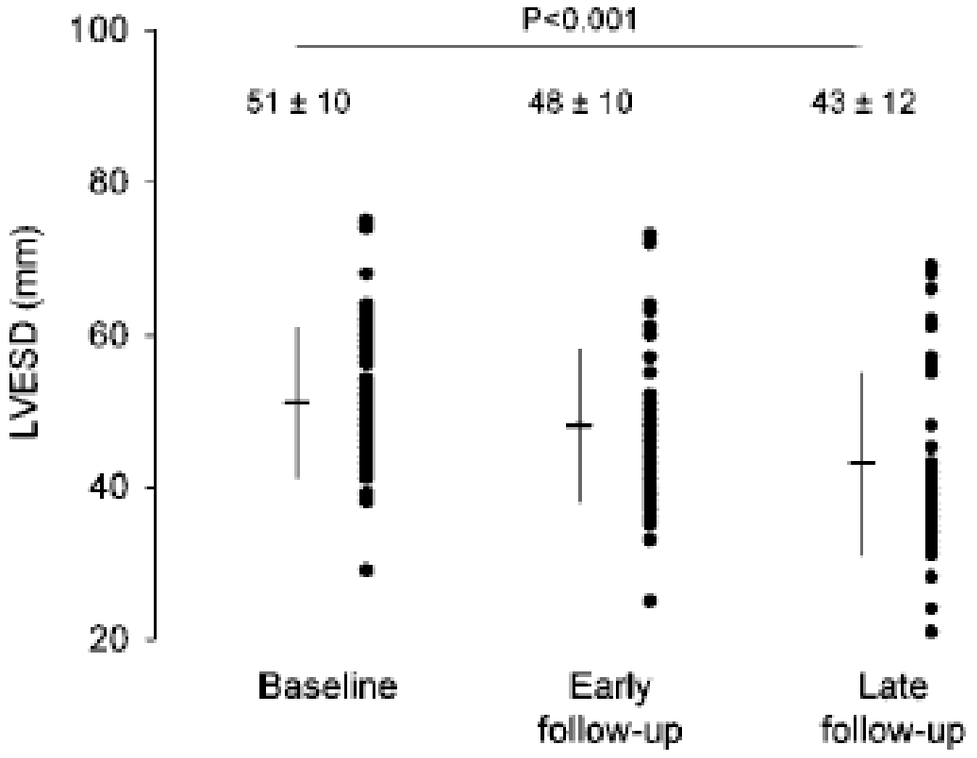
- anterior mitral leaflet angle > 25˚
- end-systolic inter-papillary muscle distance > 20 mm
- systolic sphericity index > 0.7

Restrictive Annuloplasty and Coronary Revascularization in Ischemic Mitral Regurgitation Results in Reverse Left Ventricular Remodeling

Jeroen J. Bax, MD; Jerry Braun, MD; Soeresh T. Somer, MD; Robert Klautz, MD; Eduard R. Holman, MD; Michel I.M. Versteegh, MD; Eric Boersma, MSc; Martin J. Schalij, MD; Ernst E. van der Wall, MD; Robert A. Dion MD

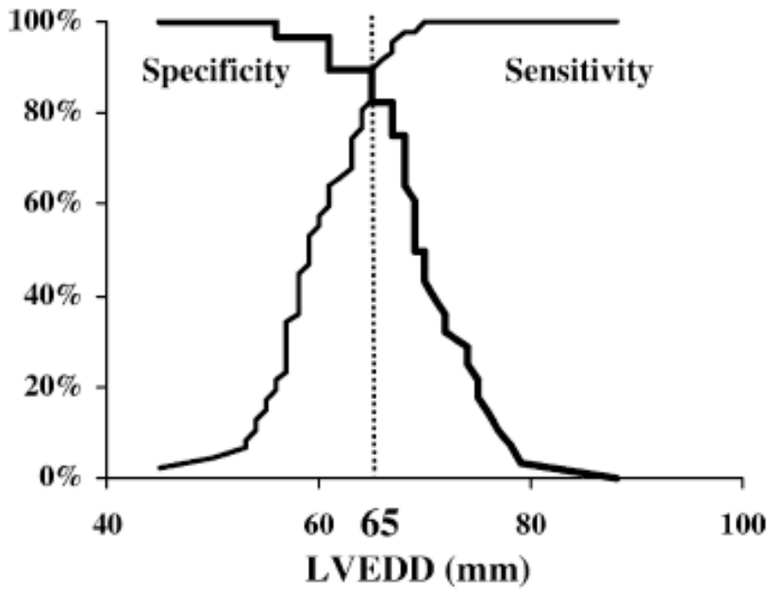
(*Circulation*. 2004;110[suppl II]:II-103–II-108.)



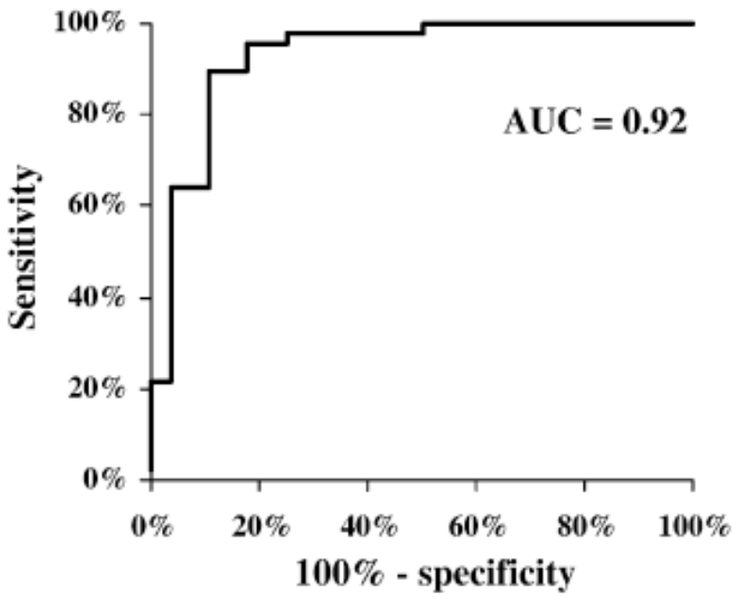


Preoperative left ventricular dimensions predict reverse remodeling following restrictive mitral annuloplasty in ischemic mitral regurgitation☆

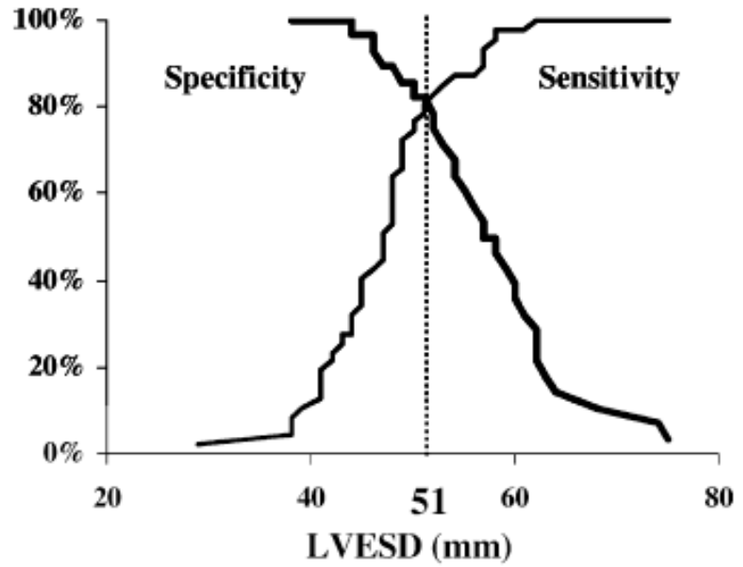
Jerry Braun[a], Jeroen J. Bax[b], Michel I.M. Versteegh[a], Pieter G. Voigt[a], Eduard R. Holman[b], Robert J.M. Klautz[a], Eric Boersma[c], Robert A.E. Dion[a,*]



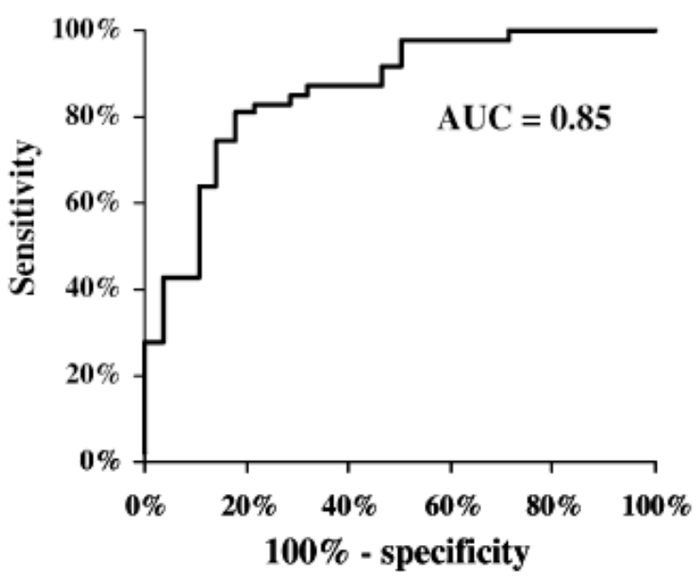
Panel A



Panel B



Panel A



Panel B

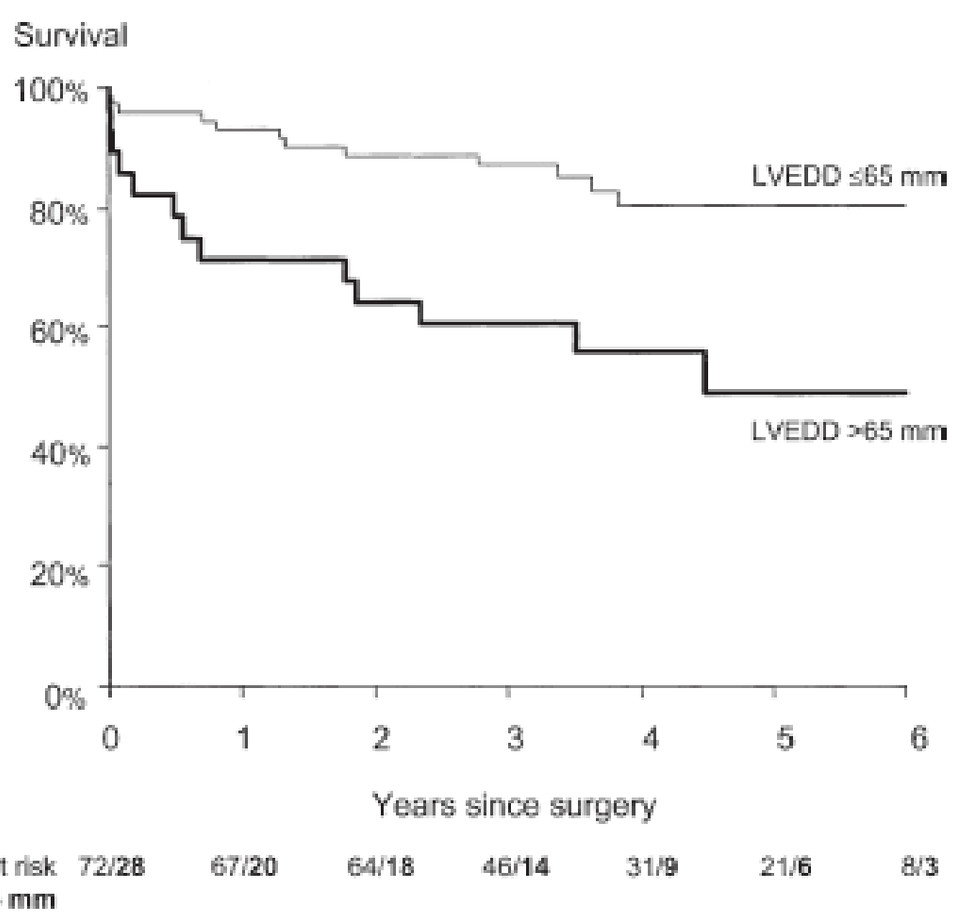
European Journal of Cardio-thoracic Surgery 27 (2005) 847–853

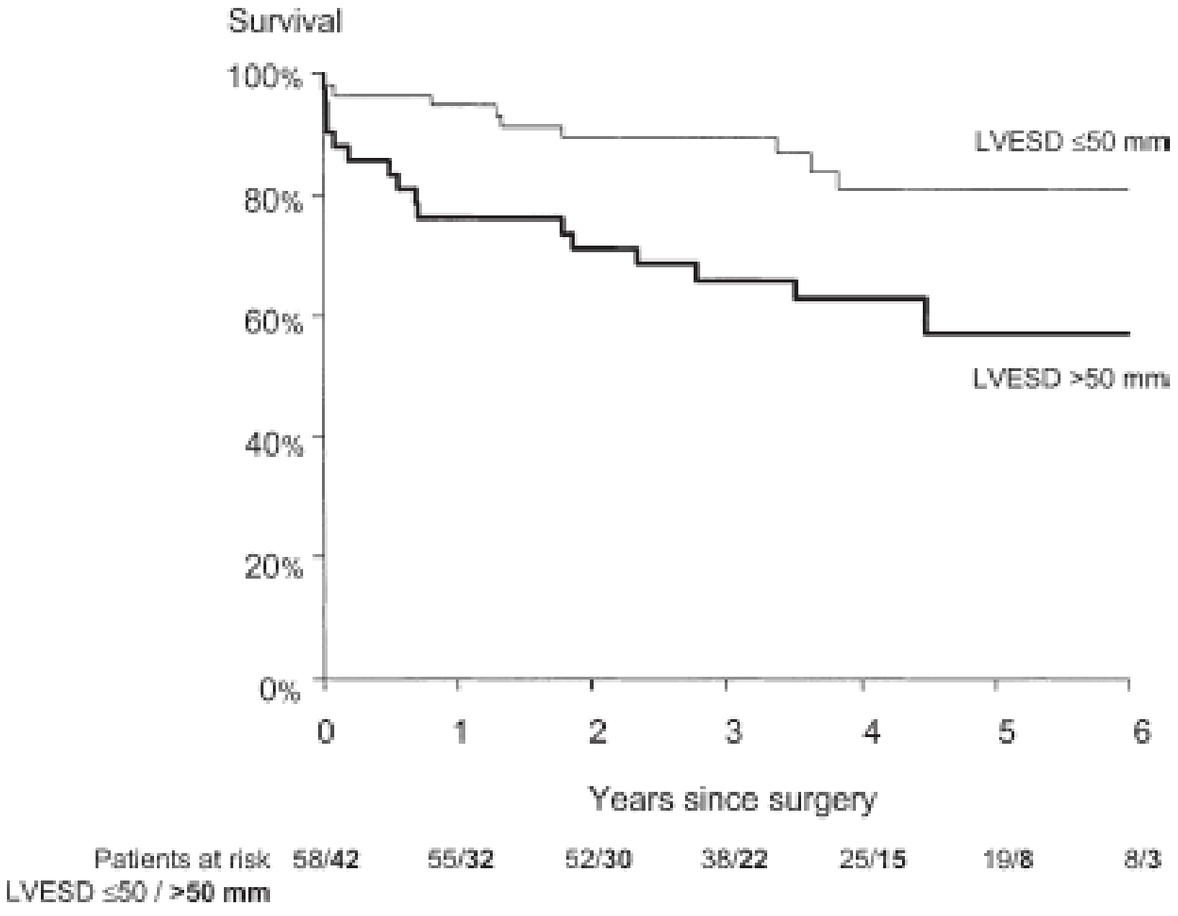
Restrictive Mitral Annuloplasty Cures Ischemic Mitral Regurgitation and Heart Failure

Jerry Braun, MD, Nico R. van de Veire, MD, Robert J. M. Klautz, MD, PhD, Michel I. M. Versteegh, MD, Eduard R. Holman, MD, PhD, Jos J. M. Westenberg, PhD, Eric Boersma, PhD, Ernst E. van der Wall, MD, PhD, Jeroen J. Bax, MD, PhD, and Robert A. E. Dion, MD, PhD

Departments of Cardiothoracic Surgery, Cardiology, and Radiology, Leids Universitair Medisch Centrum, Leiden, and Department of Cardiology, Erasmus Medisch Centrum, Rotterdam, the Netherlands

(Ann Thorac Surg 2008;85:430–7)





Rule # 1

- LVEDD $\leq$ 65 mm
- LVESD $\leq$ 51 mm

Preoperative Posterior Leaflet Angle Accurately Predicts Outcome After Restrictive Mitral Valve Annuloplasty for Ischemic Mitral Regurgitation

Julien Magne, MSc; Philippe Pibarot, DVM, PhD; François Dagenais, MD, FRCS; Zeineb Hachicha, MD; Jean G. Dumesnil, MD, FRCPC; Mario Sénéchal, MD, FRCPC

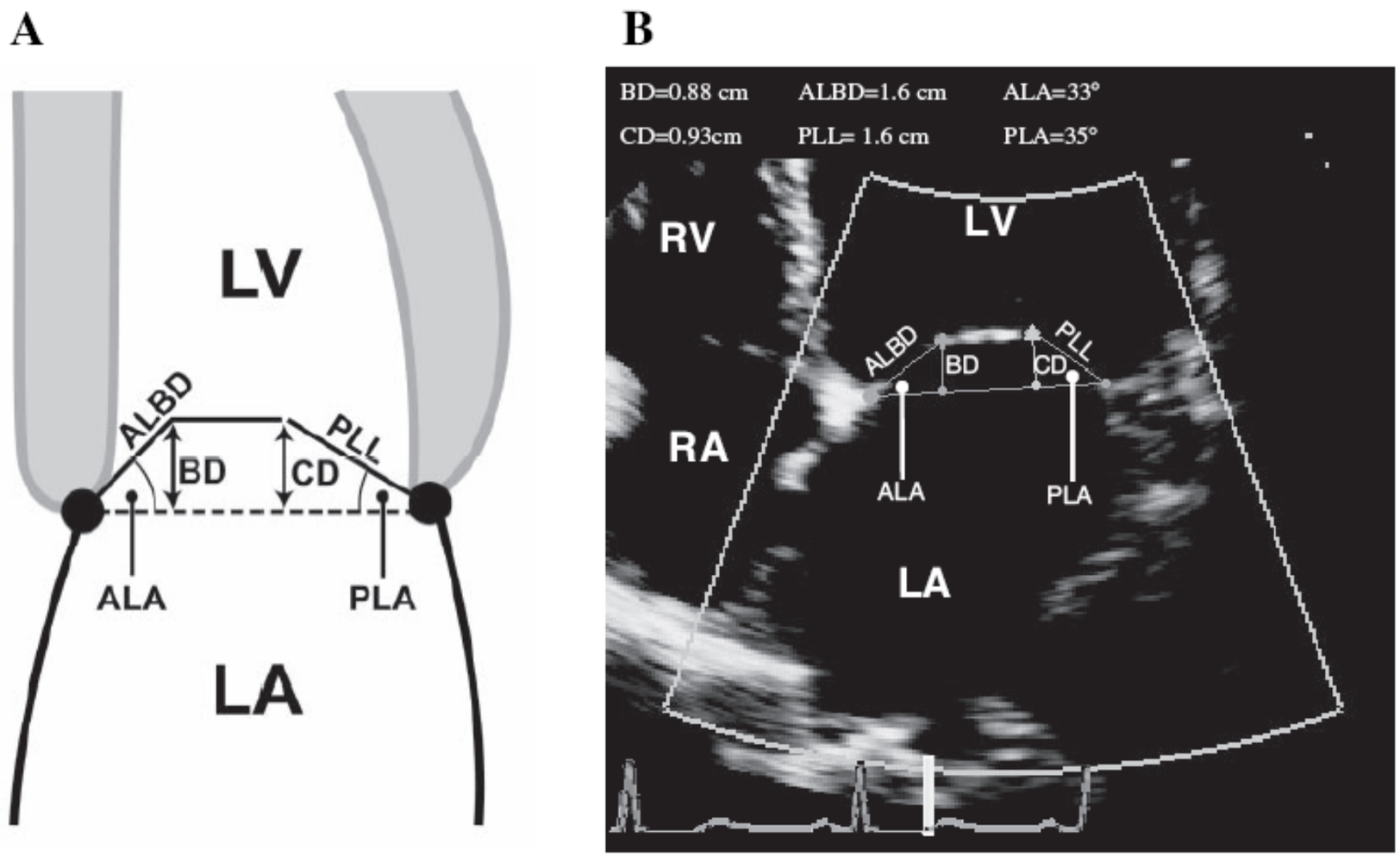


Figure 1. Method of mitral leaflet angle quantification. A, Schema of transthoracic echocardiographic 4-chamber view in midsystole. B, Echocardiographic image demonstrating technique of measurements of anterior leaflet angle (ALA) and posterior leaflet angle (PLA) using coaptation distance (CD), bending distance (BD), anterior leaflet bending distance (ALBD), and posterior leaflet length (PLL). RA indicates right atrial; RV, right ventricle.

Performance PLA

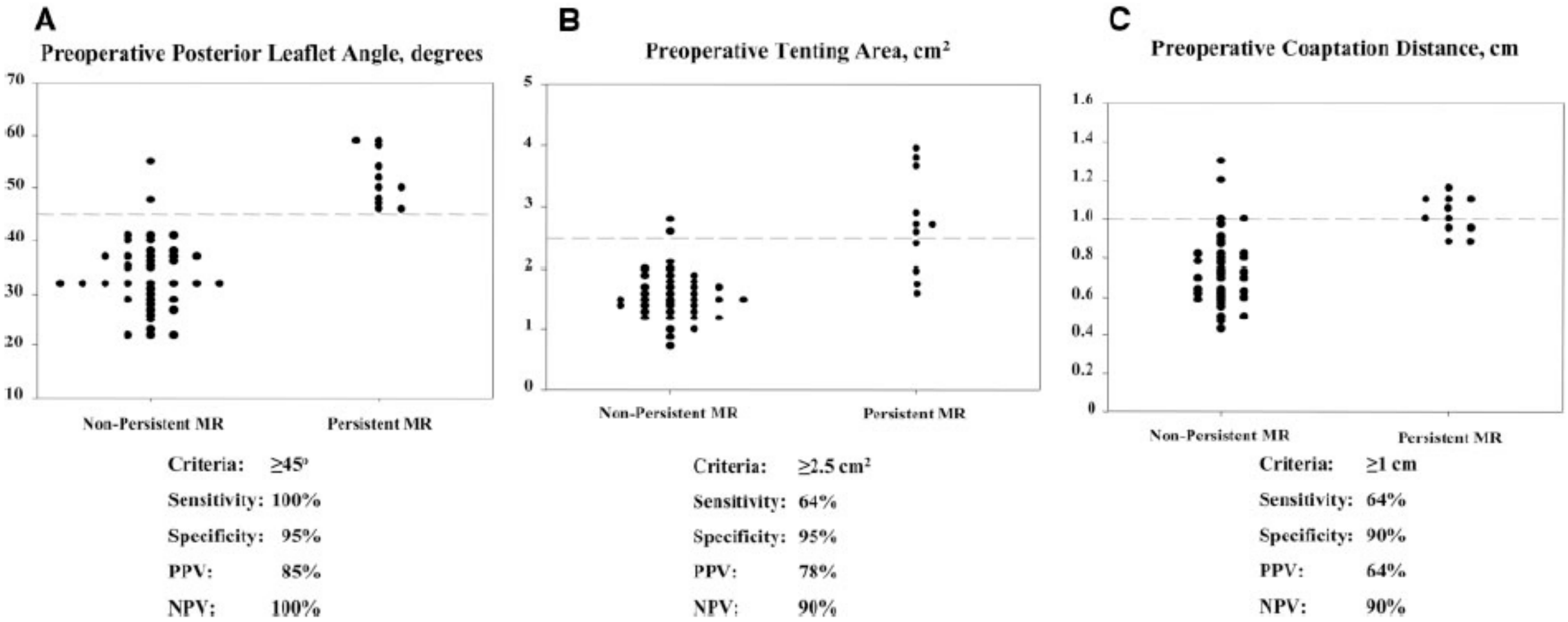


Figure 3. Comparison of the performance of 4-chamber posterior leaflet angle (A), tenting area (B), and coaptation distance (C) to differentiate nonpersistent mitral regurgitation patients from persistent mitral regurgitation patients. PPV indicates positive predictive value; NPV, negative predictive value.

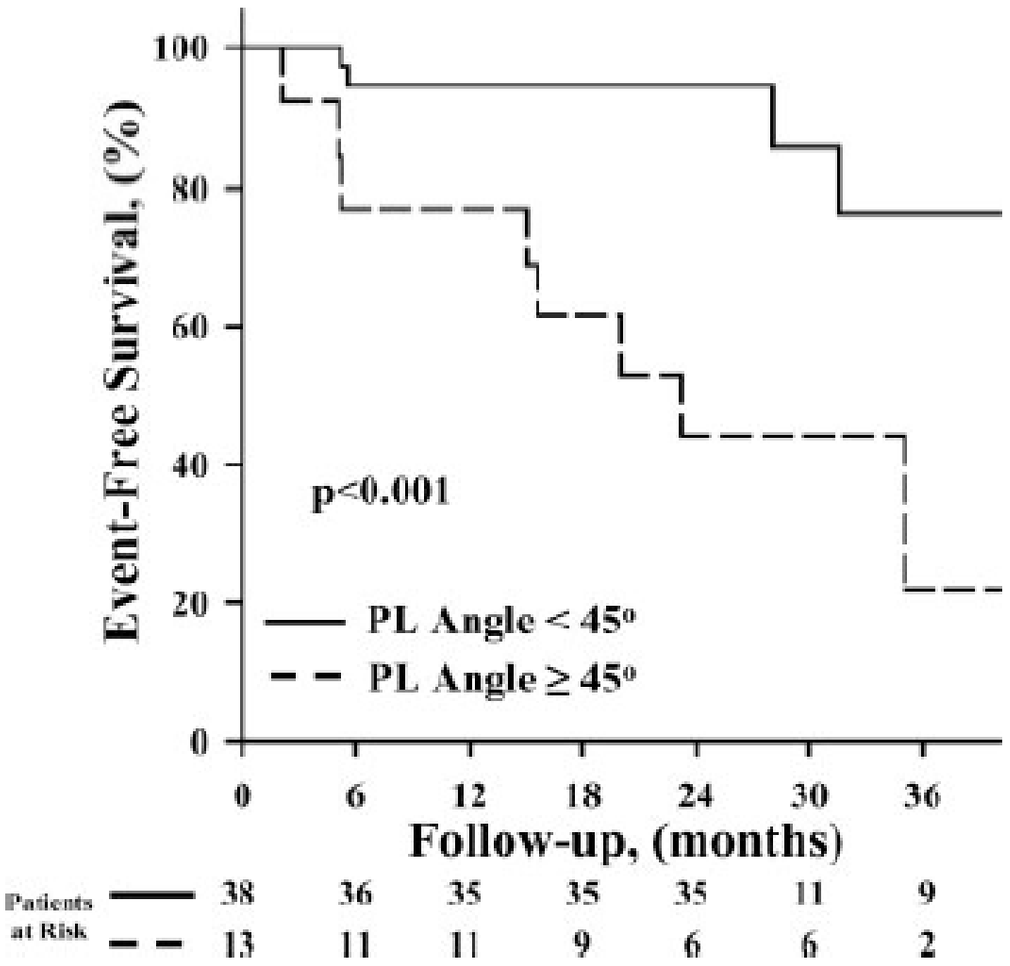


Figure 4. Event-free survival after mitral valve annuloplasty among patients with ischemic mitral regurgitation according to the preoperative posterior leaflet angle. Numbers at the bottom indicate the number of patients at risk for each follow-up time in the studied groups.

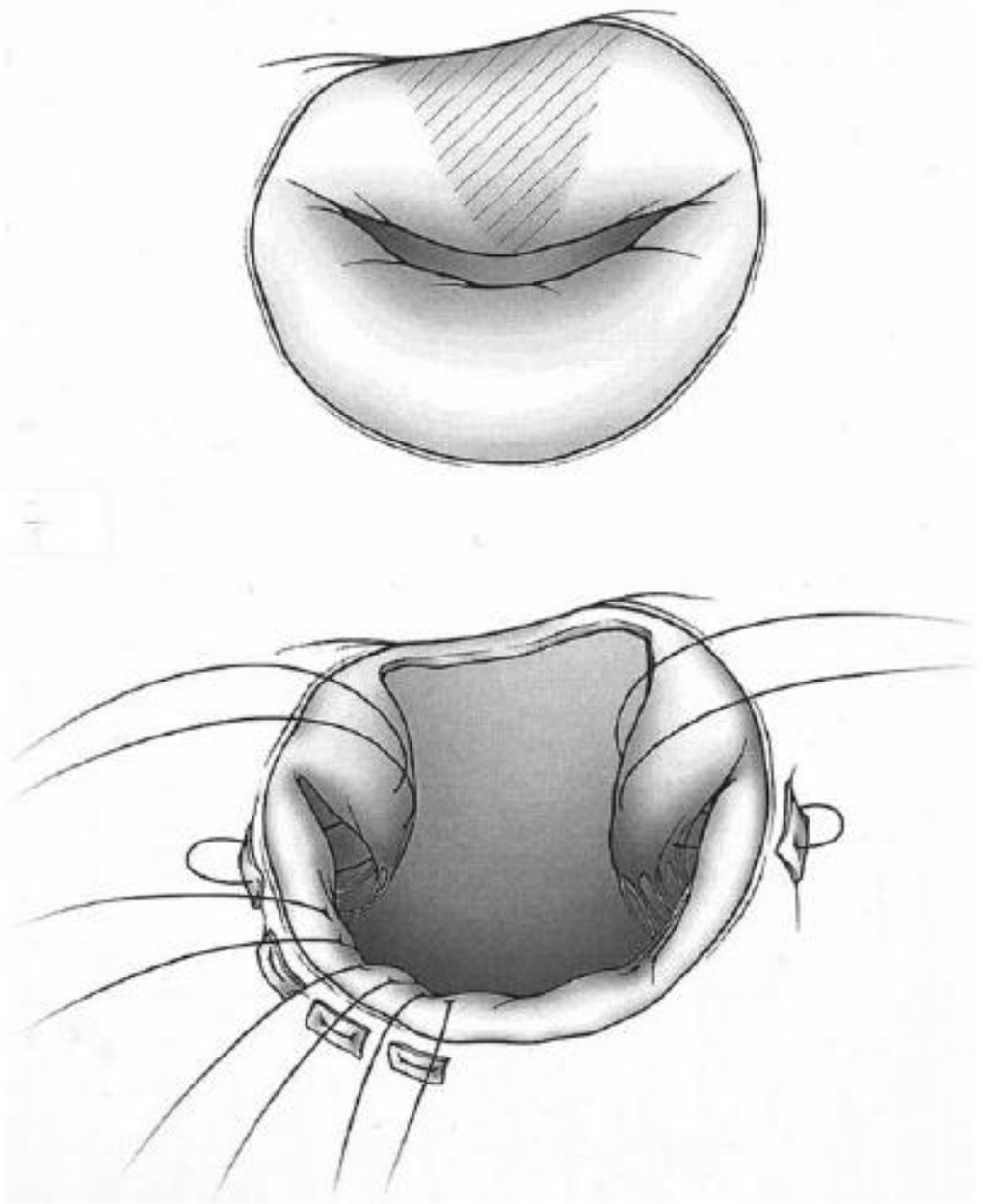
- patients with a preoperative **PML angle > 45°** are at high risk for a **worse outcome** and **recurrence of MR**

- **MV replacement with chordal sparing** is the **preferred approach** in these patients

Rule # 2 -3-4

- Posterior Leaflet Angle $\geq 45^{\circ}$
- Tenting Area $\geq$ 2.5 cm2
- Coaptation Distance $\geq$ 1cm

MV Replacement with Chordal Sparing



The NEW ENGLAND JOURNAL of MEDICINE

ORIGINAL ARTICLE

Mitral-Valve Repair versus Replacement for Severe Ischemic Mitral Regurgitation

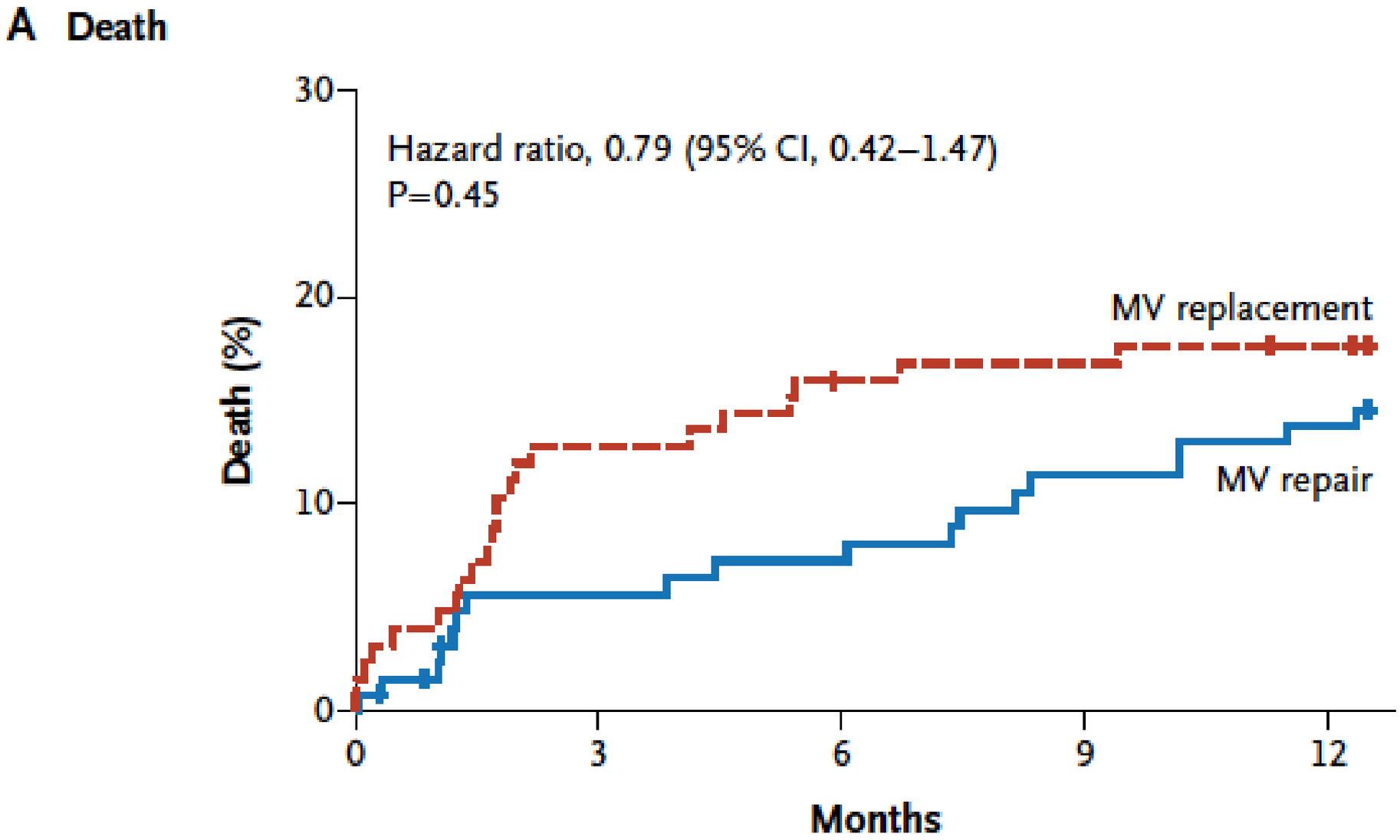
- 251 patients with severe IMR to undergo MV repair or chordal-sparing replacement
- primary end point **LVESVI at 12 months**
- secondary end point a composite of MACCE, functional status, quality of life at 12 months

Acker MA et al - N Engl J Med 2014;370:23-32.

LVESVI

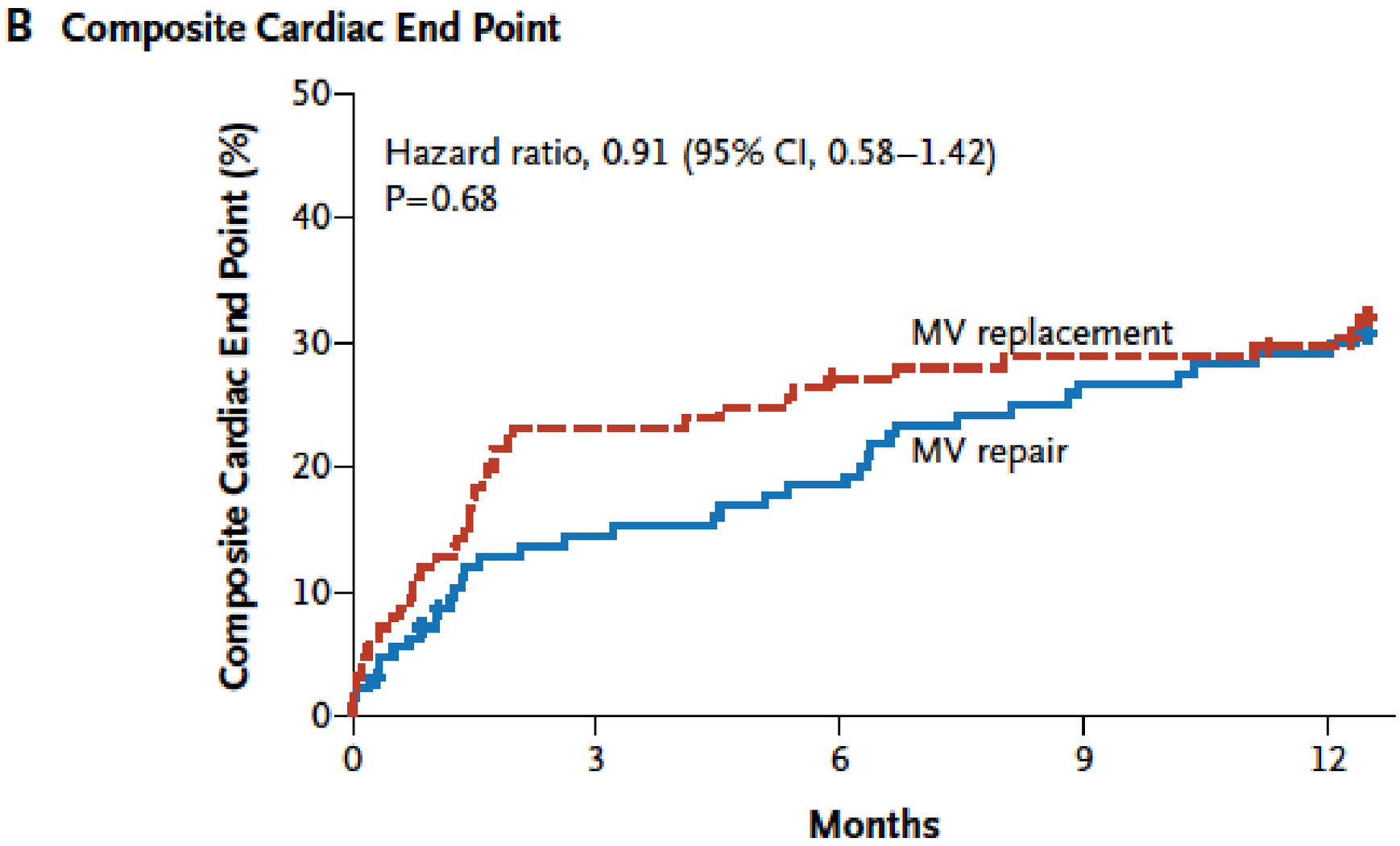
	MV repair	MV replacement	
preop	61.1±26.2	65.7±27.4	P=0.17
postop	54.6±25.0	60.7±31.5	P=0.18
death	18	22	P=0.47
recurrence of MR	32.6%	2.3%	P<0.001

12 Months F.U.



No. at Risk					
MV repair	126	116	114	109	106
MV replacement	125	109	104	103	101

12 Months F.U.



No. at Risk					
MV repair	126	105	100	90	87
MV replacement	125	96	90	88	86

The NEW ENGLAND JOURNAL of MEDICINE

ORIGINAL ARTICLE

Mitral-Valve Repair versus Replacement for Severe Ischemic Mitral Regurgitation

- **no significant difference in left ventricular reverse remodeling or survival at 12 months** between patients who underwent mitral-valve repair and those who underwent mitral-valve replacement

- **MV replacement had a more durable correction** of mitral regurgitation, but there was **no significant between-group difference in clinical outcomes**

Acker MA et al - N Engl J Med 2014;370:23-32.

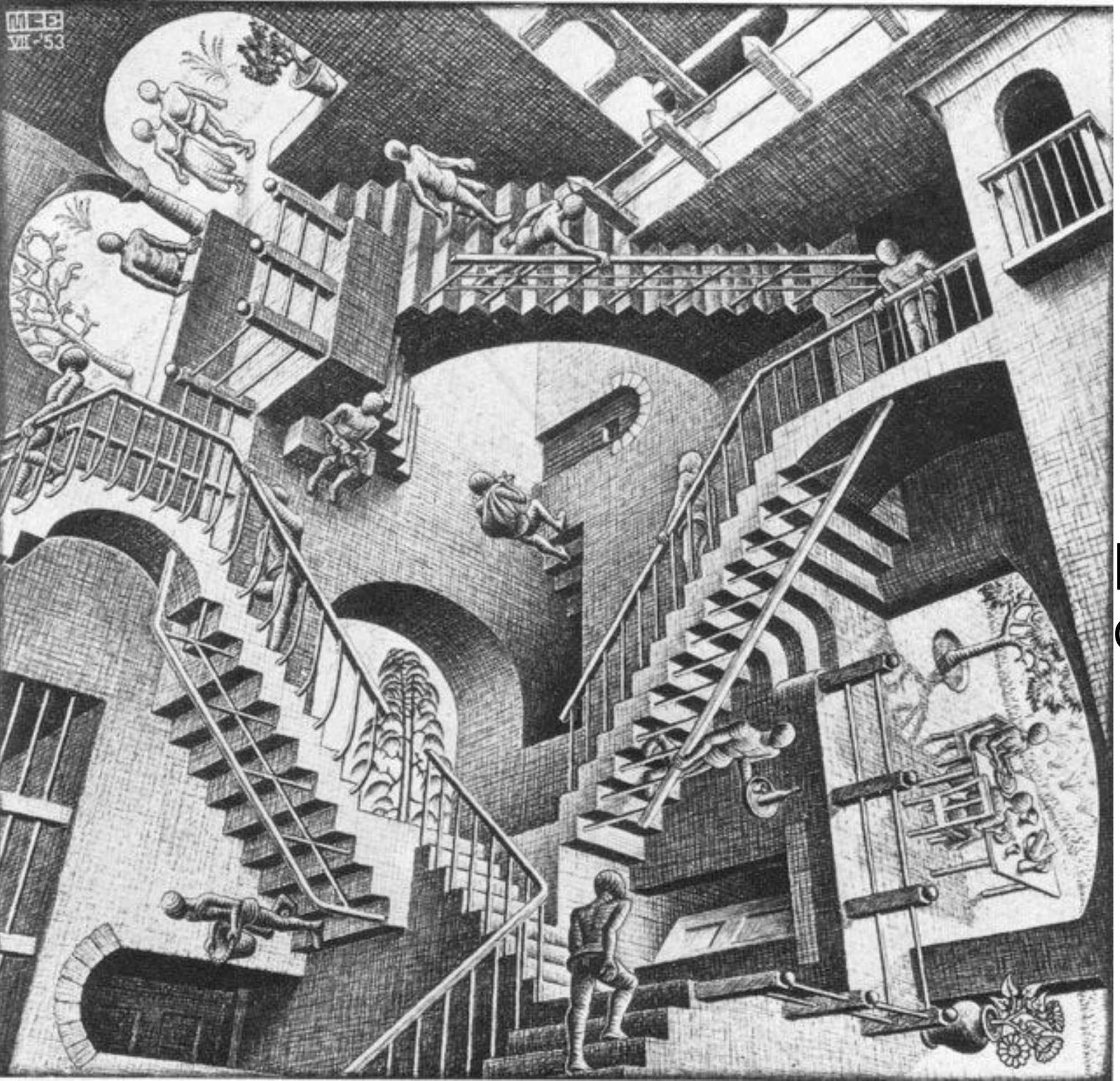
Conclusions

- **surgery for IMR is a challenge** (higher operative mortality than primary MR and worse prognosis)

- **indications and the preferred surgical procedures remain controversial**, mainly because the persistence and high recurrence of MR after MV repair and the absence of evidence that surgery prolongs life

- when surgery is indicated there is a **trend favoring MV repair** using only an undersized, rigid ring annuloplasty, with low preoperative risk but high risk of MR recurrence

- the only RCT comparing **MV repair vs replacement** could not show any difference between the two procedures



Relativity

C. Escher, 1953