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Cases in Valvular Heart Disease

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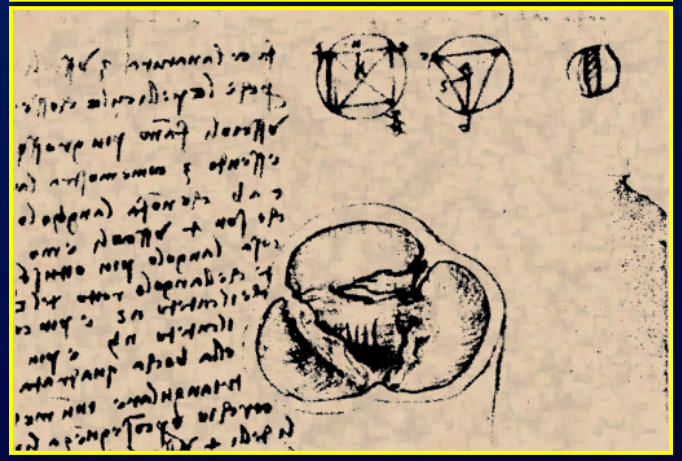
Torino, Italy

September 2013

No Disclosures

da Vinci, 1513



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51-Year-Old Female

- BAV – dilated aorta
- 1997 – first pregnancy, age 35

  During pregnancy - aorta 45 → 55 mm
- 1997 – asc aorta replaced, BAV spared

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51-Year-Old Female

- Routine follow-up
- No symptoms
- Works full time
- Not terribly active…never has been

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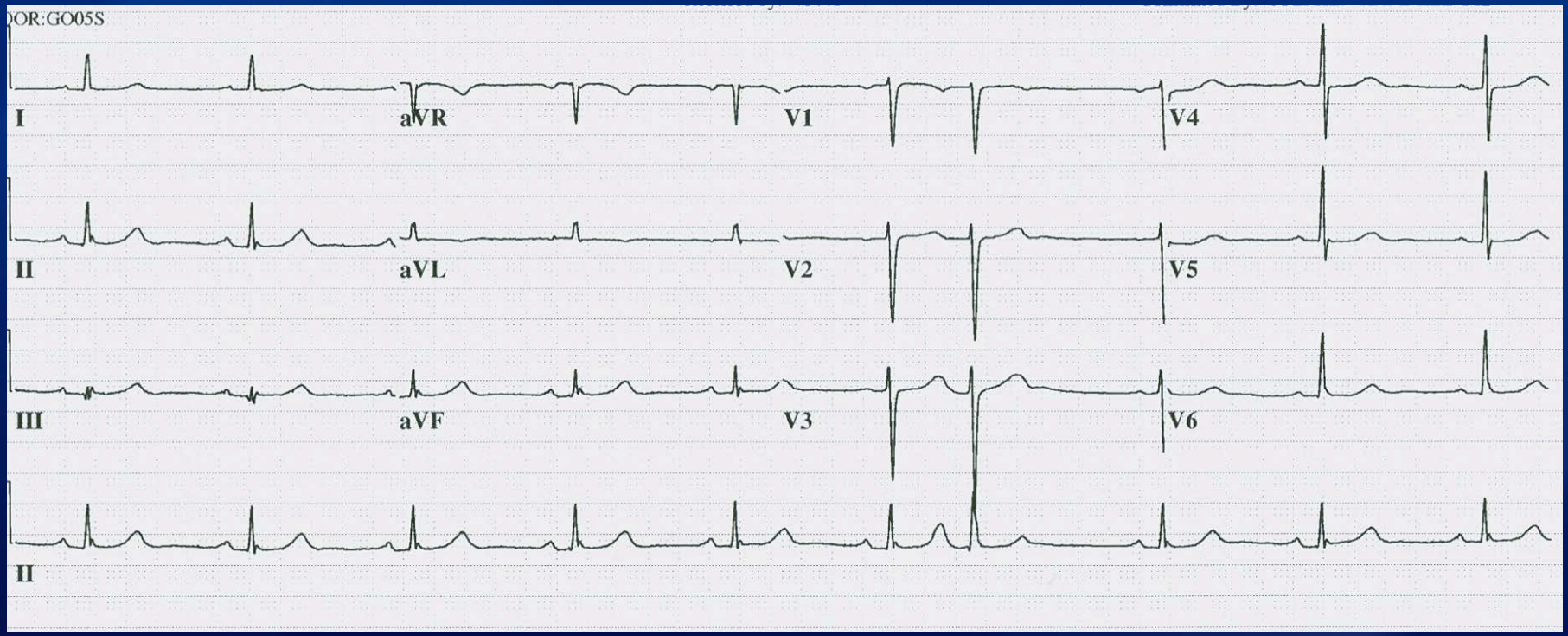
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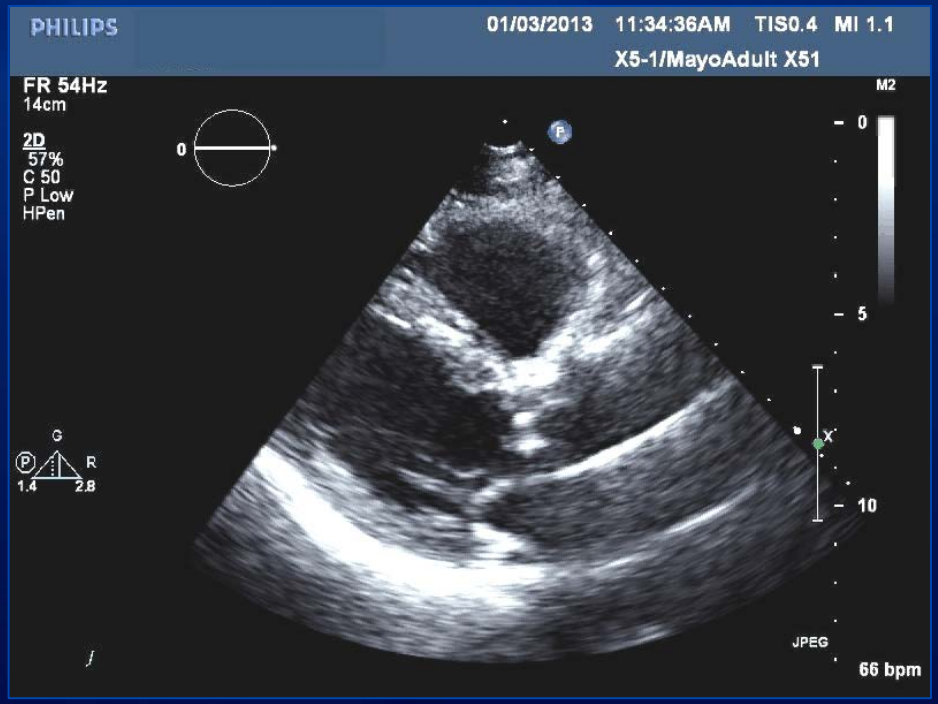
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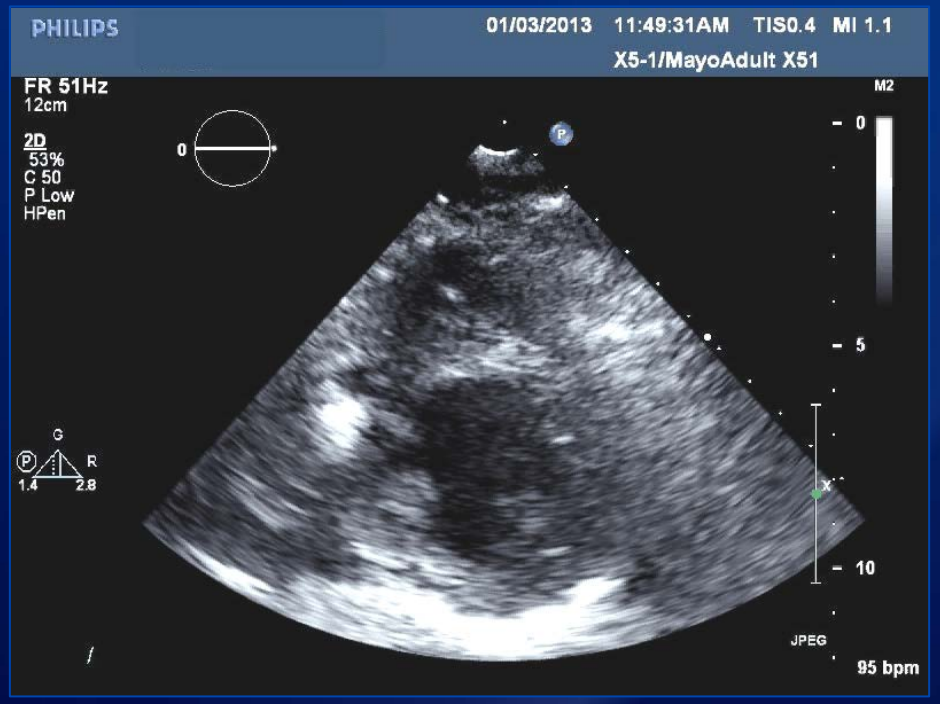
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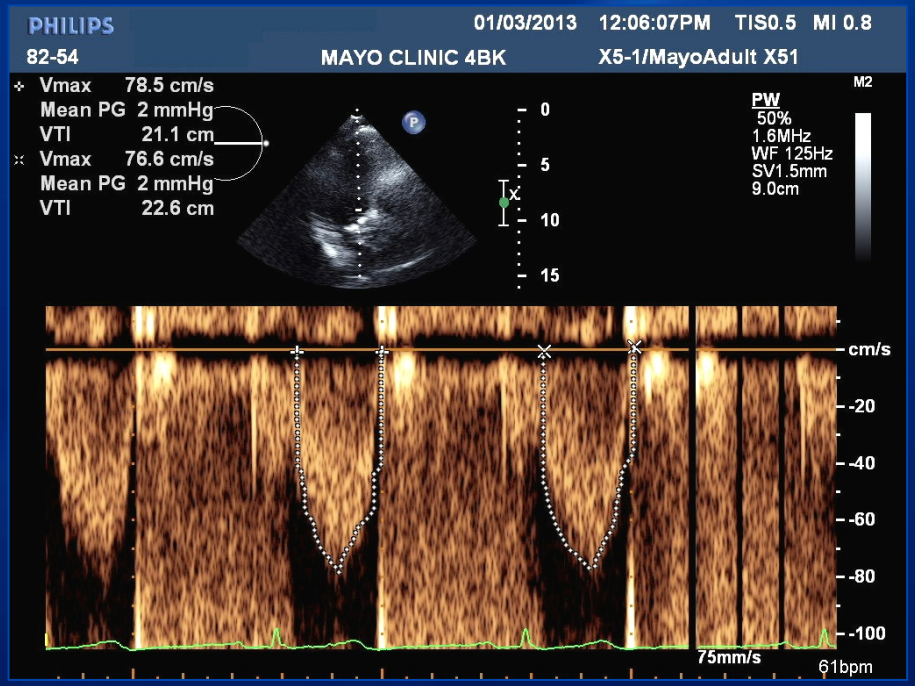

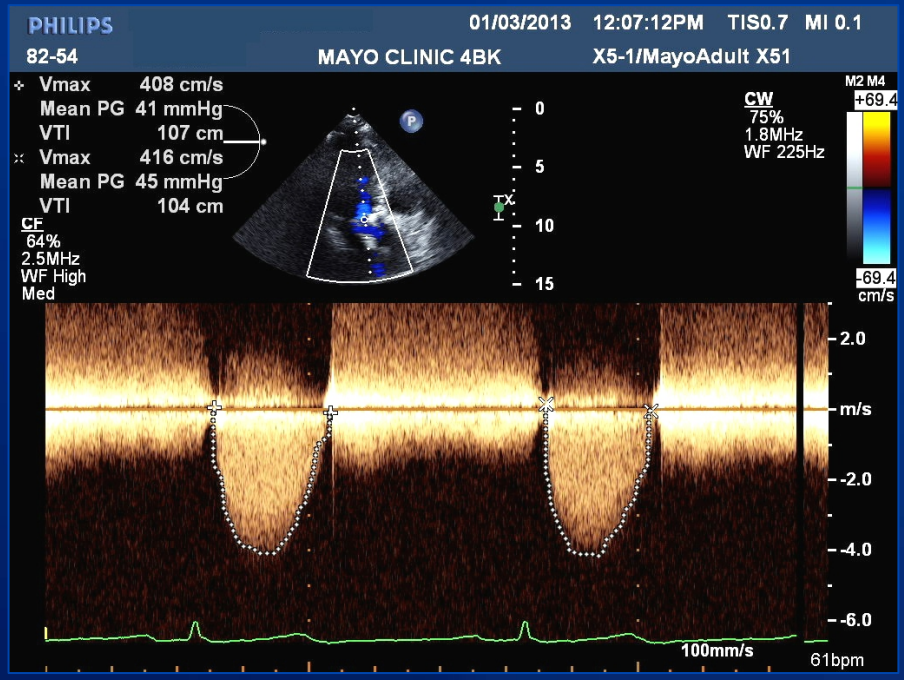

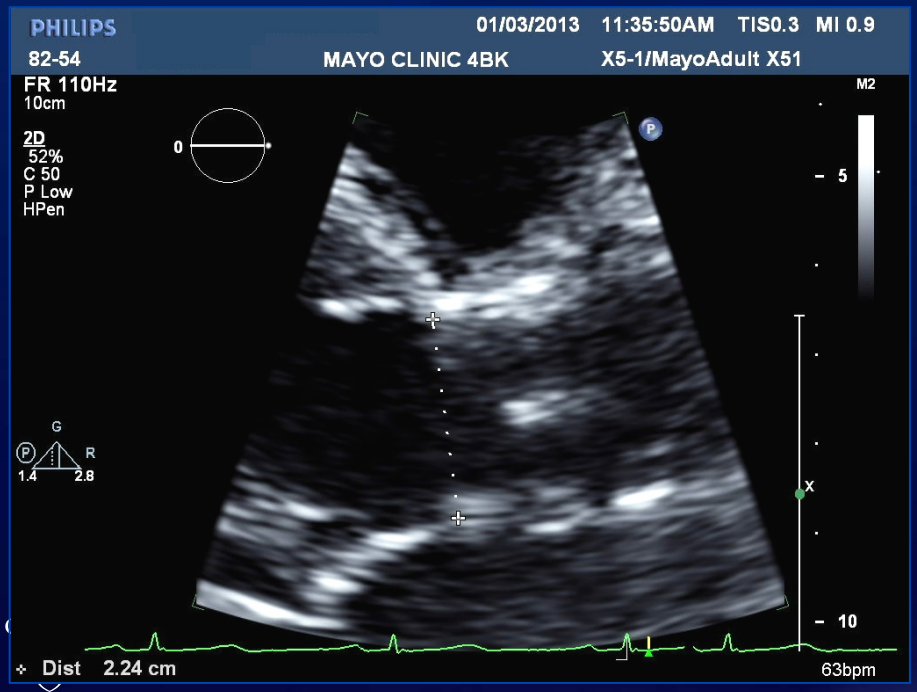

LVOT diam = 2.2 cm

LVOT vel = 0.8 m/sec

LVOT TVI = 22 cm

Peak AV = 4.1 m/sec

AV TVI = 105 cm

MG = 41 mmHg

Echocardiogram

- BAV with AS
- AV area = 0.74 cm2 (vel), 0.79 cm2 (TVI)

  MG 41 mmHg

  TVI ratio (Dimensionless index) 0.20

  Peak velocity 4.1 m/sec

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Valvular Stenosis

Severity of Aortic Stenosis

	Mean gradient	AVA/EOA
Mild AS	<25	>1.5
Moderate AS	25-40	1.0-1.5
Severe AS	>40	<1.0

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What next?

- Observation – see again in one year
- Operation
- More testing

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Exercise Time: 8.5 Minutes FAC: 92.4 % Estimated METS: 8.5

HR Response: Rest: BPM Peak: 160 BPM 1-minute Post: 136 BPM HR Recovery: 24.0 BPM

BP Response: Rest: 104 / 62

Reason for Termination: 1) Sympt

8.5 minutes 92.4% FAC
VO2 26 mL/kg/min 95% predicted
ECG negative

7.4

Normal

iency:

Measurements

Type	Time	Speed							
SITTING	0.0								
SUPINE	0.0				74				
STANDING	0.0				65	104	62		
EXERCISE	0.0	1.7			68				227
EXERCISE	1.0	2.0			88				439
EXERCISE	2.0	2.0			88	104	62	8	514
EXERCISE	3.0	2.0	7.0		105				732
EXERCISE	4.0	2.0	7.0		110	116	64	11	815
EXERCISE	5.0	2.0	14.0		125				936
EXERCISE	6.0	2.0	14.0		131	104	66	13	1011
EXERCISE	7.0	3.0	12.5		148				1206
EXERCISE	8.0	3.0	12.5		155	102	60	16	1324
PEAK EX	8.5	3.0	14.0		160	102	66	19	1381
COOL DOWN	1.0	1.7			136	96	56	19	1064
COOL DOWN	3.0	1.7			102	96	54		
RECOVERY	6.0				84	96	62		

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What next?

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Exercise Testing in AS

Amato et al - Heart 2001

ECG changes
Symptoms
Arrhythmia
↑BP ≤20 mmHg

- 66 consecutive pt with seve cm2)
- Mean FU 15 months
- Significant differences for (+) vs (-) TMET (p = 0.0001) and AVA <0.7 cm2 vs >0.7 cm2 (p = 0.0021)
- Although asymptomatic, 6% (4/66) sudden death
  All had (+) TMET and AVA <0.6 cm2
- TMET is safe and prognostic value in asympt AS

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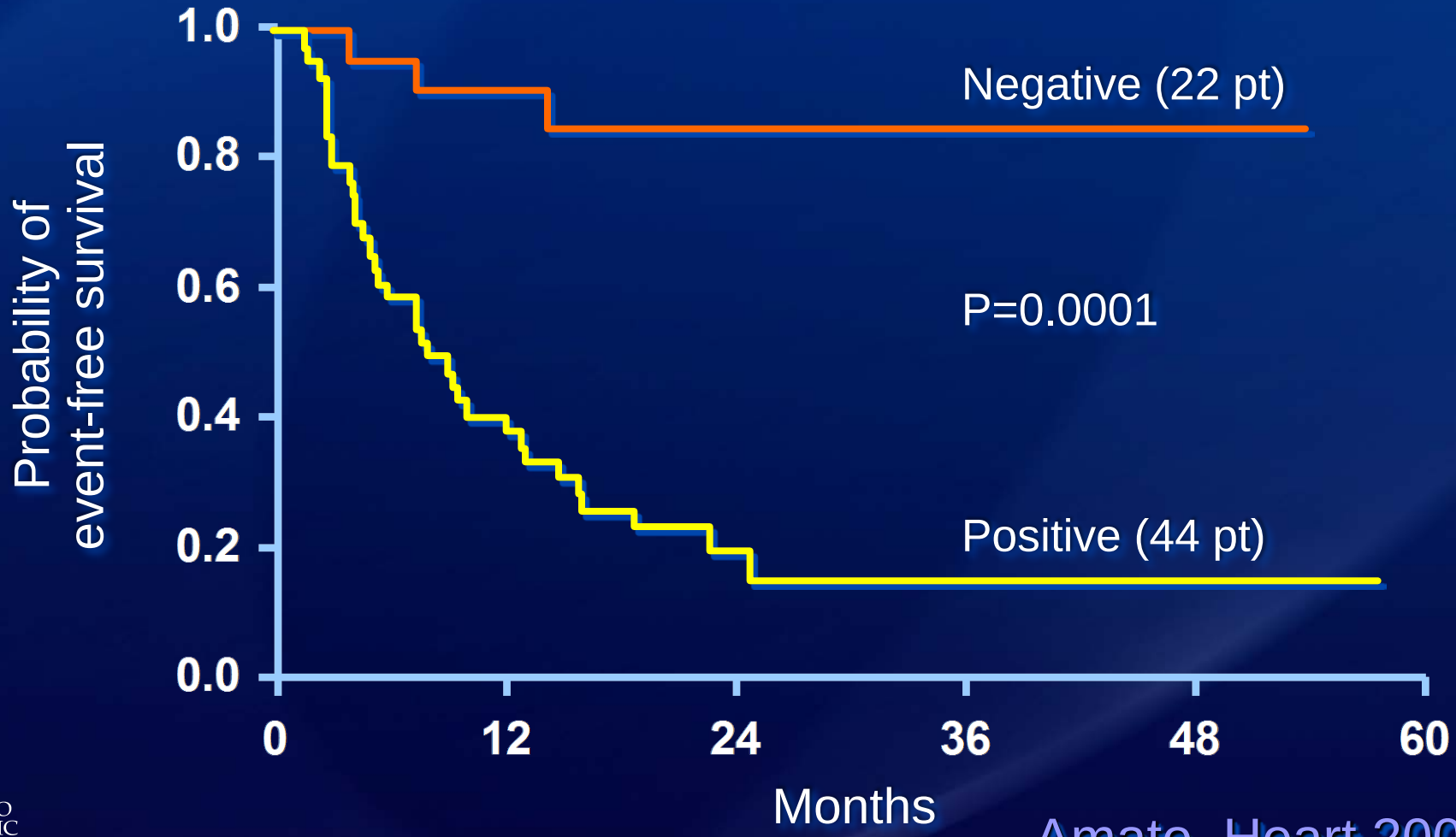
Kaplan-Meier Analysis - Probability of Event-free Survival for Patients with Asymptomatic Severe AS – TMET



Amato, Heart 2001

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51-Year-Old Female

- AVR mechanical valve
- Uncomplicated postop course

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Take Home Points
Asymptomatic Severe Aortic Stenosis 2013

- Reasonable to observe if truly asymptomatic
- Exercise testing is safe in asymptomatic AS

  Risk stratify

  Abnormal ex test – suggest intervention

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Mitral Valve Prolapse with MR

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42-Year-Old Man

- Murmur for many years
- Asymptomatic
- Exam – normal JVP and carotids
  - Apical systolic murmur, radiates to axilla
- ECG and CXR unremarkable

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Echo Report

Hemodynamics

Heart Rate: 67 BPM
Blood Pressure: 110 / 68 mmHg
ECG:
Sinus rhythm

Media Details

Server #clinical clips –116

Final Impressions

1. Bileaflet mitral valve prolapse with predominant A2 prola
regurgitation, small anterolateral commissure jet . Regurgita
2. Mild left ventricular enlargement. Ejection fraction 66%.
3. No regional wall motion abnormalities.
4. Normal right ventricular size and systolic function.
5. Estimated right ventricular systolic pressure; 26 mmHg.
6. No intracardiac mass or thrombus, but the left atrial appen
location.
7. No pericardial effusion.

Bileaflet mitral valve prolapse (MVP)

Severe posterolateral mitral regurgitation (MR)
ERO 0.45 cm2

Enlarged Left Ventricle
Ejection fraction 66%

Left Ventricle

2D:		
Dimension (d) (mm)	54 *	39 – 53
Dimension (s) (mm)	33	23 – 35
EF*(%)	66	
LV Mass (g)	193	
LV Mass index (g/m²)	109	

Left Atrium

2D:		
4 chamber area(cm²)	21.70	
Length 4–Chamber View(mm)	56	
2 chamber area(cm²)	25.80	
Length 2–Chamber View (mm)	59	
Averaged Length(mm)	58	

Important findings:

1. Cause
2. Severity
3. LV size and function

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What Would You Recommend?

Observation – see again in 1 year

Mitral valve repair

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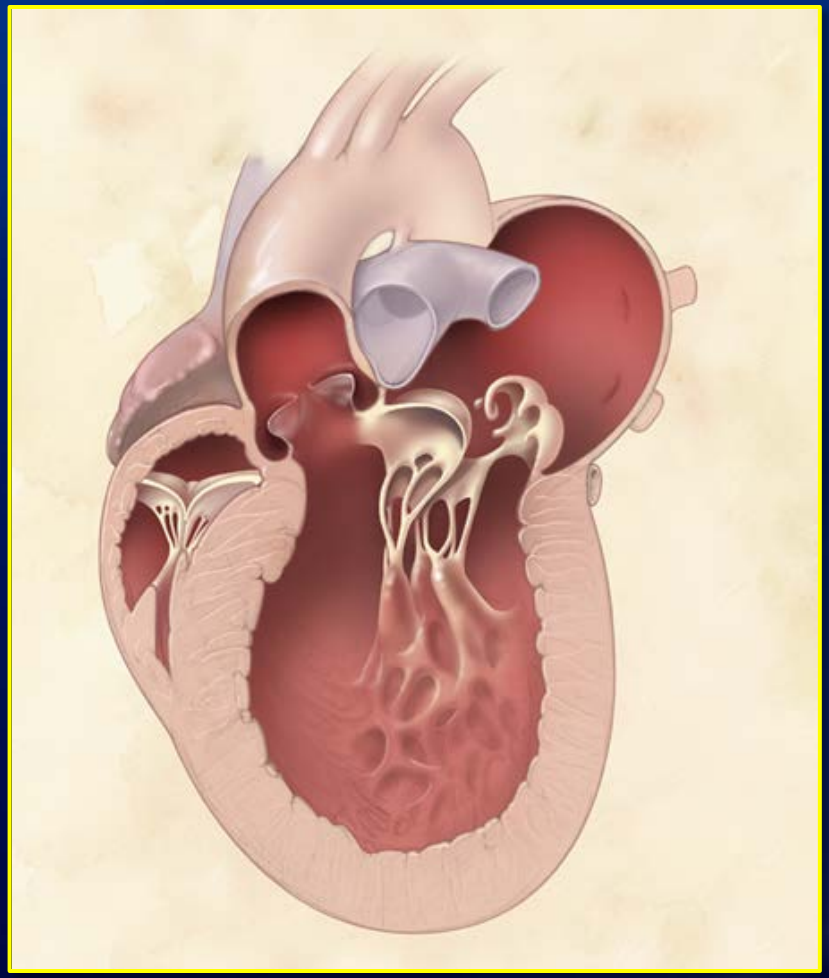
MVP with Mitral Regurgitation



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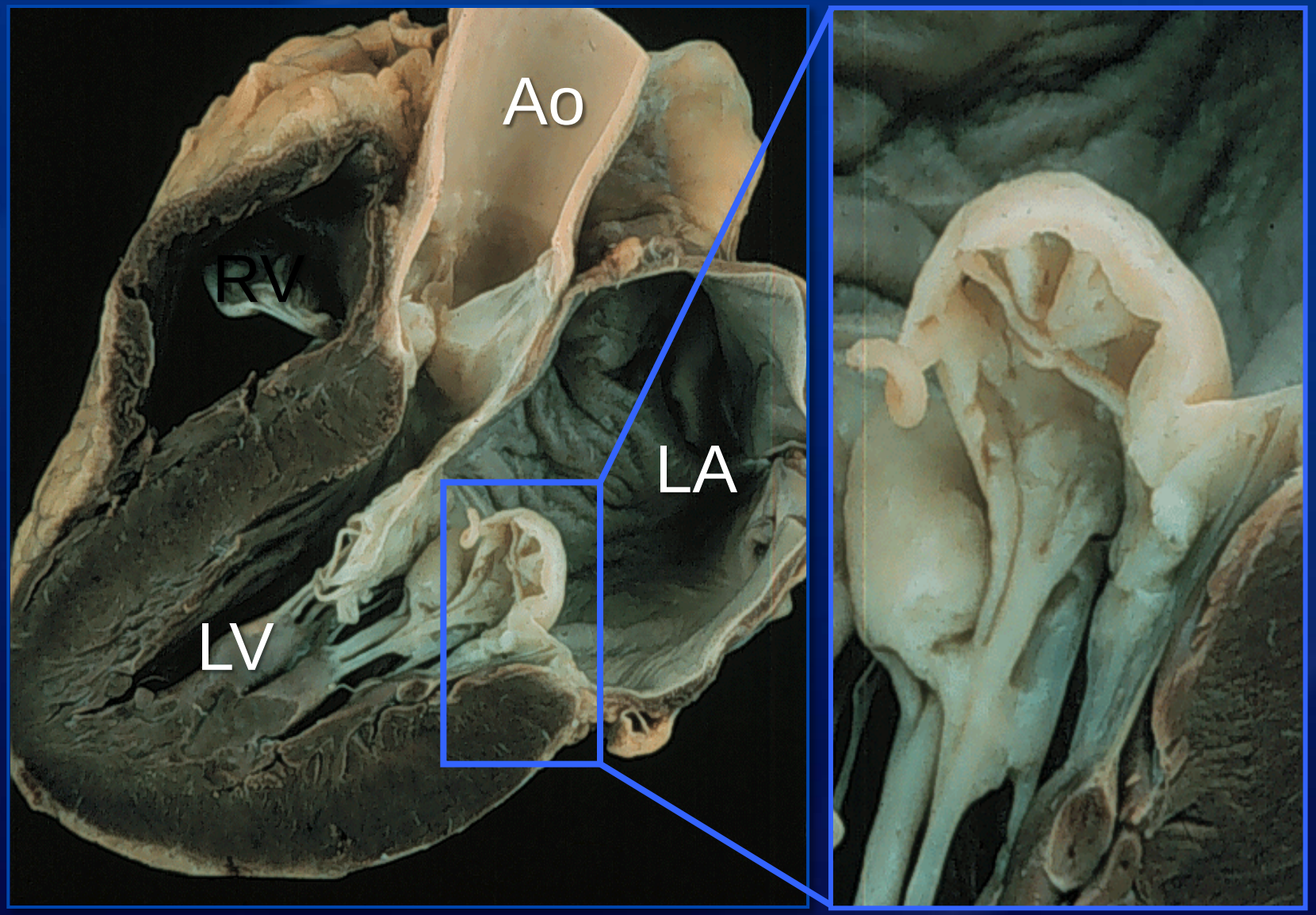

Courtesy of W.D. Edwards, MD

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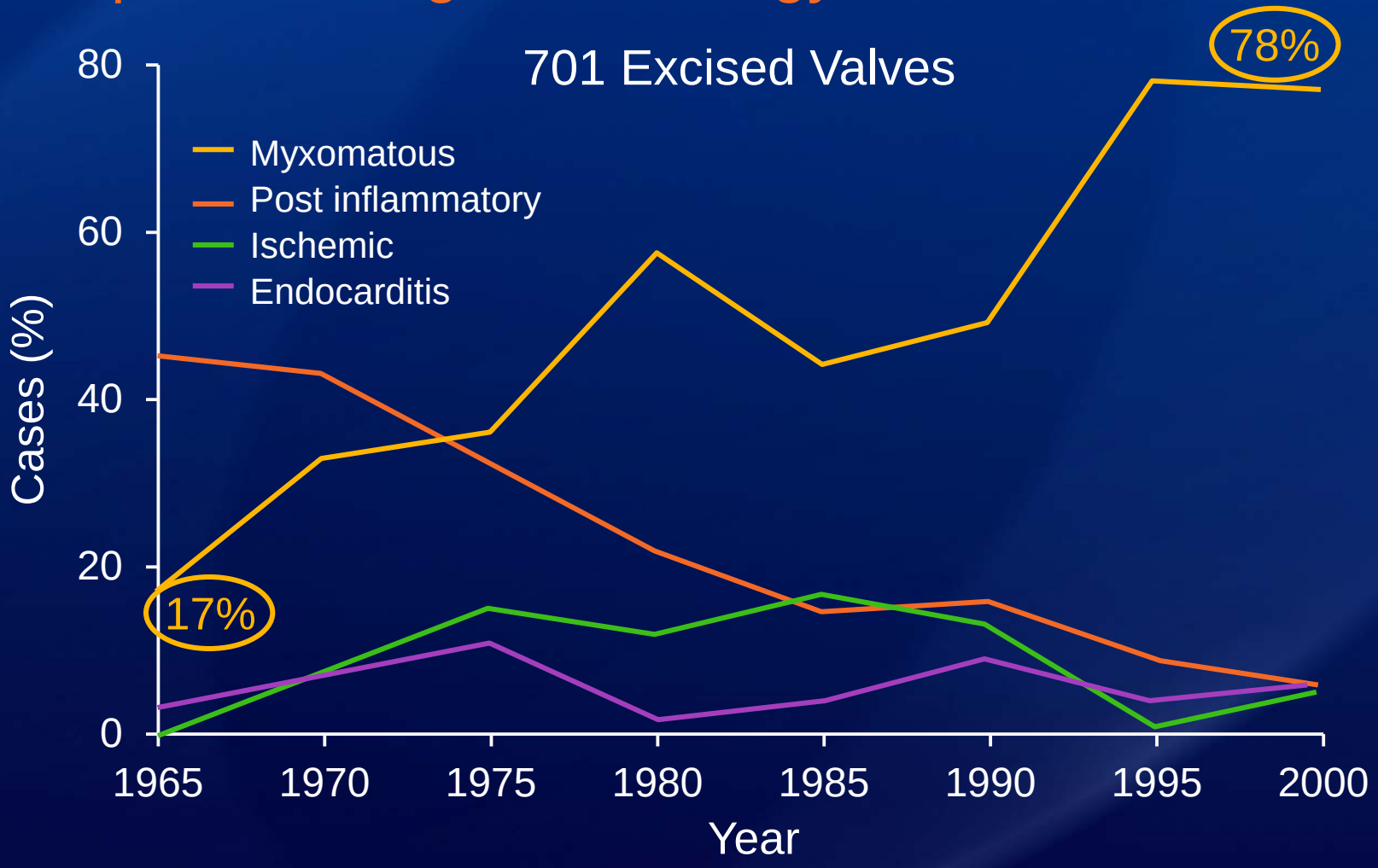
Mitral Regurgitation

Temporal Changes in Etiology



*IE Prophylaxis

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MVP with Chronic MR
Pathophysiology

- Volume overload – ↑ preload, ↓ afterload

  LV enlargement and dysfunction

- Prolonged asymptomatic period – symptoms late

- Vasodilator not indicated in asymptomatic patient with preserved EF (unless HT)

- EF decreases after MV repair or replacement

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Mitral Regurgitation
Natural History

Flail leaflets

- Diagnosis by Echo
- Uniformly severe degree of MR
- Most frequent cause of surgical MR in North America

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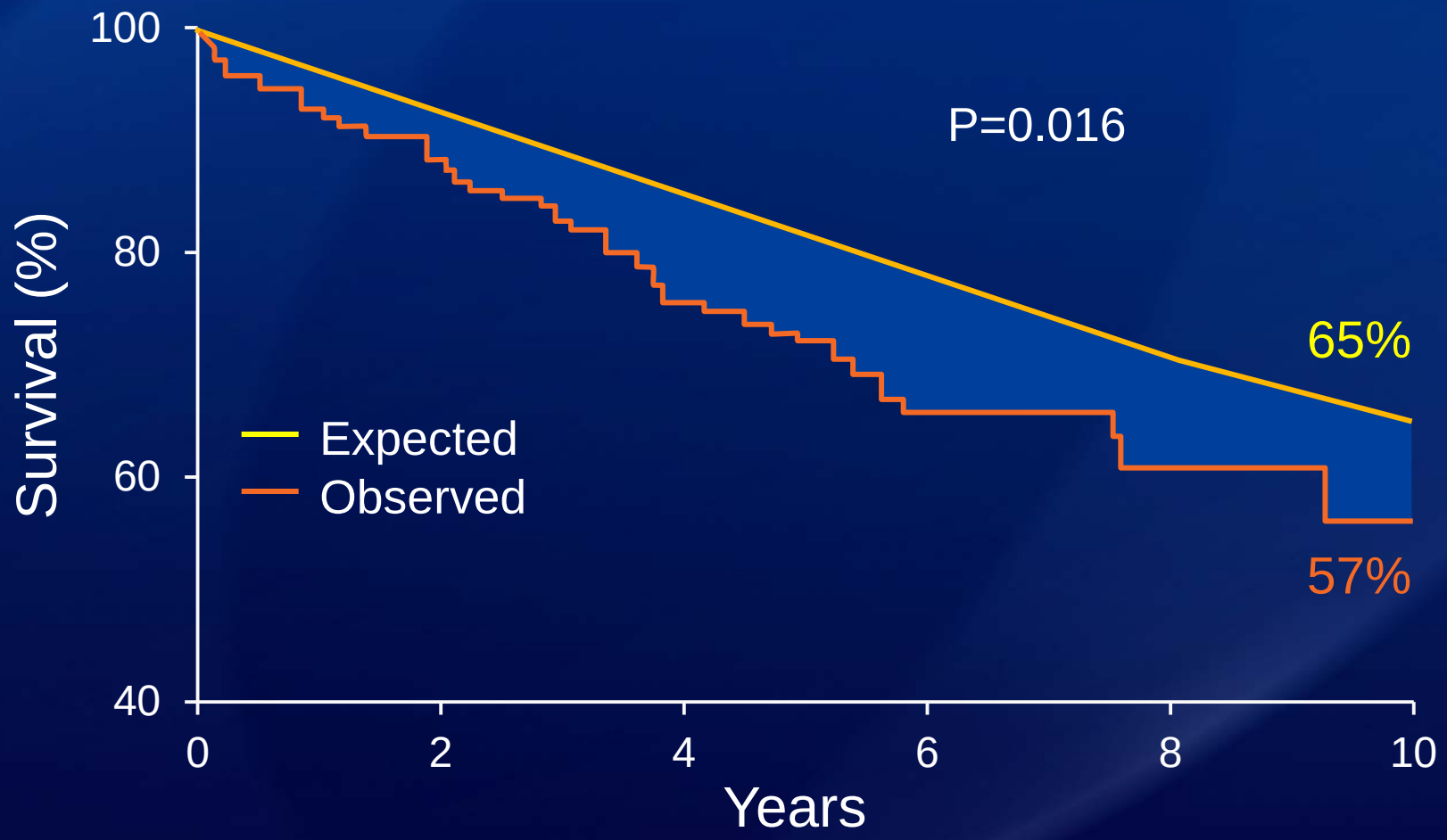
Mitral Regurgitation

Natural History: Excess Mortality



Ling et al: NEJM, 1996

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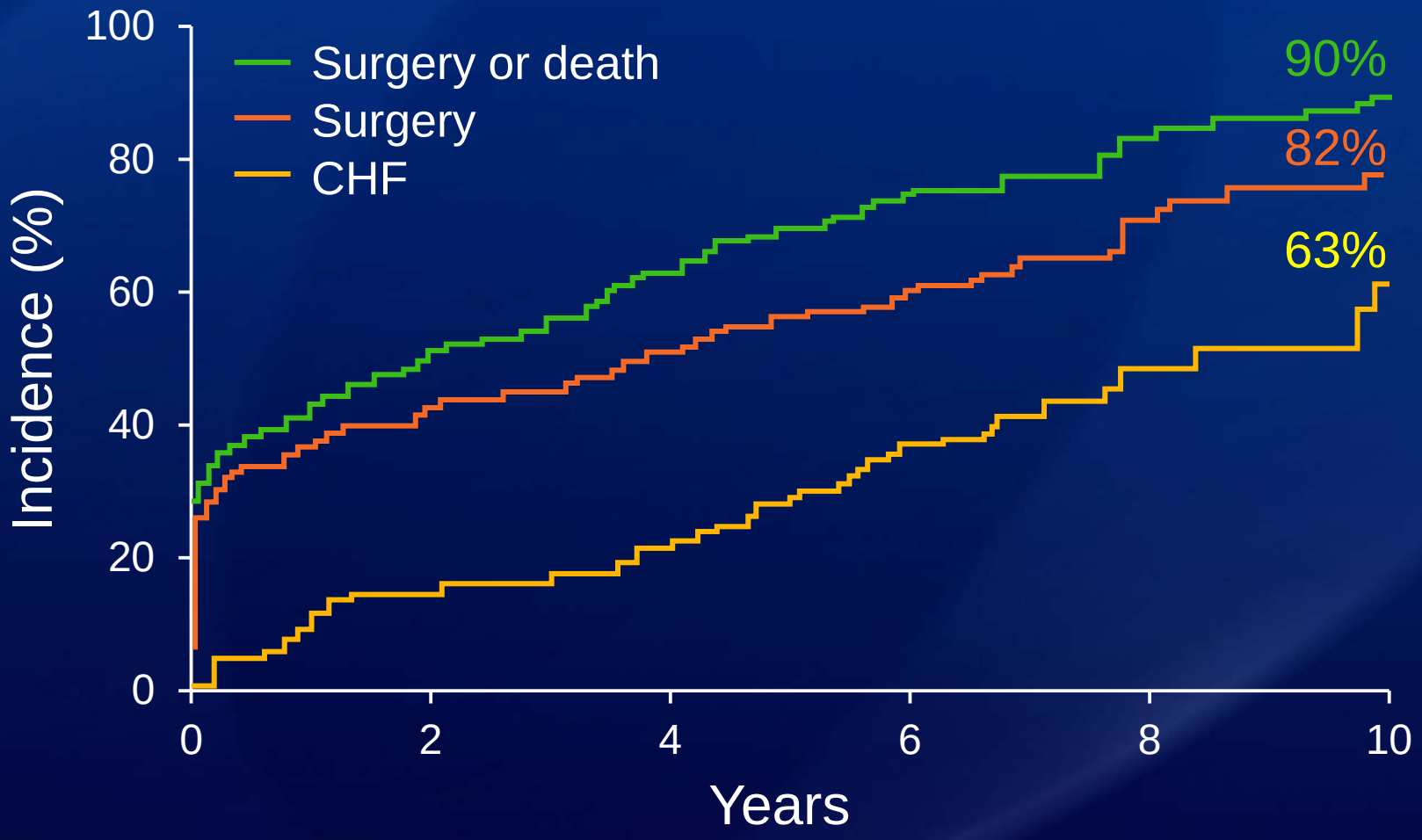
Mitral Regurgitation

Natural History: High Morbidity



Ling et al: NEJM, 1996

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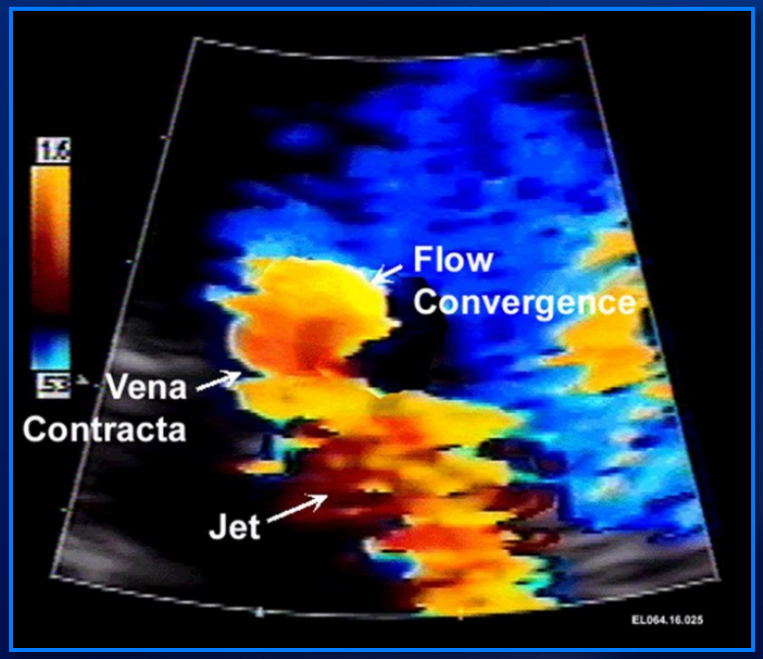
Lesion Severity Quantitation
PISA

Grade MR	ERO (cm^2)	RV (cc)
Mild	<0.2	<30
Moderate	0.2-0.39	0.3-0.59
Severe	≥0.40	≥60



EFFECTIVE REGURGITANT ORIFICE AREA

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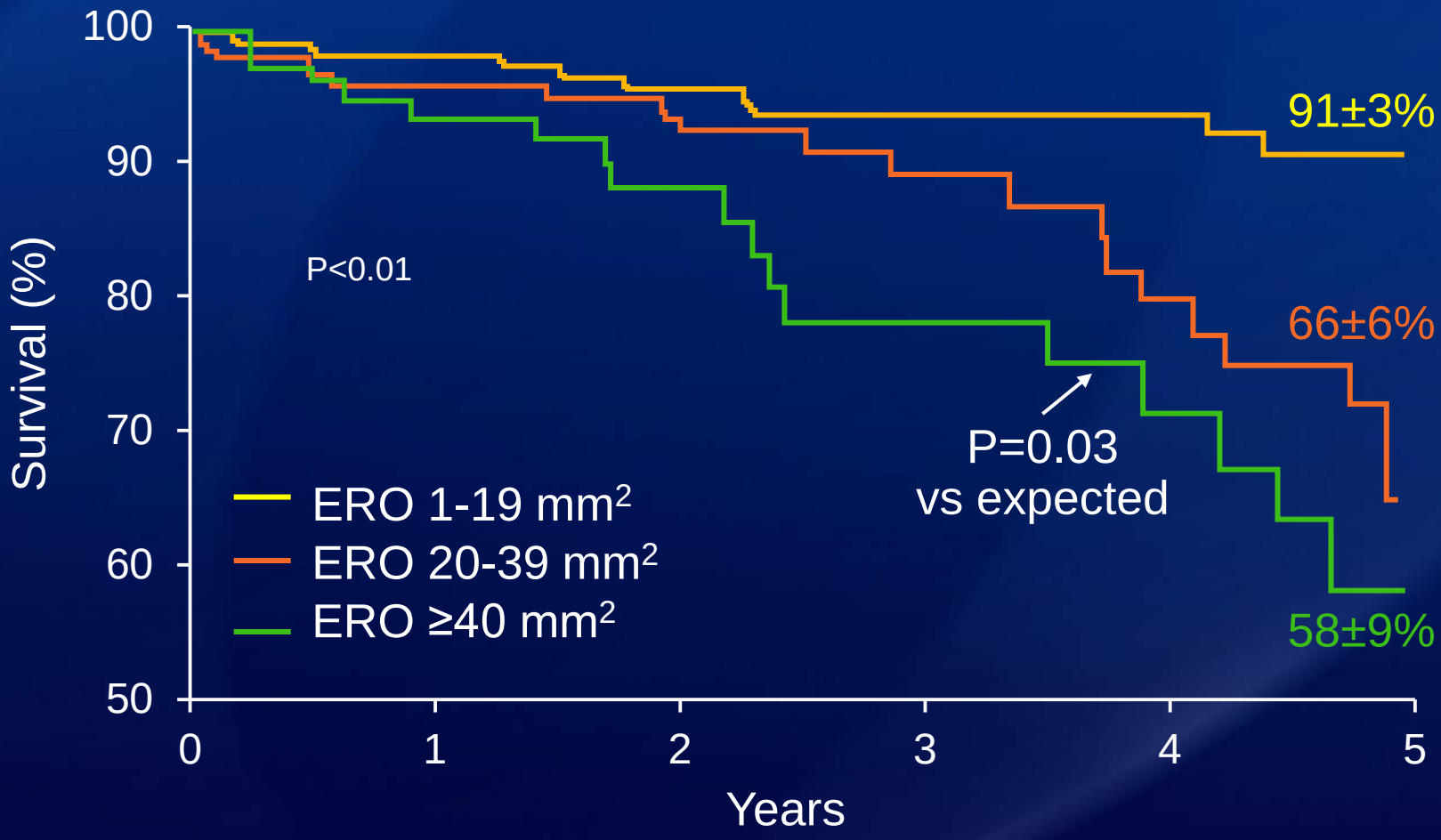
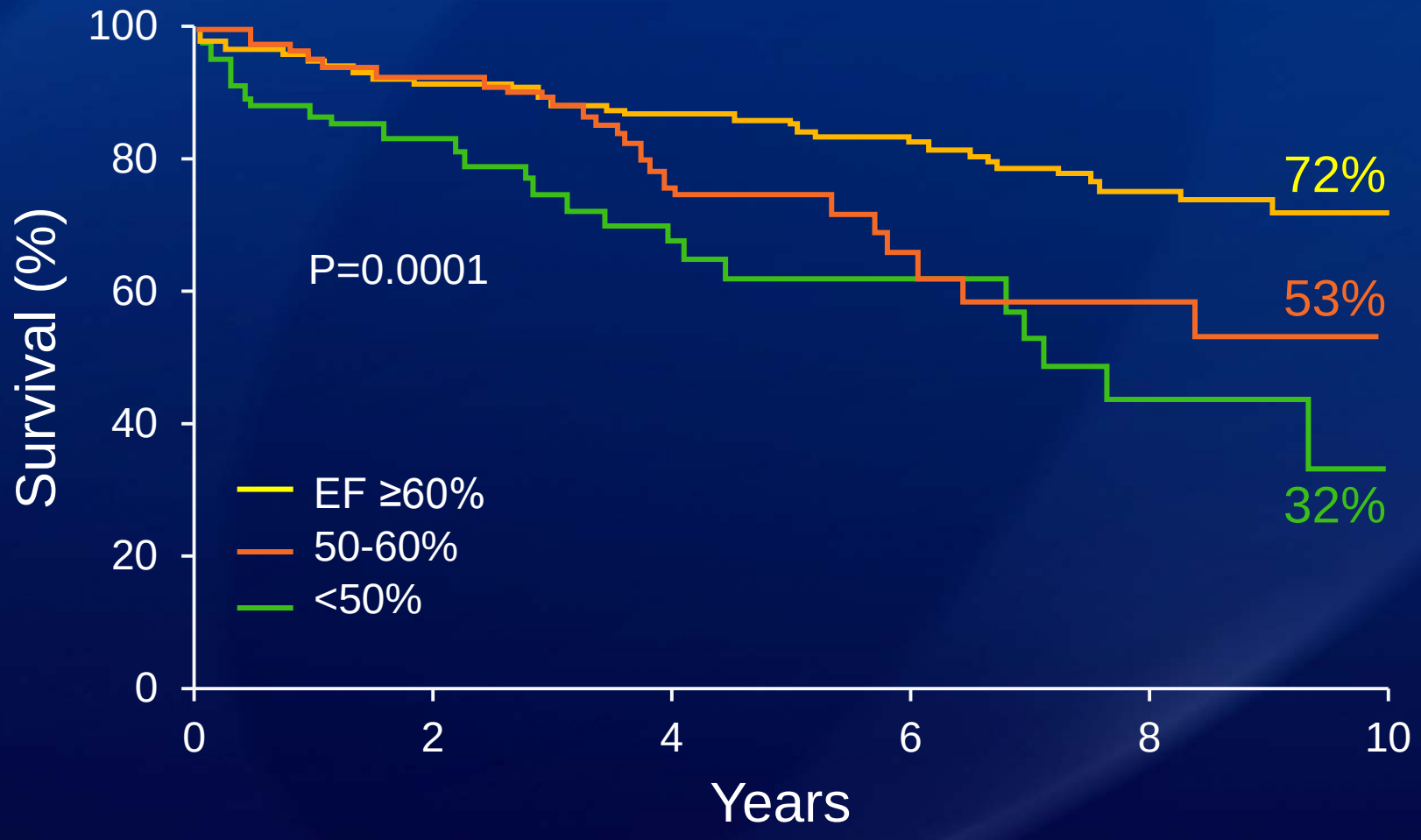
Asymptomatic MR
Natural History



Enriquez-Sarano et al: NEJM, 2005

Mitral Regurgitation

Preop EF vs Postop Survival



Enriquez-Sarano et al: Circulation, 1994

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Surgery for Severe MR
ESC Class I Indications

Symptoms	LVEF (%)	LVESD (mm)
NYHA II-IV	>30	<55
Asymptomatic or symptomatic	≤60	≥45

Alfieri et al: EHJ, 2012

Surgery for Severe MR
ESC Class IIa Indications

Symptoms	LVEF (%)	Other
Asymptomatic	>60	AF PA >50 mmHg
Asymptomatic	>60	LVESD ≥40 (≥22 mm/m2) Repairable valve
Symptomatic	<30	LVEDD > 55 Repairable valve Refractory to meds

Alfieri et al: EHJ, 2012

Research

Original Investigation

Association Between Early Surgical Intervention vs Watchful Waiting and Outcomes for Mitral Regurgitation Due to Flail Mitral Valve Leaflets

Rakesh M. Suri, MD, DPhil; Jean-Louis Vanoverschelde, MD; Francesco Grigioni, MD, PhD; Hartzell V. Schaff, MD; Christophe Tribouilloy, MD; Jean-Francois Avierinos, MD; Andrea Barbieri, MD; Agnes Pasquet, MD; Marianne Huebner, PhD; Dan Rusinaru, MD; Antonio Russo, MD; Hector I. Michelena, MD; Maurice Enriquez-Sarano, MD

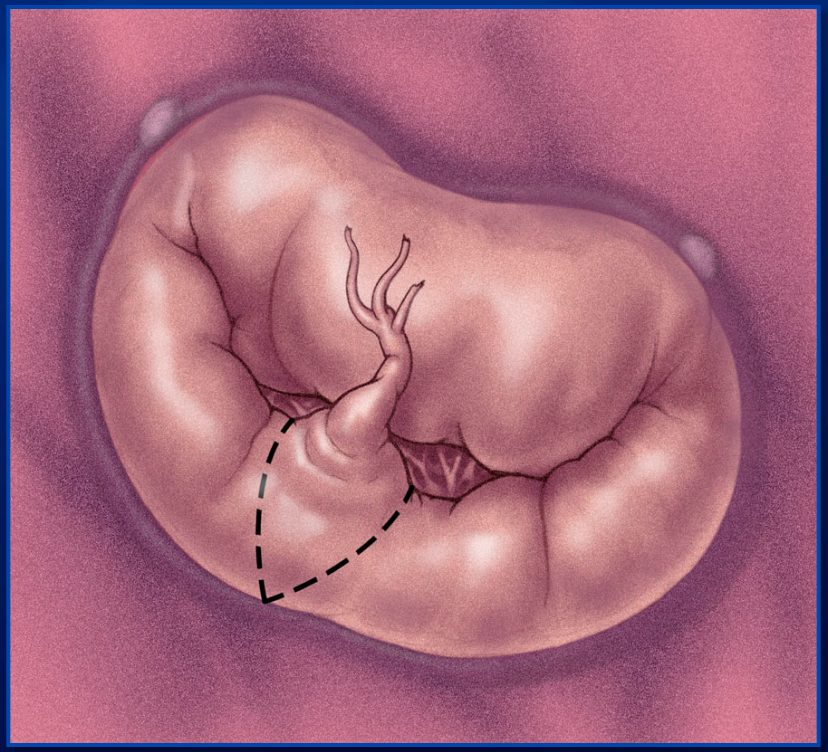
Editorial page 587

Among registry patients with MV regurgitation due to flail mitral leaflets, performance of early mitral surgery compared with initial medical management was associated with greater long-term survival and a lower risk of heart failure, with no difference in new-onset atrial fibrillation.

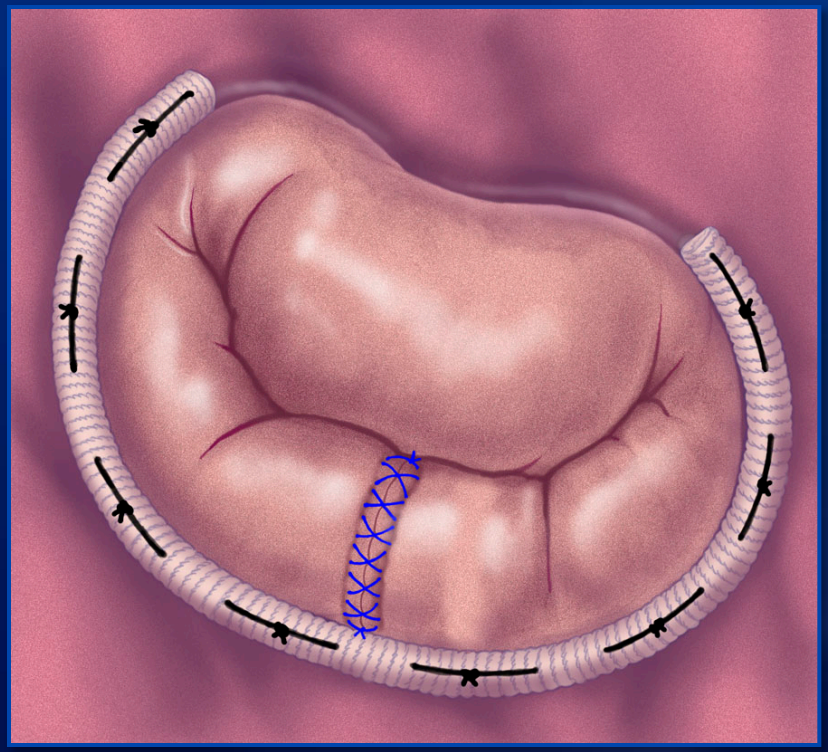
Association (AHA) guideline class I triggers, 575 patients were initially medically managed and 446 underwent mitral valve surgery within 3 months following detection.

Suri et al: JAMA, 2013

Chronic Mitral Regurgitation
Myxomatous Valve



Triangular resection



Annuloplasty repair

>99% chance of repair all MVP types

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Survival Advantage and Improved Durability of Mitral Repair for Leaflet Prolapse Subsets in the Current Era

Rakesh M. Suri, MD, DPhil, Hartzell V. Schaff, MD, Joseph A. Dearani, MD, Thoralf M. Sundt III, MD, Richard C. Daly, MD, Charles J. Mullany, MB, MS, Maurice Enriquez-Sarano, MD, and Thomas A. Orszulak, MD

Division of Cardiovascular Surgery, Mayo Clinic College of Medicine, Rochester, Minnesota

Background. Factors predicting long-term survival and repairs, 22 replacements), at a mean of 4.8 years

Mortality	30 d	5 yr	10 yr	15 yr	P
Expected (%)	0.2	13.5	28.4	44.6	NA
Overall (%)	1.5	13.6	32.9	60.9	NA
Repair (%)	0.7	11.3	29.4	58.5	NA
Replacement (%)	5.6	25.4	47.5	70.7	<0.0001

Suri et al: Ann Thorac Surg, 2006

42-Year-Old Man

- Murmur for many years
- Asymptomatic
- Echo

  Enlarged LV, EF 66%

  MVP with grade 4 MR (ERO 0.45 cm2)

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Gold Standard – Median Sternotomy

10-15 cm sternum divided

Safe

Excellent outcomes

5-7 day hospitalization

6-8 week restricted lifting

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42-Year-Old Man

- Murmur for many years
- Asymptomatic
- Echo

  Enlarged LV, EF 66%

  MVP with grade 4 MR
- Robotic MV repair, home 3 days

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Robotic Mitral Valve Repair
1 Month Postoperative

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Mitral Valve Repair
Mayo Clinic 2002-2011

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ORIGINAL ARTICLE

Robotic Mitral Valve Repair for All Categories of Leaflet Prolapse: Improving Patient Appeal and Advancing Standard of Care

RAKESH M. SURI, MD, DPHIL; HAROLD M. BURKHART, MD; KENT H. REHFELDT, MD; MAURICE ENRIQUEZ-SARANO, MD; RICHARD C. DALY, MD; ERIC E. WILLIAMSON, MD; ZHUO LI, MS; AND HARTZELL V. SCHAFF, MD

Robot-assisted MV repair using proven, conventional open-repair techniques is reproducible and safe and hastens recovery for all categories of leaflet prolapse. One month after surgery, significant regression in left ventricular size and volume is evident.

open-repair techniques is reproducible and safe and hastens recovery for all categories of leaflet prolapse. One month after surgery, significant regression in left ventricular size and volume is evident.

Mayo Clin Proc. 2011;86(9):838-844

CT = computed tomography; LV = left ventricular; LVEDD = LV end-diastolic diameter; LVEF = LV ejection fraction; MR = mitral regurgitation; MV = mitral valve; TTE = transthoracic echocardiography

The standard of care to correct severe mitral regurgitation (MR) due to degenerative mitral valve (MV) disease is MV repair. In studies comparing MV repair with MV replacement with a prosthetic valve, repair achieved better survival and equivalent, if not better, durability. The availability of a reproducible MV repair technique as a safe and reliable alternative to prosthetic replacement has influenced the indications for surgical intervention in patients with MR

PATIENTS AND METHODS

Between January 1, 2008, and December 31, 2009, a total of 632 patients underwent MV repair at Mayo Clinic in Rochester, MN. Of these, 105 underwent robot-assisted MV repair (da Vinci S HD Surgical System; Intuitive Surgical, Inc, Sunnyvale, CA); 100 provided authorization for their medical records to be used for research purposes. Our data represent a retrospective chart review of these patients. The study was approved by the Mayo Clinic Institutional Review Board. Patients with mitral leaflet prolapse and severe MR were offered surgery in accordance with current American College of Cardiology/American Heart Association guidelines.[1] All patients underwent transthoracic echocardiography (TTE) and electrocardiographically gated volumetric computed tomography (CT) of the chest, abdomen, and pelvis and were seen by a

Suri et al: Mayo Clin Proc, 2011

Take Home Points
Mitral Valve Repair 2013

- All categories MVP >99% repair
- ↑ survival compared to MVR or medical Rx
- Early referral for severe MR with enlarged LV
- Minimally invasive/robotic excellent option at experienced center

  Safe, effective, improved QOL, return to work and similar cost

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Questions and Discussion

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