

STS/EACTS Latin America Cardiovascular Surgery Conference

November 15-17, 2018

Hilton Cartagena | Cartagena, Colombia



Disclosures

- No disclosures to report

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Mitral Valve Surgery in the Low EF Patient Population: Is it ever too late?

Francis D. Pagani MD PhD

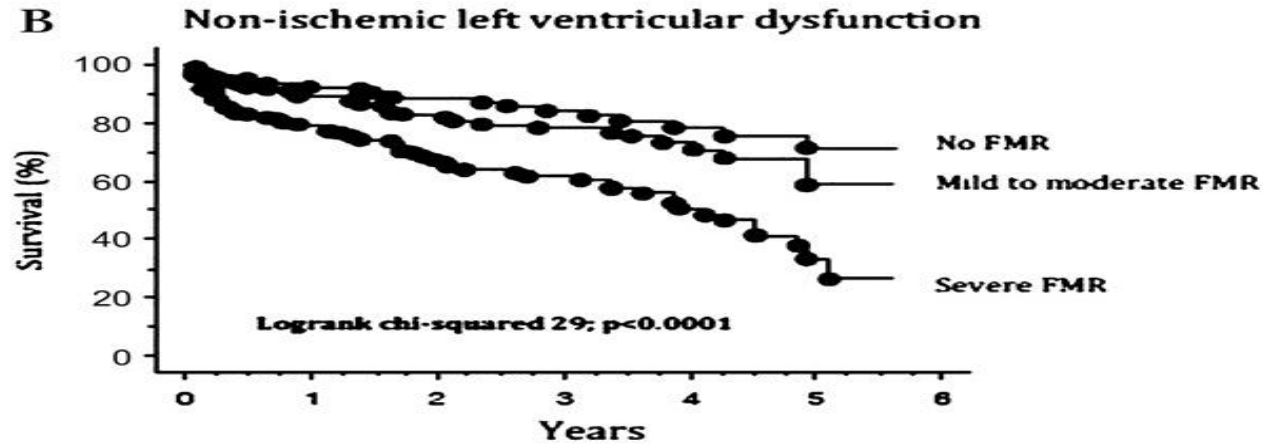
Otto Gago MD Professor of Cardiac Surgery

University of Michigan

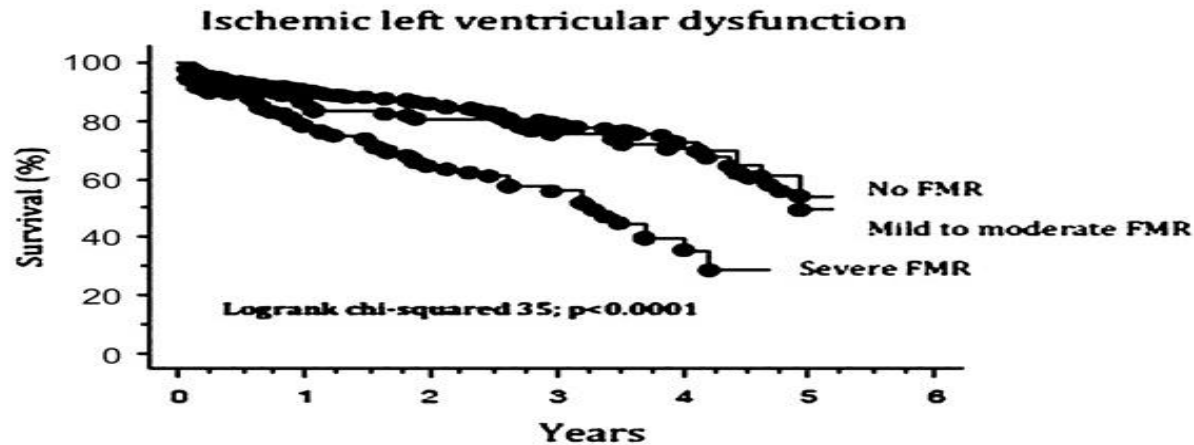
Ann Arbor, Michigan, USA

M UNIVERSITY OF
MICHIGAN

Mortality of Functional MR

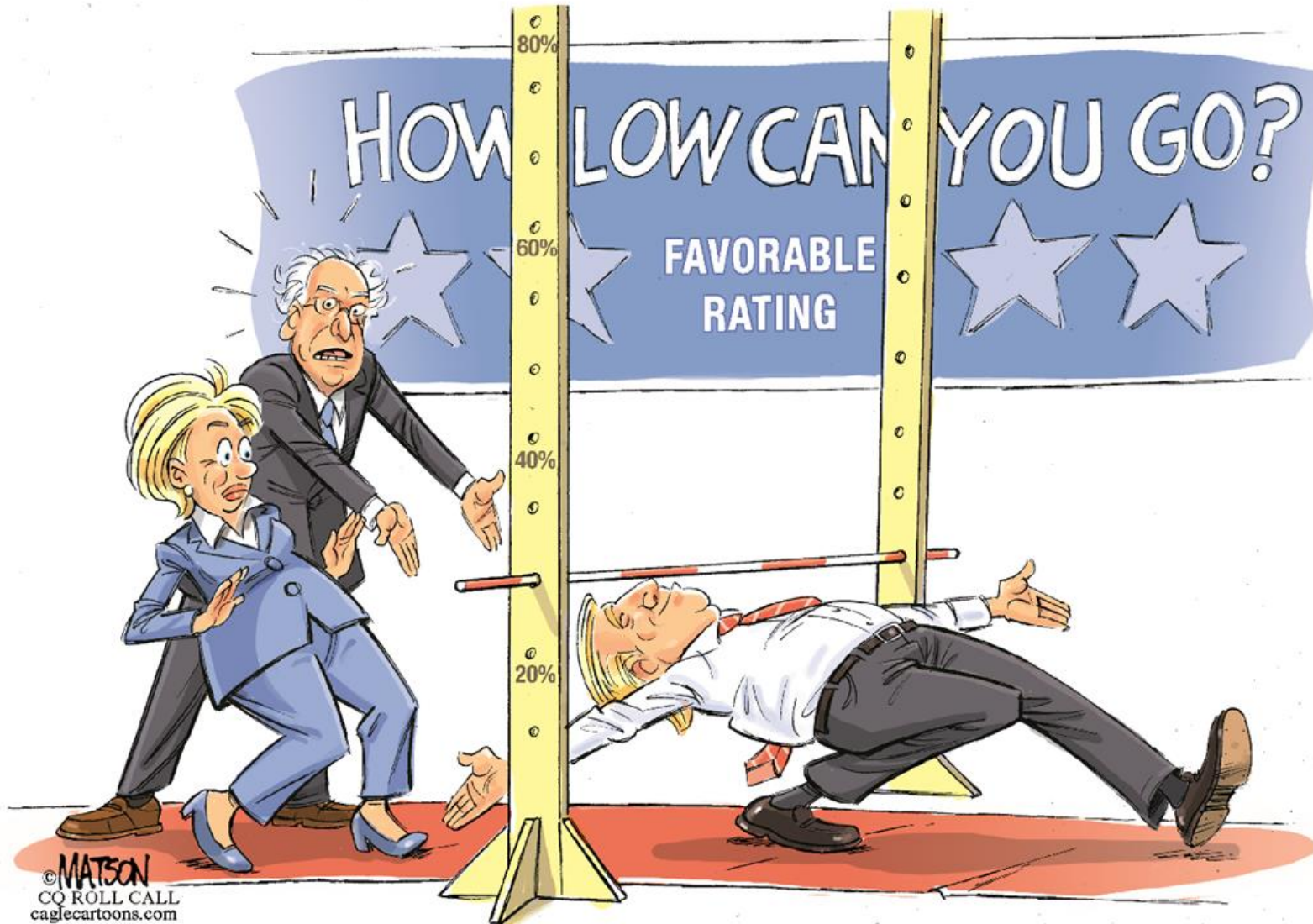


No-FMR	137	104	79	50	30	15
FMR MOD	148	108	78	58	31	11
SEV FMR	139	87	62	45	26	5



No-FMR	131	95	74	56	30	6
Mod FMR	376	278	217	131	69	12
SEV FMR	138	82	60	26	10	1

How Low an LVEF Can You Go?



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"WHO CAN COMPETE WITH THAT?!"

Considerations

- LVEF by itself is a poor discriminator of operative candidacy
- Preoperative LV ejection fraction:
 - Does predict long term mortality under conservative management¹
 - Survival following MV surgery², or
 - Postoperative heart failure³

1 Ling H, Enriquez-Sarano M, Seward J, *et al.* Clinical outcome of mitral regurgitation due to flail leaflets. *N Engl J Med* 1996;335:1417–23.

2 Enriquez-Sarano M, Tajik A, Schaff H, *et al.* Echocardiographic prediction of survival after surgical correction of organic mitral regurgitation. *Circulation* 1994;90:830–7.

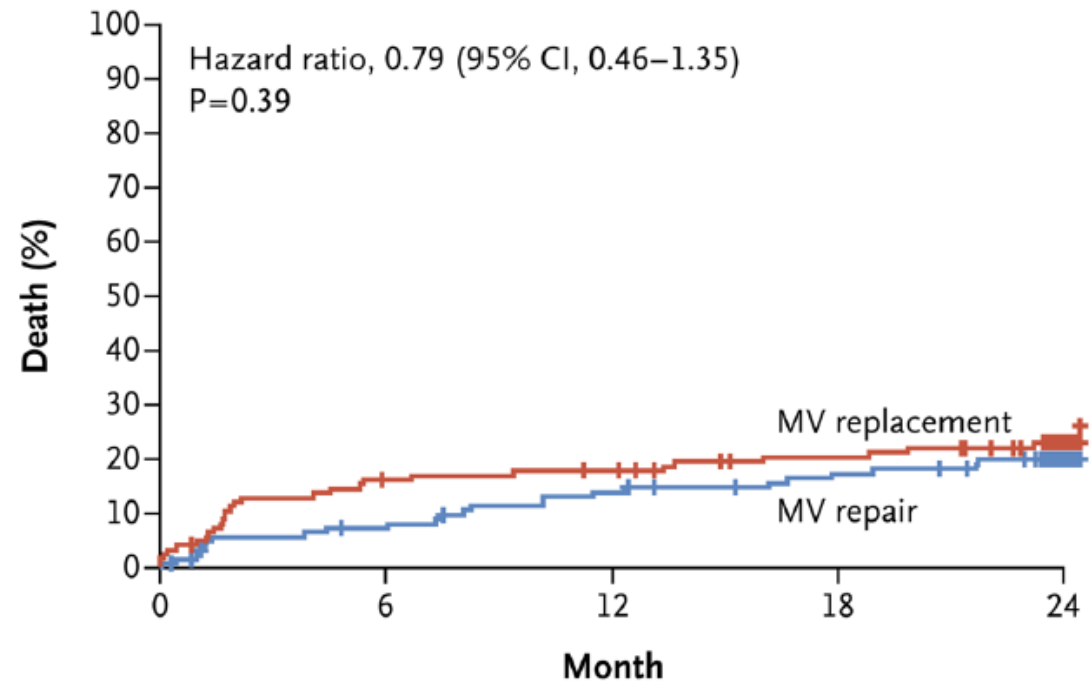
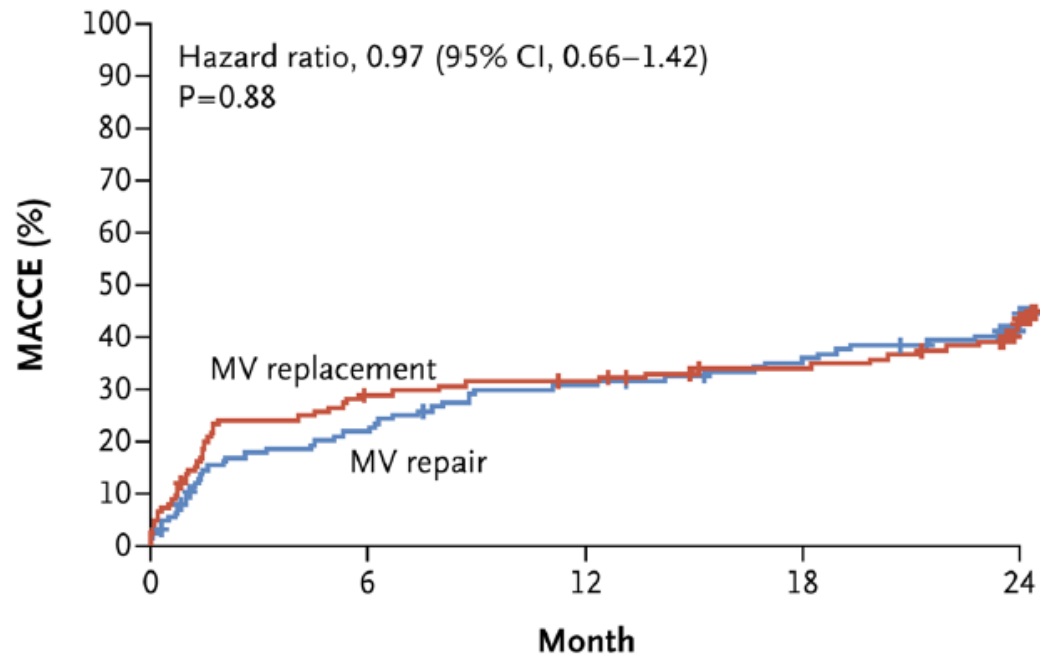
3 Enriquez-Sarano M, Schaff H, Orszulak T, *et al.* Congestive heart failure after surgical correction of mitral regurgitation. A long-term study. *Circulation* 1995;92:2496–503.

Mitral-Valve Repair versus Replacement for Severe Ischemic Mitral Regurgitation

Michael A. Acker, M.D., Michael K. Parides, Ph.D., Louis P. Perrault, M.D., Alan J. Moskowitz, M.D., Annetine C. Gelijns, Ph.D., Pierre Voisine, M.D., Peter K. Smith, M.D., Judy W. Hung, M.D., Eugene H. Blackstone, M.D., John D. Puskas, M.D., Michael Argenziano, M.D., James S. Gammie, M.D., Michael Mack, M.D., Deborah D. Ascheim, M.D., Emilia Bagiella, Ph.D., Ellen G. Moquete, R.N., T. Bruce Ferguson, M.D., Keith A. Horvath, M.D., Nancy L. Geller, Ph.D., Marissa A. Miller, D.V.M., Y. Joseph Woo, M.D., David A. D'Alessandro, M.D., Gorav Ailawadi, M.D., Francois Dagenais, M.D., Timothy J. Gardner, M.D., Patrick T. O'Gara, M.D., Robert E. Michler, M.D., and Irving L. Kron, M.D., for the CTSN*

Table 1. Baseline and Operative Characteristics of the Patients.*

Characteristic	Repair Group (N = 126)	Replacement Group (N = 125)	P Value
Left ventricular ejection fraction — %	42.4±12.0	40.0±11.0	0.10
Effective regurgitant orifice area — cm ²	0.40±0.17	0.39±0.11	0.64
Grade on CCS angina scale — no. (%)‡			0.19
No angina	57 (45.2)	70 (56.0)	
Grade III or IV	31 (24.6)	21 (16.8)	
NYHA class III or IV — no./total no. (%)§	72/125 (57.6)	76/124 (61.3)	0.55



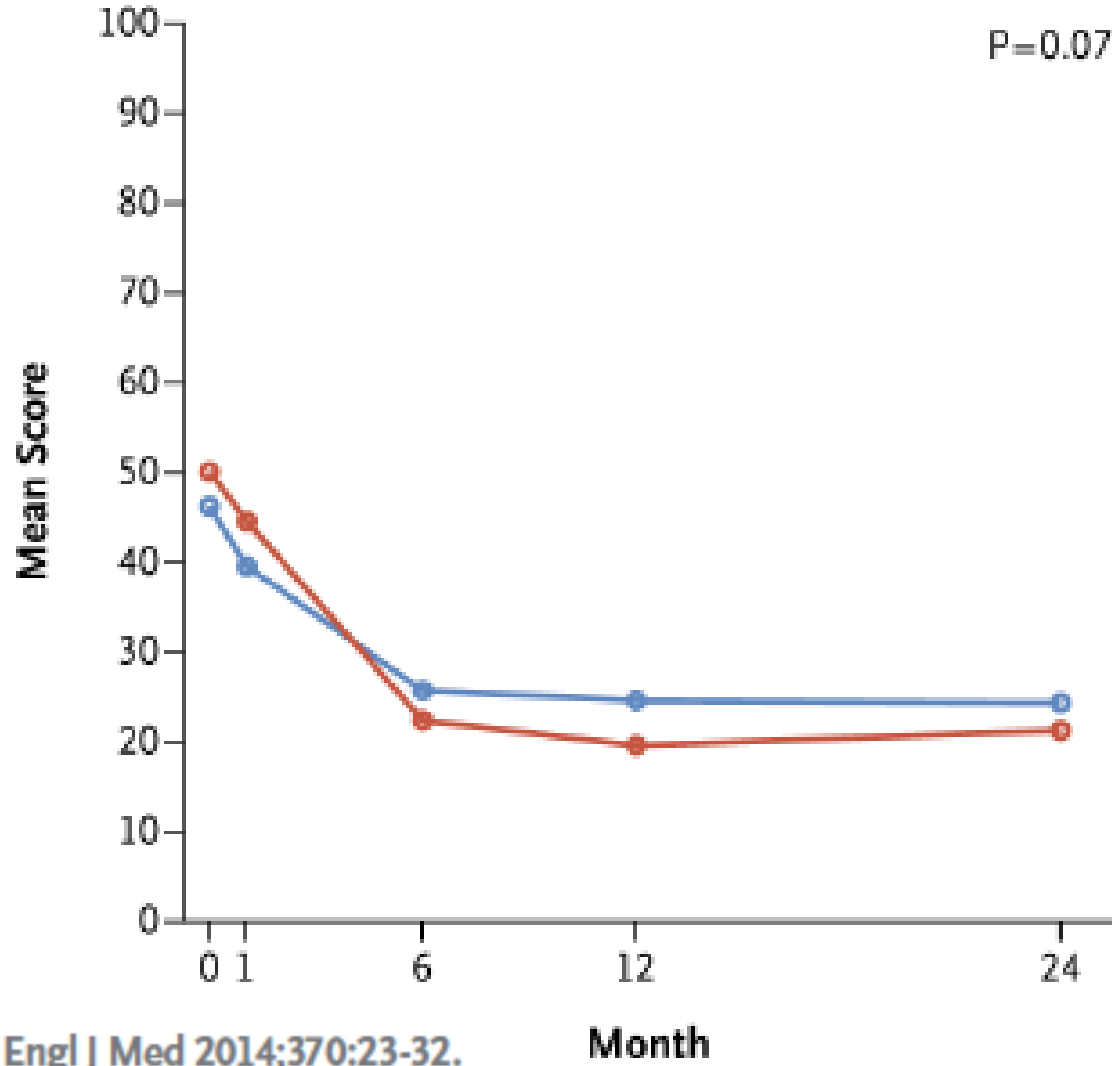
No. at Risk

MV repair	126	96	84	77	48
MV replacement	125	87	83	76	50

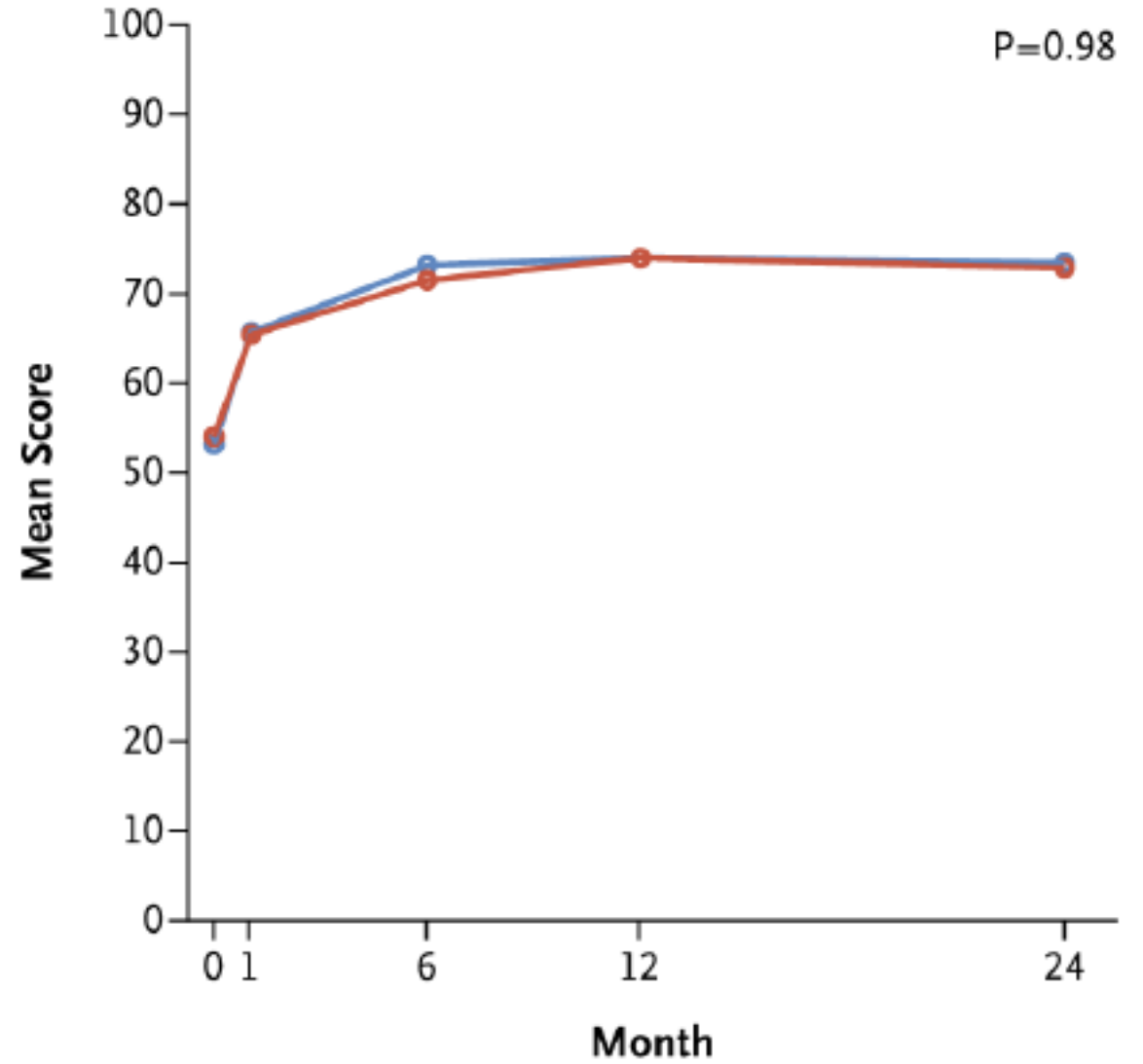
No. at Risk

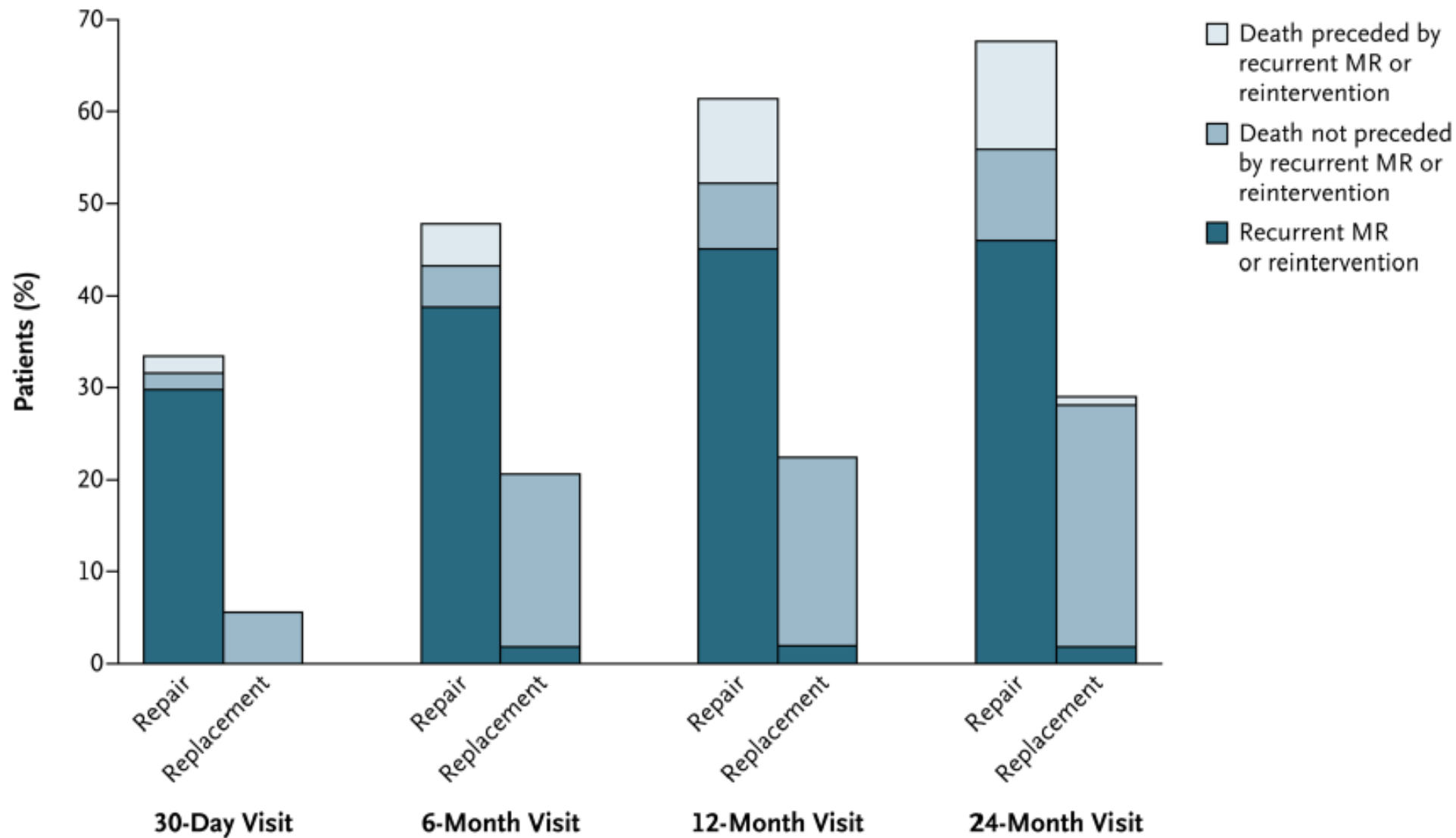
MV repair	126	113	104	97	64
MV replacement	125	103	100	92	65

Minnesota Living with Heart Failure



EQ-5D





Mitral valve repair in heart failure: Five-year follow-up from the mitral valve replacement stratum of the Acorn randomized trial

Michael A. Acker, MD,^a Mariell Jessup, MD,^a Steven F. Bolling, MD,^b Jae Oh, MD,^c
Randall C. Starling, MD,^d Douglas L. Mann, MD,^e Hani N. Sabbah, PhD,^f Richard Shemin, MD,^g
James Kirklin, MD,^h and Spencer H. Kubo, MDⁱ

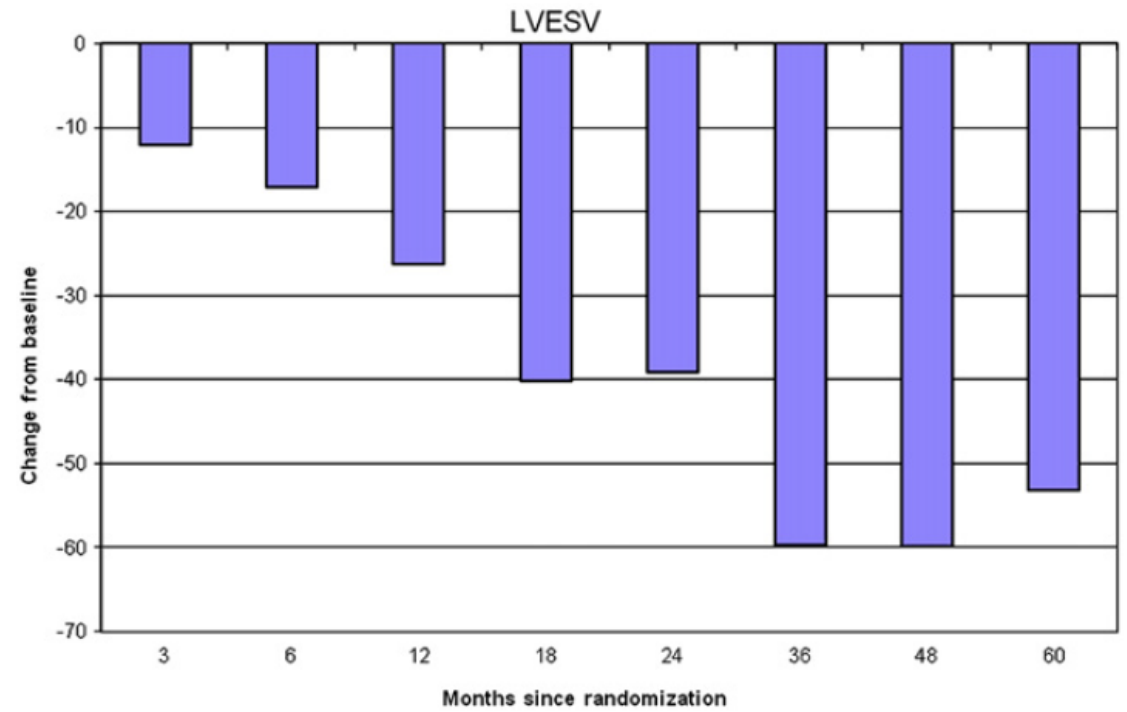
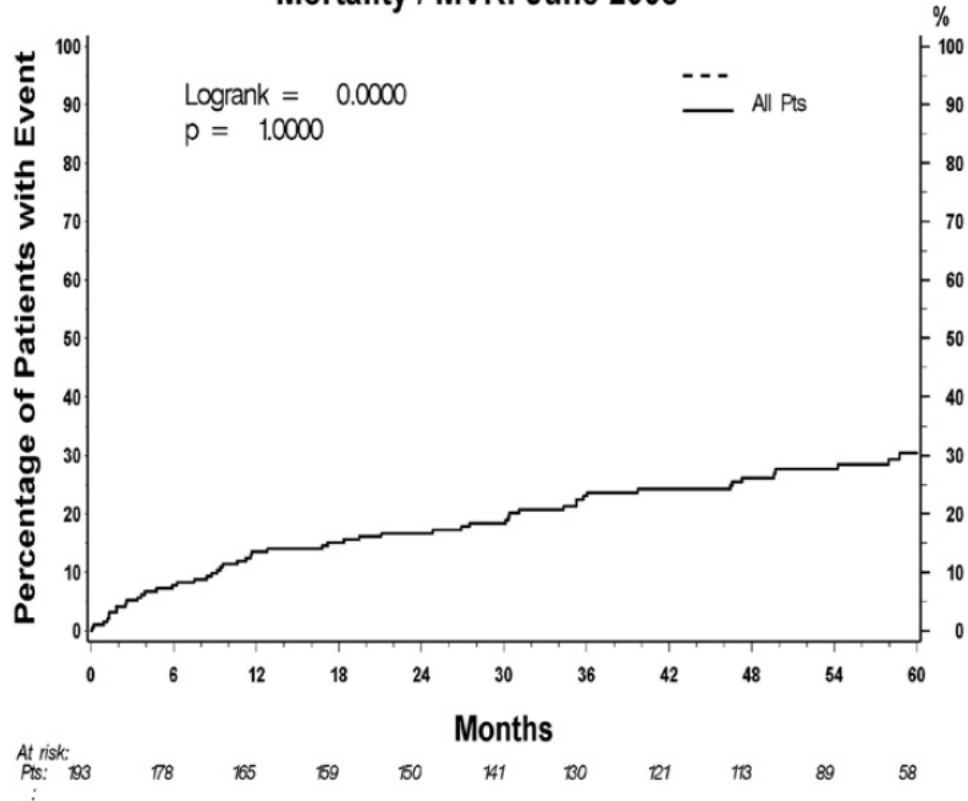
- Mean LV volume = 270+/-100.3 mL
- LV end-diastolic dimension = 69.7+/-8.8 mm
- LV ejection fraction = 23.9%+/-8.9%
- Mean 6MWT = 344.3+/-90.4 m,
- Peak VO₂ = 14.1+/-4.3 mL/kg/min,
- MLHF score = 58.8+/-23.9 units
- NYHA Class III (71.5%), with 23.3% in Class II and 5.2% in Class IV

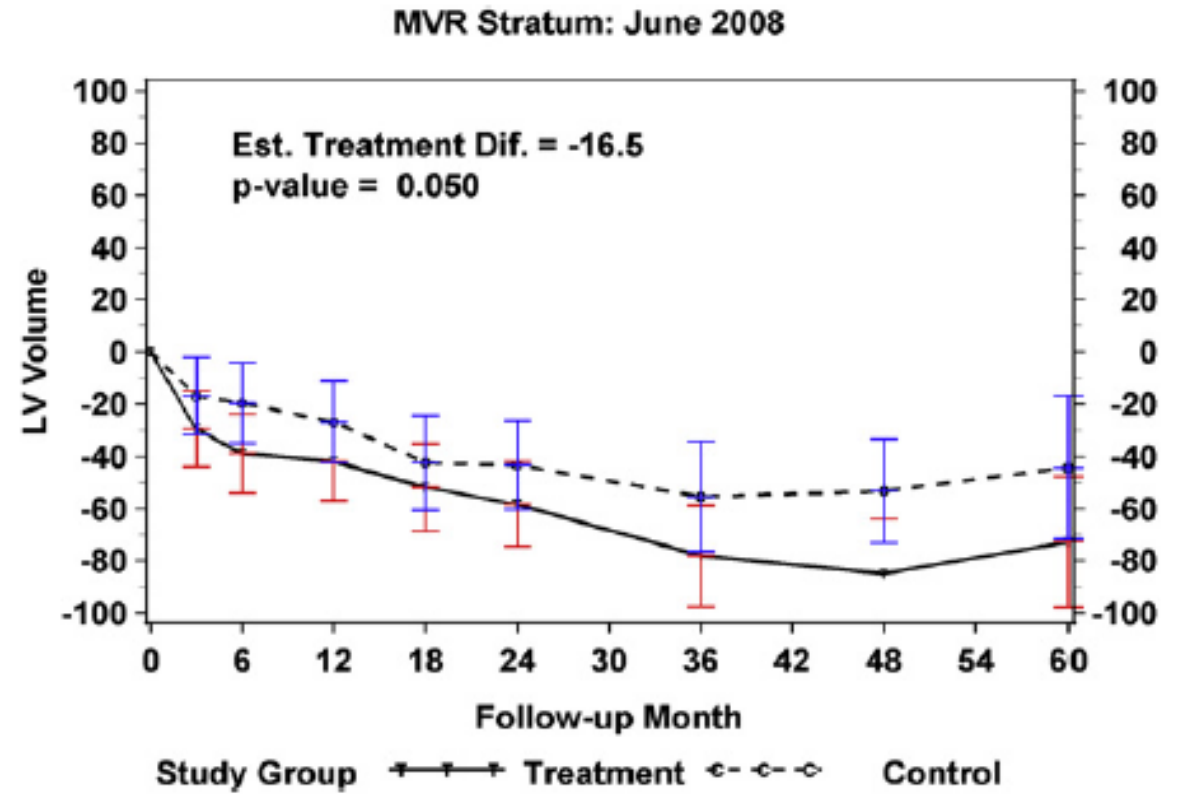
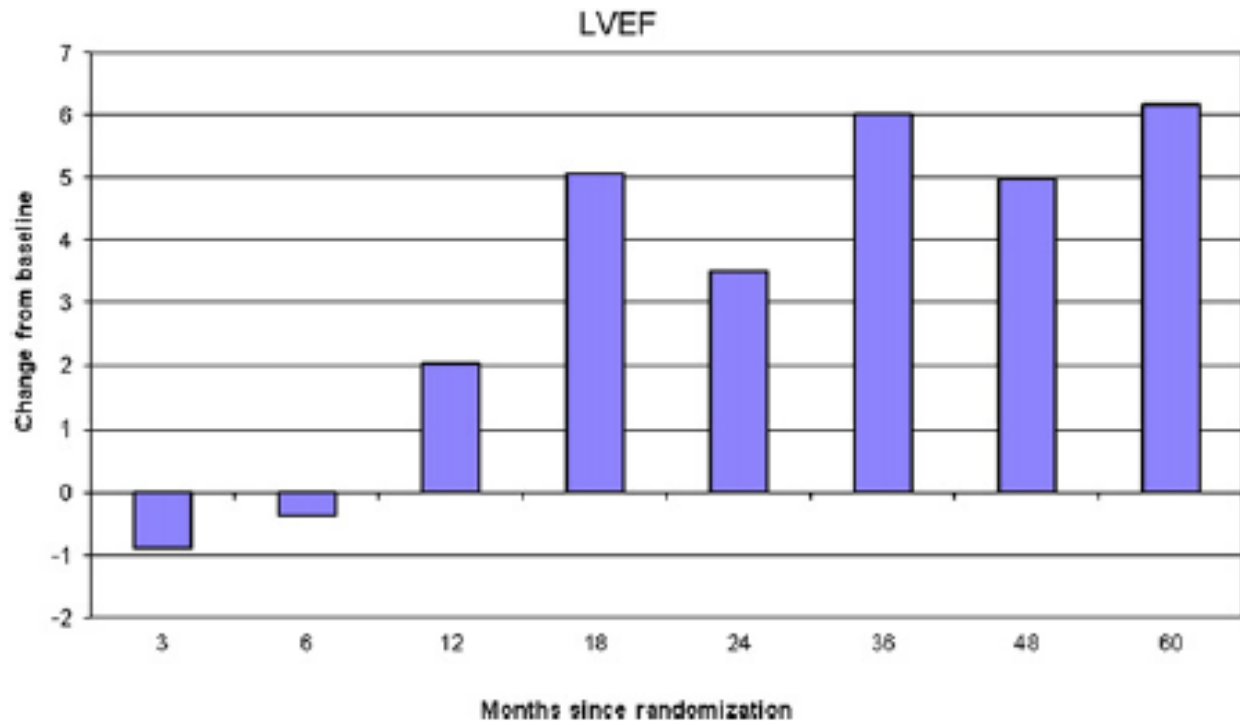
Mitral valve repair in heart failure: Five-year follow-up from the mitral valve replacement stratum of the Acorn randomized trial

Michael A. Acker, MD,^a Mariell Jessup, MD,^a Steven F. Bolling, MD,^b Jae Oh, MD,^c
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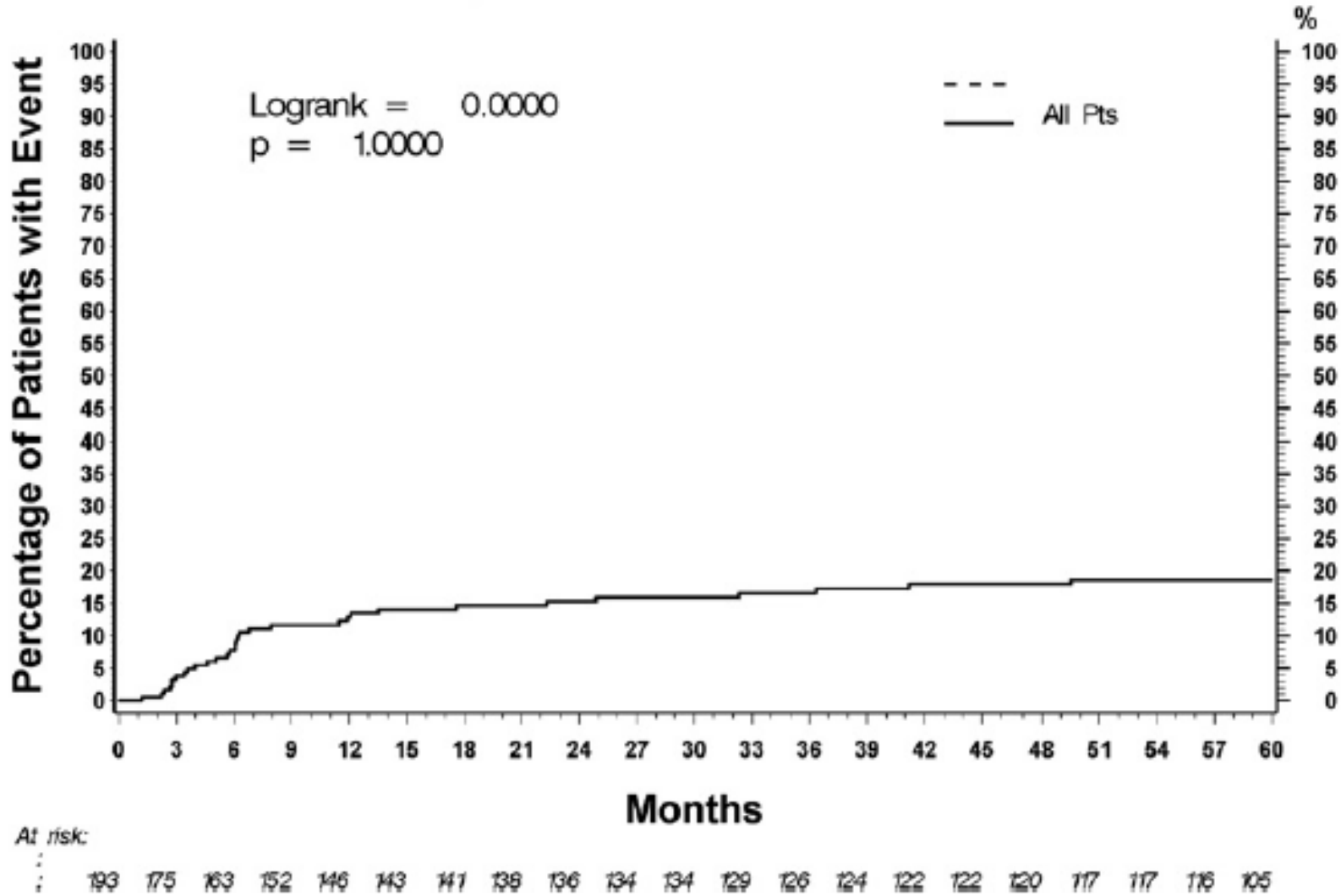
- Excluded any patient with 4 of the following criteria:
- Severe LV enlargement (LVEDD 80 mm)
- Marked exercise limitation - peak VO₂ = 13 ml·kg⁻¹·min⁻¹
- Systolic BP < 80 mm Hg
- Atrial fibrillation
- HF duration 8 years
- Exercise-induced increase in systolic blood pressure 10%
- 6-min walk test < 350 m
- Prior cardiac surgery
- Blood urea nitrogen 100 mg/dl
- Cachexia

Mortality / MVR: June 2008





Time to 3/4+ MR or Repeat MVR Combined: June 2008, MVR Stratum



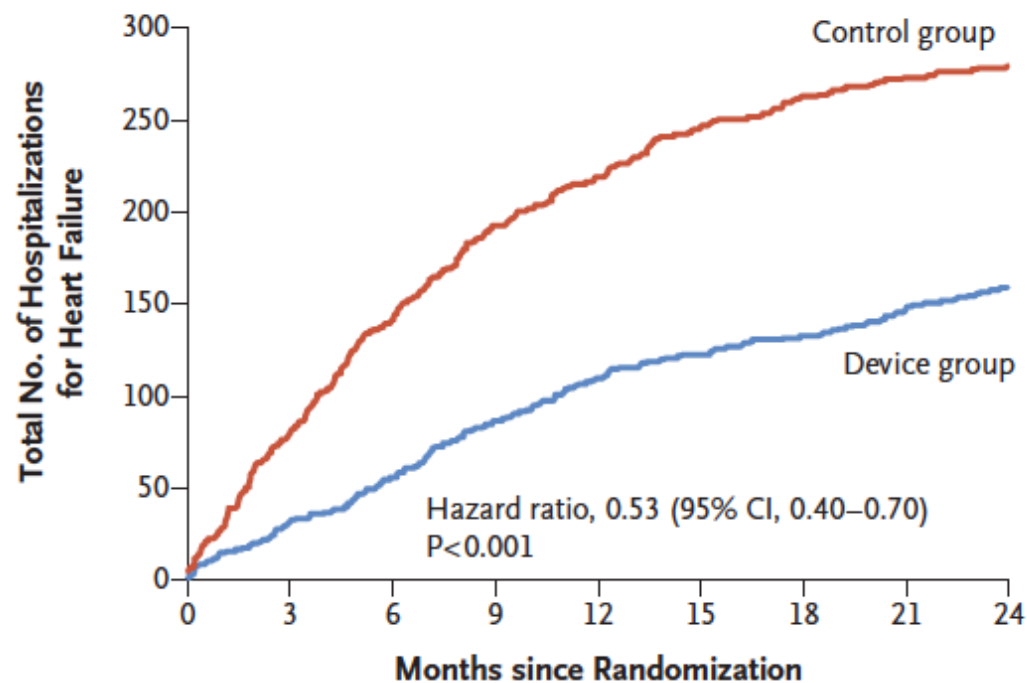
- 85% underwent mitral valve repair with undersize annuloplasty

Transcatheter Mitral-Valve Repair in Patients with Heart Failure

G.W. Stone, J.A. Lindenfeld, W.T. Abraham, S. Kar, D.S. Lim, J.M. Mishell,
B. Whisenant, P.A. Grayburn, M. Rinaldi, S.R. Kapadia, V. Rajagopal,
I.J. Sarembock, A. Brieke, S.O. Marx, D.J. Cohen, N.J. Weissman,
and M.J. Mack, for the COAPT Investigators*

Characteristic	Device Group (N= 302)	Control Group (N= 312)
Effective regurgitant orifice area — cm ²	0.41±0.15	0.40±0.15
Left ventricular end-systolic dimension — cm	5.3±0.9	5.3±0.9
Left ventricular end-diastolic dimension — cm	6.2±0.7	6.2±0.8
Left ventricular end-systolic volume — ml	135.5±56.1	134.3±60.3
Left ventricular end-diastolic volume — ml	194.4±69.2	191.0±72.9
Left ventricular ejection fraction		
Mean — %	31.3±9.1	31.3±9.6
≤40% — no./total no. (%)	231/281 (82.2)	241/294 (82.0)
Right ventricular systolic pressure — mm Hg	44.0±13.4 (253)	44.6±14.0 (275)

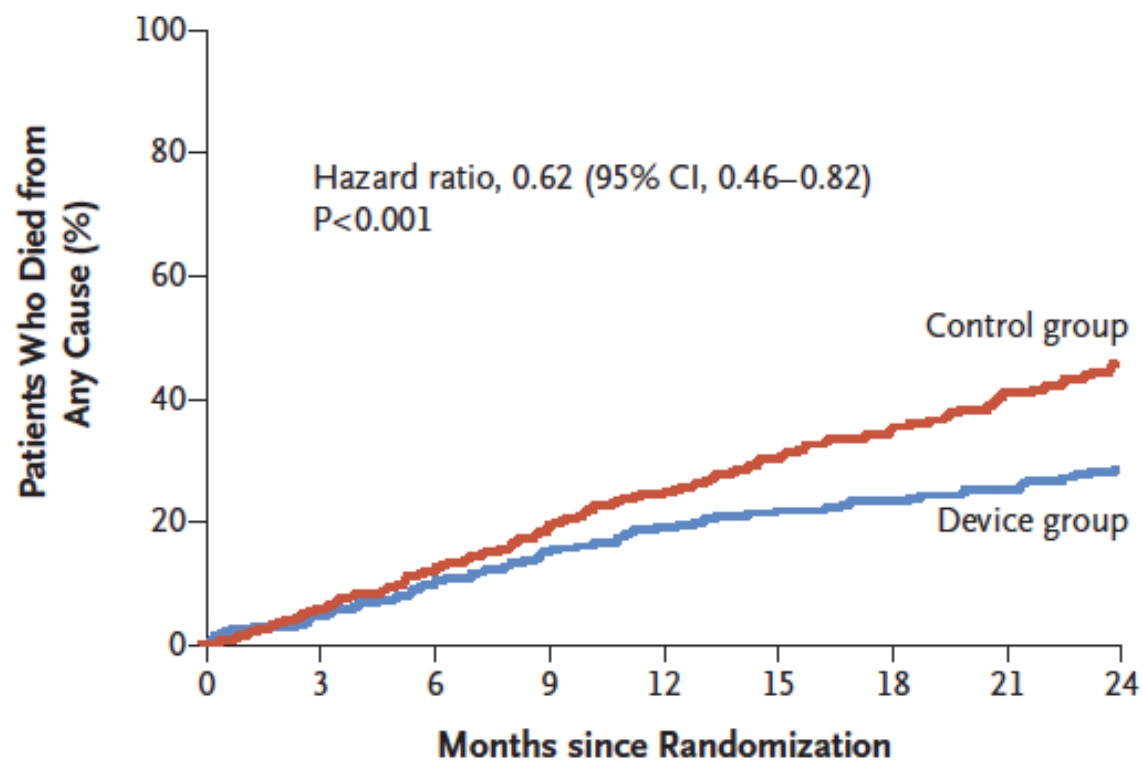
A Hospitalization for Heart Failure



No. at Risk

Control group	312	294	271	245	219	176	145	121	88
Device group	302	286	269	253	236	191	178	161	124

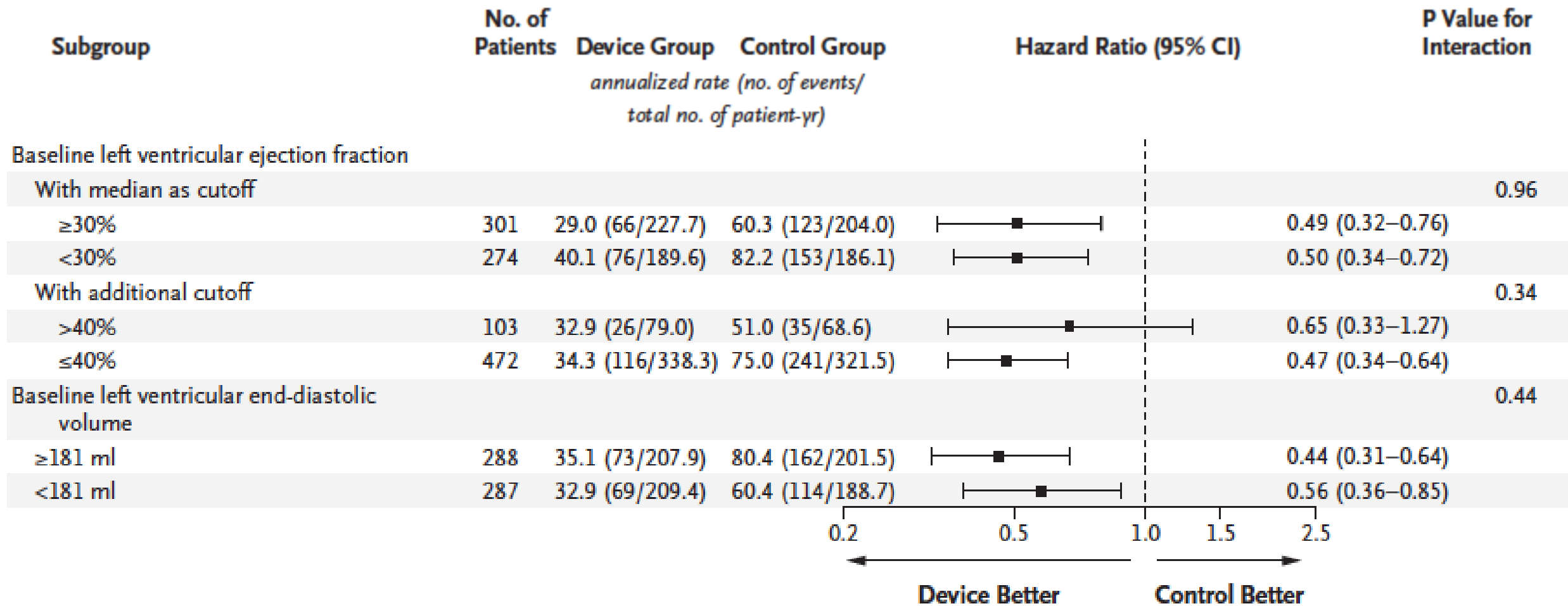
C Death from Any Cause



No. at Risk

Control group	312	294	271	245	219	176	145	121	88
Device group	302	286	269	253	236	191	178	161	124

Secondary endpoints (hierarchical order)	Device group	Control group	HR [95% CI] [†] or Difference [95% CI] [‡]	Lower 95% CL	P value*
Mitral regurgitation grade ≤2+ at 12 months ^{1,7}	87.0% (2.2%) ⁸	39.7% (3.3%) ⁸	-	-	<0.001
All-cause mortality through 12 months (non-inferiority) ^{1,3}	18.8% (2.3%) ⁴	23.2% (2.5%) ⁴	0.79 [0.56, 1.13] [†]	-	<0.001 ⁹
Composite of death or first heart failure hospitalization through 24 months ^{1,3}	44.8% (3.0%) ⁴	66.1% (3.1%) ⁴	0.58 [0.46, 0.73] [†]	-	<0.001
Change in KCCQ score from baseline to 12 months ^{1,7}	12.2 (1.9) ¹⁰	-3.6 (1.8) ¹⁰	15.8 [10.8, 20.9] [‡]	-	<0.001 ¹¹
Change in six-minute walk distance from baseline to 12 months, meters ^{1,7}	-3.0 (8.6) ¹⁰	-48.2 (8.0) ¹⁰	45.3 [23.1, 67.5] [‡]	-	<0.001 ¹¹
First all-cause hospitalization through 24 months ^{1,3}	68.6% (3.0%) ⁴	79.9% (3.0%) ⁴	0.81 [0.66, 0.98] [†]	-	0.03
NYHA functional class I or II at 12 months ^{1,7}	71.4% (2.9%) ⁸	51.7% (3.3%) ⁸	-	-	<0.001
Change in left ventricular end-diastolic volume from baseline to 12 months, mL ^{1,7}	-5.4 (4.3) ¹⁰	17.5 (4.5) ¹⁰	-23.0 [-34.3, -11.7] [‡]	-	<0.001 ¹¹
All-cause mortality through 24 months ^{1,3}	29.3% (2.8%) ⁴	47.4% (3.3%) ⁴	0.59 [0.45, 0.79] [†]	-	<0.001



Structural Heart Disease

Survival After MitraClip Treatment Compared to Surgical and Conservative Treatment for High-Surgical-Risk Patients With Mitral Regurgitation

Friso Kortlandt, MD; Juliette Velu, MSc; Remco Schurer, MD; Tom Hendriks, MSc;
Ben Van den Branden, MD, PhD; Berto Bouma, MD, PhD; Ted Feldman, MD; Johannes Kelder, MD, PhD;
Annelies Bakker, MD; Marco Post, MD, PhD; Pim Van der Harst, MD, PhD; Frank Eefting, MD;
Martin Swaans, MD, PhD; Benno Rensing, MD, PhD; Jan Baan Jr, MD, PhD;
Jan Van der Heyden, MD, PhD

Table. Baseline Characteristics

Variable	MitraClip	Surgery	Conservative Treatment	P Value		
				MitraClip vs Surgery	MitraClip vs Conservative Treatment	Surgery vs Conservative Treatment
n	568	173	295			
NYHA				<0.001	<0.001	0.050
II	78 (13.7)	55 (31.8)	112 (38.1)			
III	402 (70.8)	82 (47.4)	145 (49.3)			
IV	88 (15.5)	36 (20.8)	37 (12.6)			
Cause				0.045	<0.001	<0.001
FMR	365 (64.4)	95 (56.2)	228 (78.9)			
DMR	165 (29.1)	66 (39.1)	44 (15.2)			
MMR	37 (6.5)	8 (4.7)	17 (5.9)			
LVEF, %	37.22 (±14.69)	44.66 (±13.91)	33.85 (±14.24)	<0.001	0.002	<0.001

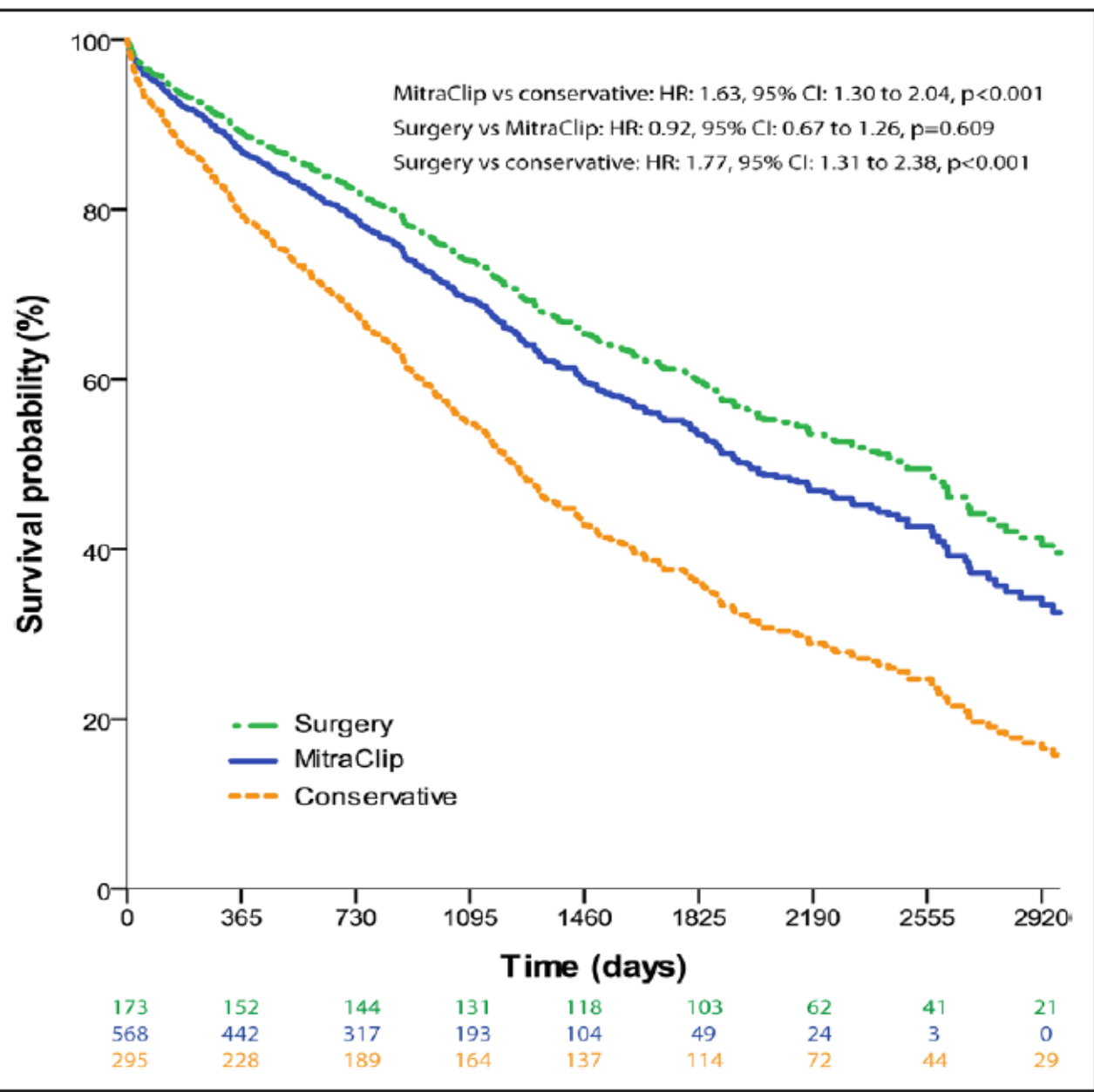


Figure. Mortality hazard curve after correction for confounding, using Cox regression. Numbers below are patients at risk. CI indicates confidence interval; and HR, hazard ratio.

Conclusions

- In *selected patients* with low LVEF:
 - Operative mortality low
 - Improvement in functional state assessed by NYHA classification
 - Improvements in LV geometry
 - Likely has survival benefit similar compared to medical therapy

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The Society
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European Association for Cardio-Thoracic Surgery

