



Functional Ischaemic Mitral Regurgitation: CABG + MV Replacement

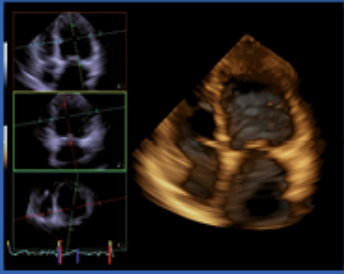
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Surgical Tutor: Royal College of Surgeons of England
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UK Licensed Ham Radio Operator: Callsign - 2EOPMP



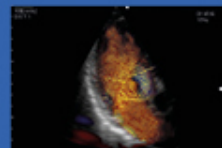
EuroValve

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Faculty disclosure

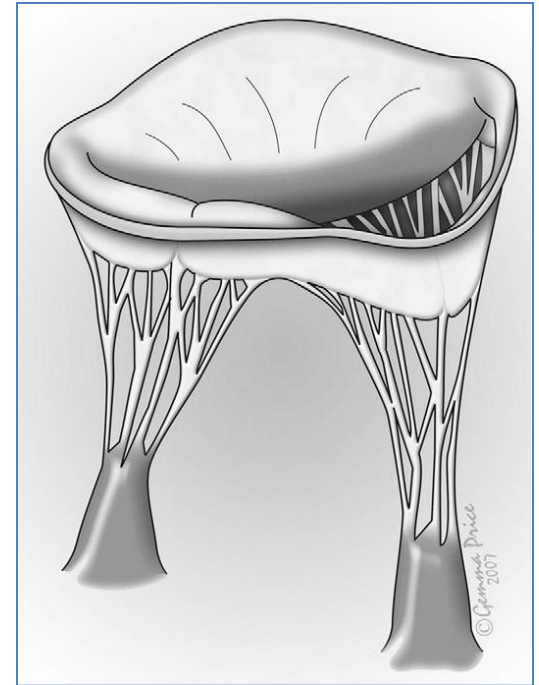
Prakash P Punjabi

I have **no financial relationships** to disclose.



Background: Functional Ischemic MR

- Occurs in up to 40% of patients following MI.
- Result of LV remodeling & dilatation.
- Mitral valve tethered and pulled apart.
- MR usually mild or moderate in severity.
- Heart failure and death increased up to 3x.
- Most have TVD and benefit from CABG.

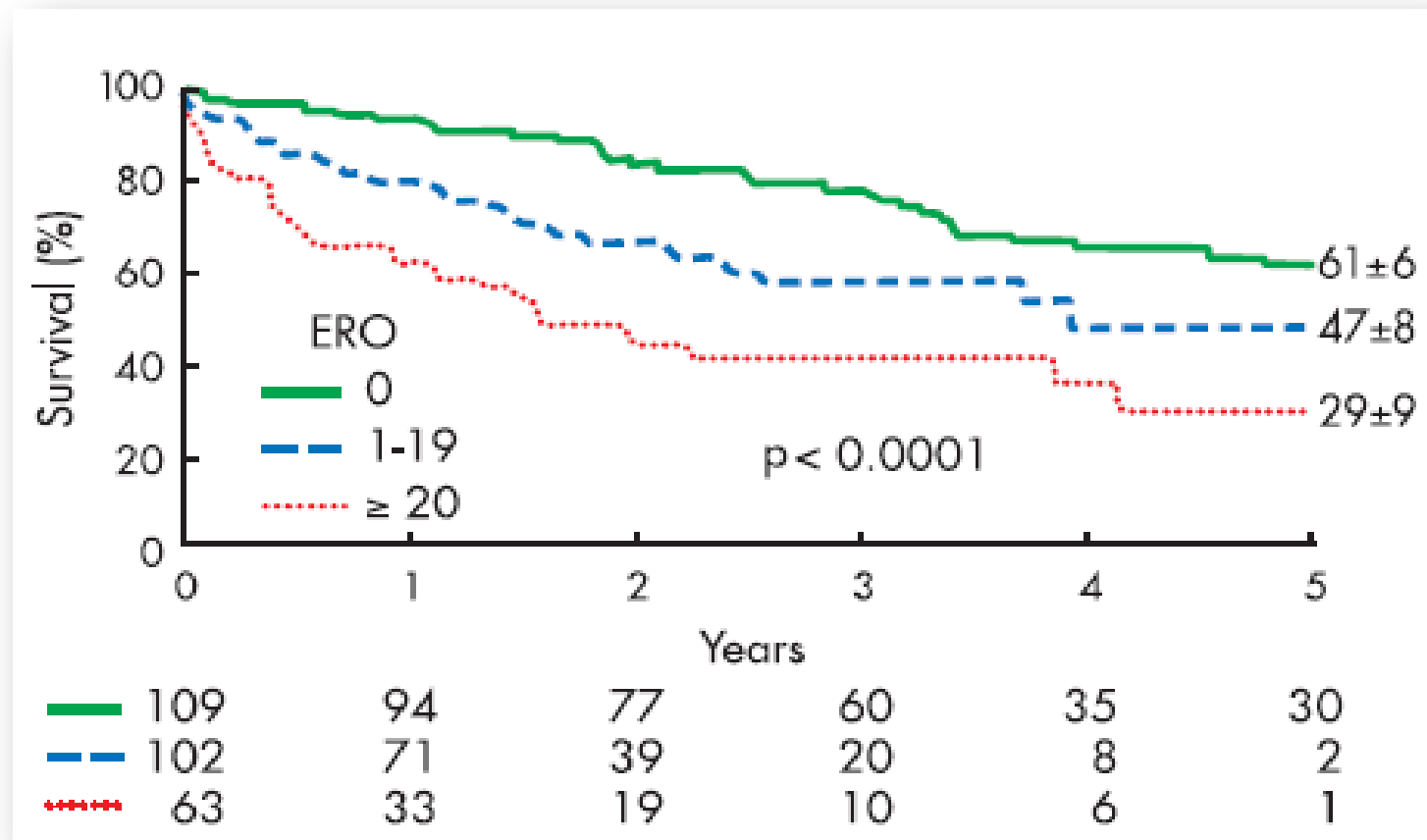


Ischemic Mitral Regurgitation: In Search of the Best Treatment for a Common Condition

Progress in Cardiovascular Diseases, Vol. 51, No. 6 (May/June), 2009: pp 460-471

K.M. John Chan, Emre Amirak, Mustafa Zakkar, Marcus Flather,
John R. Pepper and Prakash P. Punjabi

Incidence and Prognosis

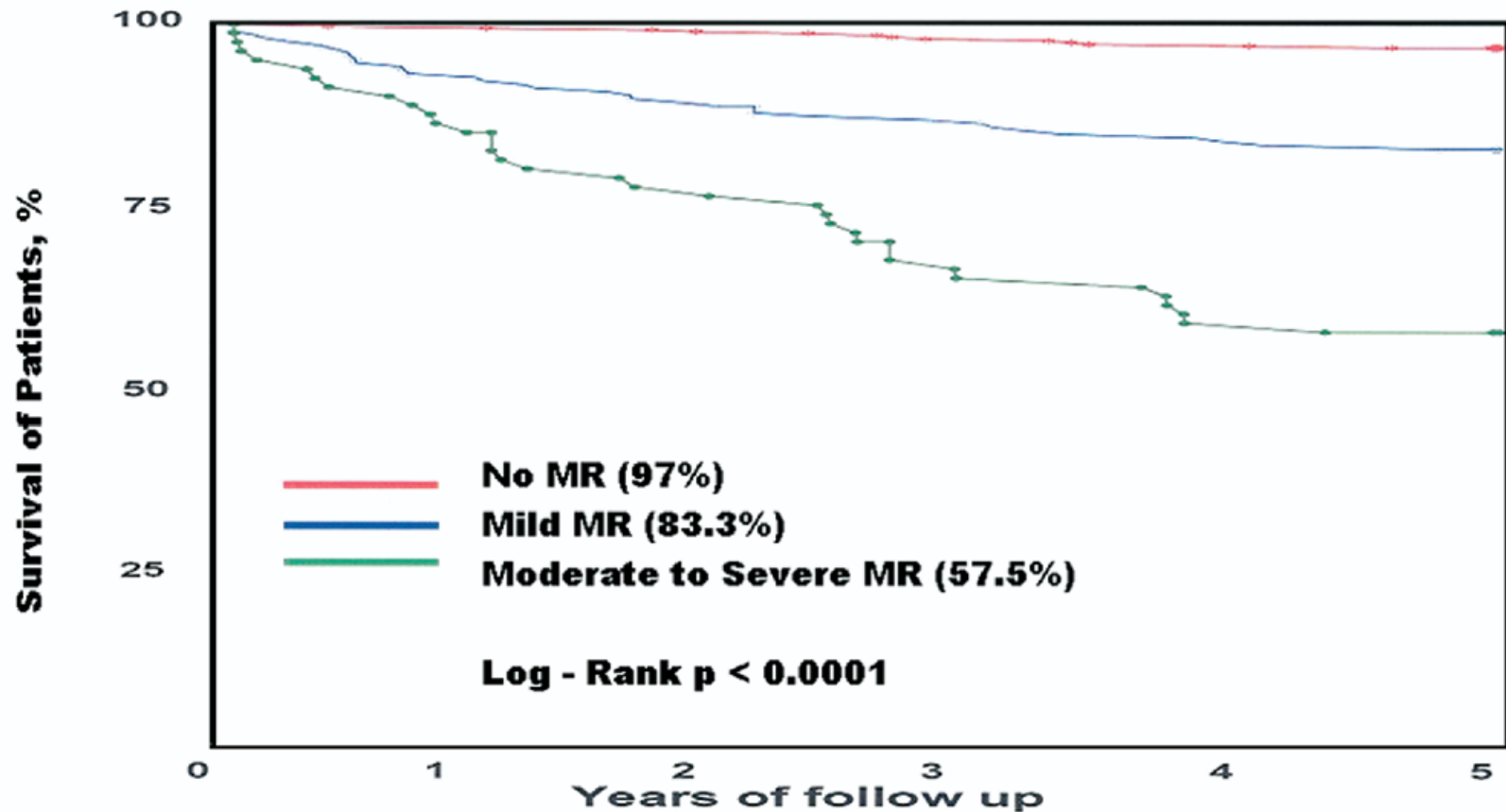


274 patients more than 16 days after Q-wave MI.

ERO $> 20 \text{ mm}^2$ independent predictor of mortality by multivariate analysis.

Grigioni, et al. Circulation 2001;103:1759

Revascularisation



711 patients undergoing PCI.

59% had no MR, 29% had mild MR, 12% had moderate or more MR.

MR was an independent predictor of reduced survival (HR 1.57, $p < 0.0001$).

Pastorius, et al. Am J Cardiol 2007;100:1218-1223

Mitral Valve Annuloplasty plus CABG versus CABG alone in moderate Functional Ischemic Mitral Regurgitation: final results of the Randomized Ischemic Mitral Evaluation (RIME) Trial

K. M. John Chan,^{1,2} **Prakash P. Punjabi**,^{1,3} Marcus D. Flather,^{2,4} Riccardo
Wage,² Karen Symmonds,² Isabelle Roussin,² Shelley Rahman-Haley,²
Dudley J. Pennell,^{1,2} Philip J. Kilner,^{1,2} Gilles D. Dreyfus,^{1,2,5}
John R. Pepper,^{1,2} on behalf of the RIME Investigators

National Heart & Lung Institute, Imperial College London¹, London, U.K.;
Royal Brompton & Harefield NHS Foundation Trust², London, U.K.; Imperial College Healthcare
NHS Trust³, London, U.K.; Norwich Medical School, University of East Anglia⁴, Norwich, U.K.;
Cardiothoracic Centre of Monaco⁵, Monte Carlo, Monaco.

American Heart Association Scientific Sessions
Los Angeles, California, Nov 7, 2012

Circulation

Volume 126 | Number 11 | November 7, 2012



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Coronary Artery Bypass Surgery With or Without Mitral Valve Annuloplasty in Moderate Functional Ischemic Mitral Regurgitation : Final Results of the Randomized Ischemic Mitral Evaluation (RIME) Trial

K.M. John Chan, Prakash P. Punjabi, Marcus Flather, Riccardo Wage, Karen Symmonds, Isabelle Roussin, Shelley Rahman-Haley, Dudley J. Pennell, Philip J. Kilner, Gilles D. Dreyfus and John R. Pepper

Circulation. published online November 7, 2012;

Circulation is published by the American Heart Association, 7272 Greenville Avenue, Dallas, TX 75231

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Print ISSN: 0009-7322. Online ISSN: 1524-4539

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November 20, 2012
(next issue online November 26, 2012)

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Coronary Artery Bypass Surgery With or Without Mitral Valve Annuloplasty in Moderate Functional Ischemic Mitral Regurgitation: Final Results of the Randomized Ischemic Mitral Evaluation (RIME) Trial
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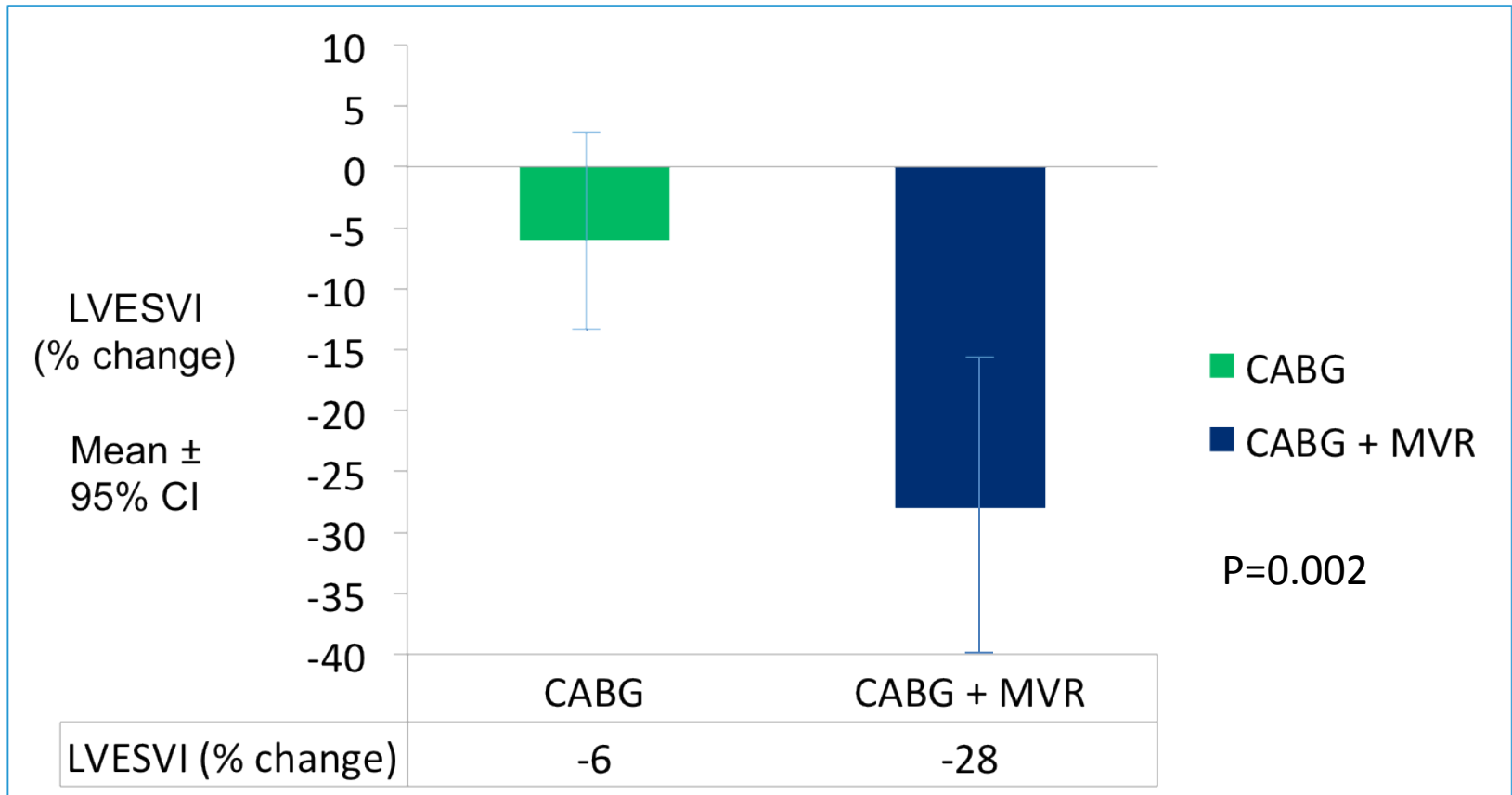
- 1 Coronary Artery Bypass Surgery With or Without Mitral Valve Annuloplasty in Moderate Functional Ischemic Mitral Regurgitation: Final Results of the Randomized Ischemic Mitral Evaluation (RIME) Trial

Circulation

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Results: Secondary endpoints

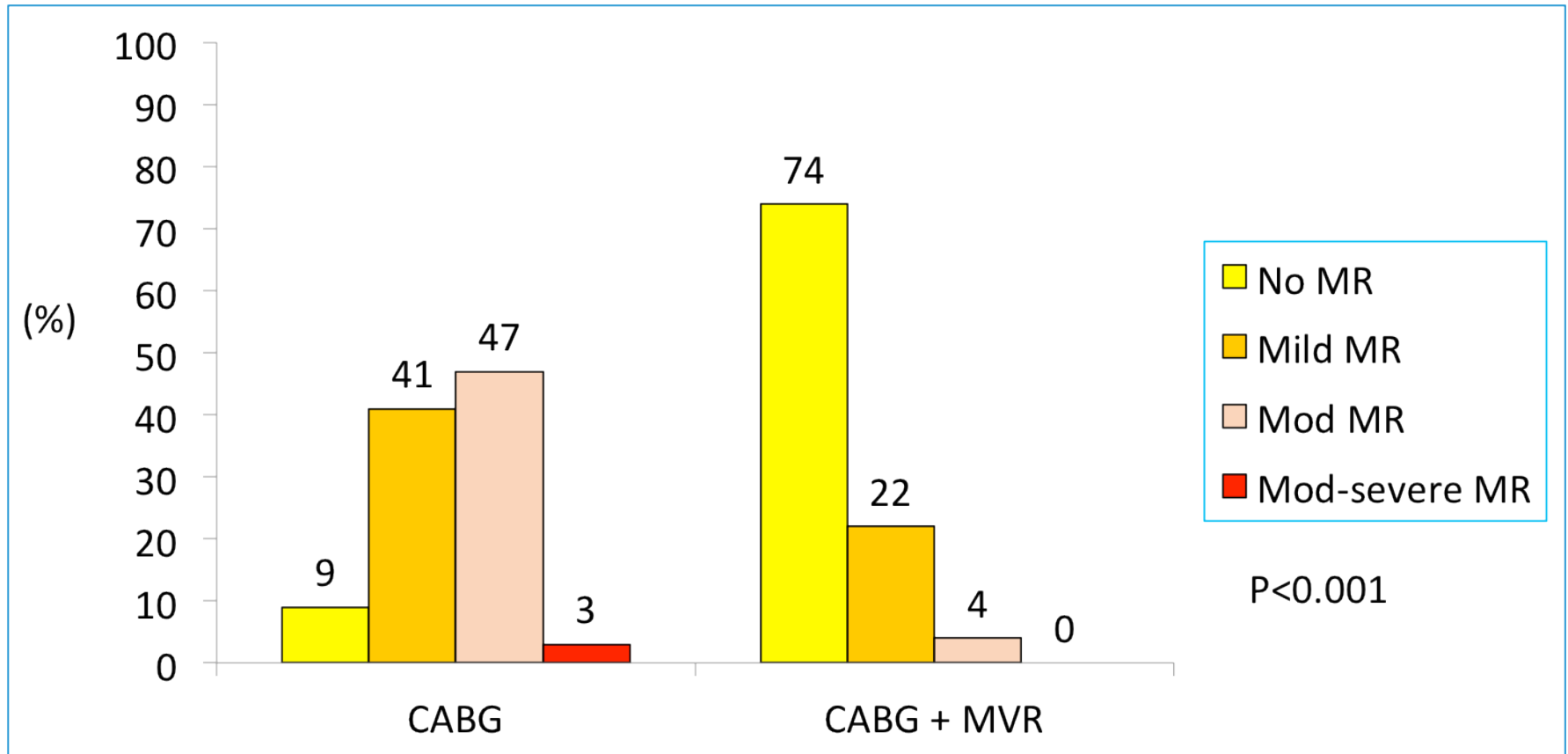
LV reverse remodelling at 1 Year



LV reverse remodelling was greater following CABG + MV repair compared to CABG alone.

Results: Secondary endpoints

Mitral regurgitation at 1 Year



Mitral regurgitation was less following CABG + MV repair compared to CABG only.

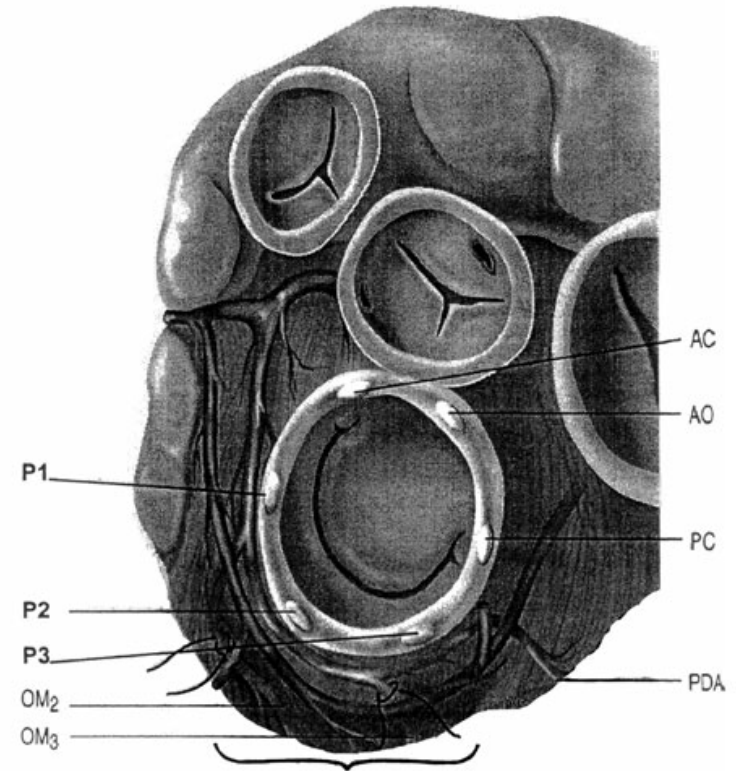
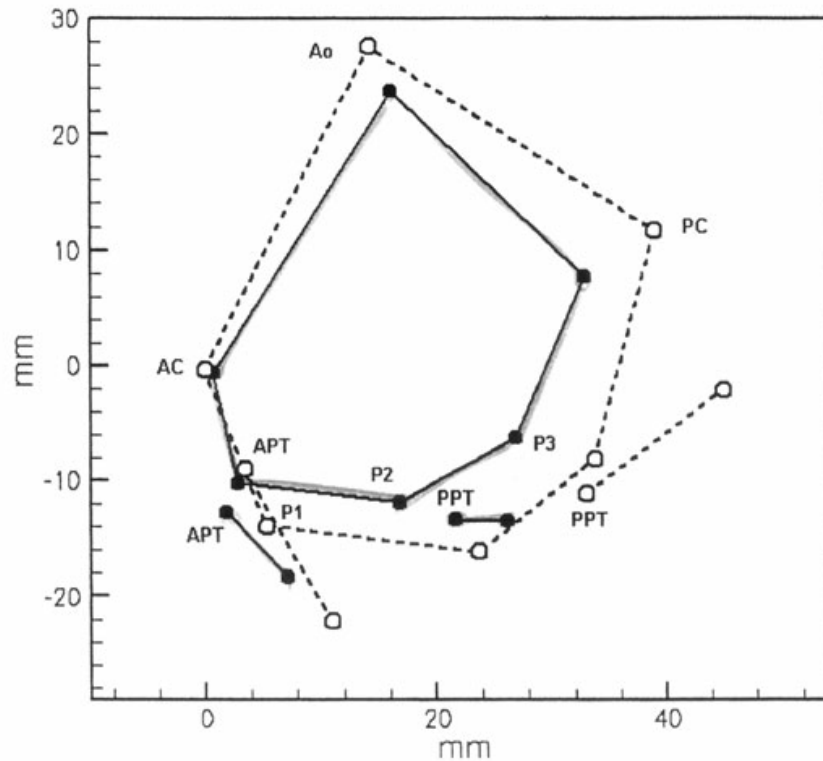
Conclusions

- Compared to CABG alone, the addition of MV annuloplasty to CABG in patients with moderate functional ischemic MR improves:
 - Functional capacity and symptoms,
 - LV reverse remodelling,
 - Mitral regurgitation,
 - BNP levels.
- The impact of these benefits on longer term clinical outcomes remain to be defined.
- CABG plus MV annuloplasty required longer operation times, increased intubation and hospital stay duration, and blood transfusion.
- Concomitant CABG plus MV annuloplasty should be considered in patients with moderate functional ischemic MR.

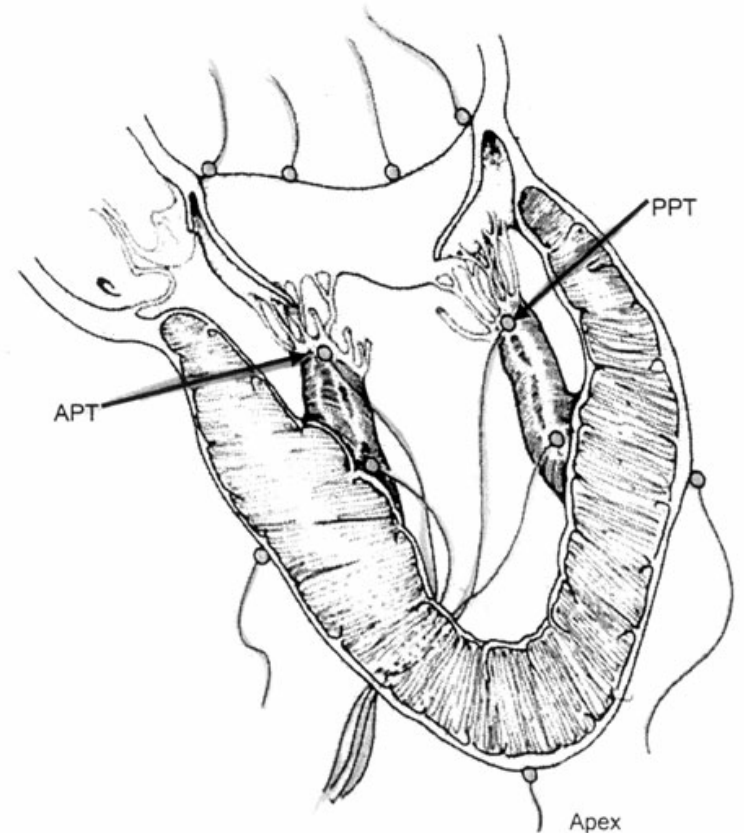
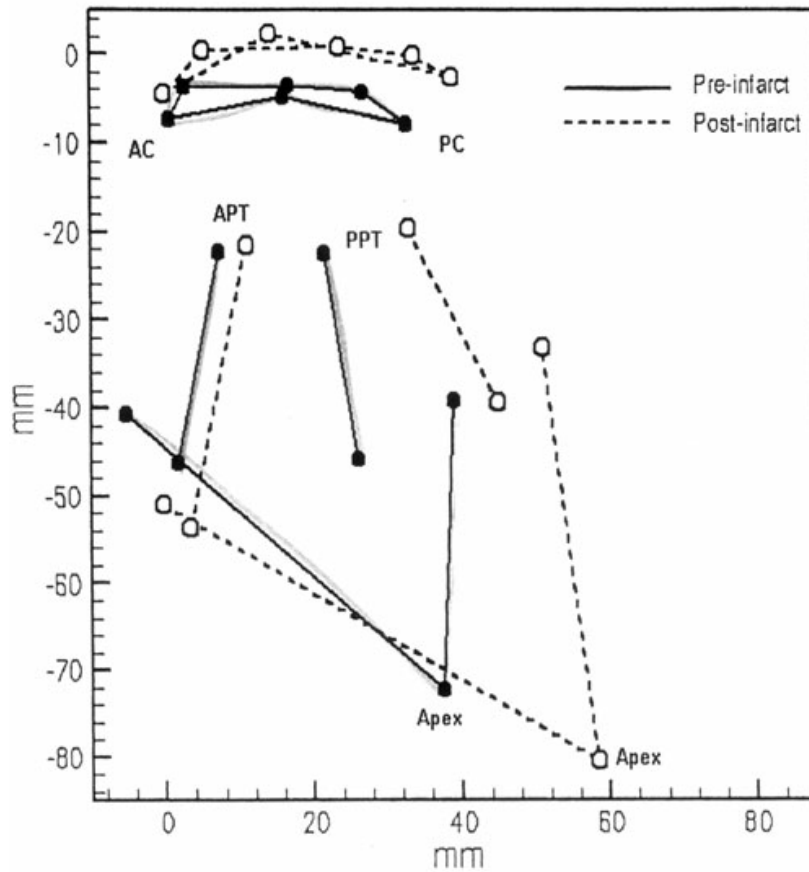
Definition

- Mitral insufficiency as a result of myocardial infarction or ischemia
 - Mitral valve leaflets normal
 - Acute rupture of papillary muscles
 - Chronic changes in left ventricular geometry or remodeling
 - Distinguish from co-existence of mitral insufficiency + coronary disease without cause-effect relationship

Mitral leaflet Tethering I



Mitral leaflet Tethering II



PRACTICE GUIDELINE

2014 AHA/ACC Guideline for the Management of Patients With Valvular Heart Disease

A Report of the American College of Cardiology/American Heart Association Task Force on Practice Guidelines

Developed in Collaboration With the American Association for Thoracic Surgery, American Society of Echocardiography, Society for Cardiovascular Angiography and Interventions, Society of Cardiovascular Anesthesiologists, and Society of Thoracic Surgeons



Table 18. Summary of Recommendations for Chronic Severe Secondary MR

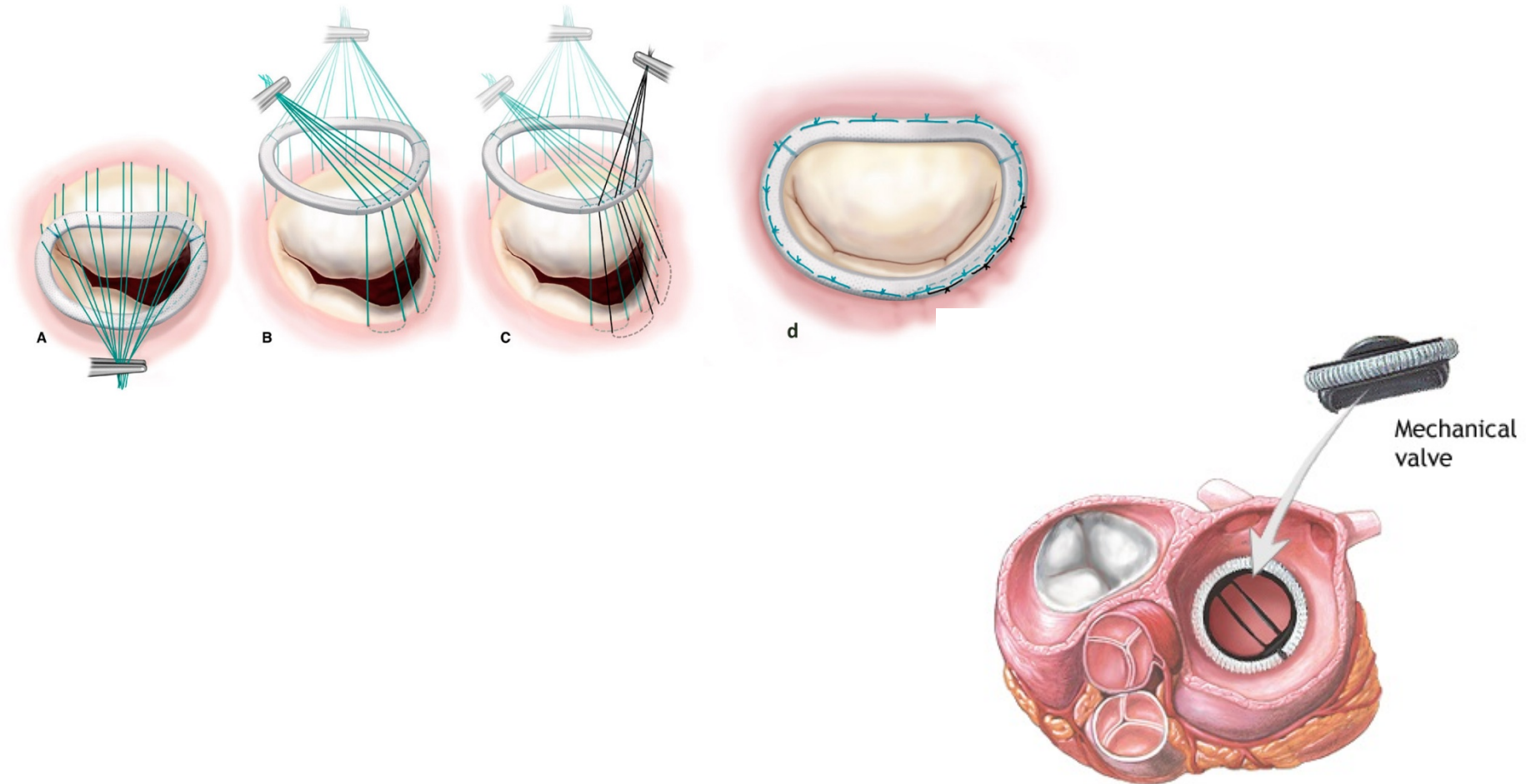
Recommendations	COR	LOE
MV surgery is reasonable for patients with chronic severe secondary MR (stages C and D) who are undergoing CABG or AVR	IIa	C
MV surgery may be considered for severely symptomatic patients (NYHA class III/IV) with chronic severe secondary MR (stage D)	IIb	B
MV repair may be considered for patients with chronic moderate secondary MR (stage B) who are undergoing other cardiac surgery	IIb	C

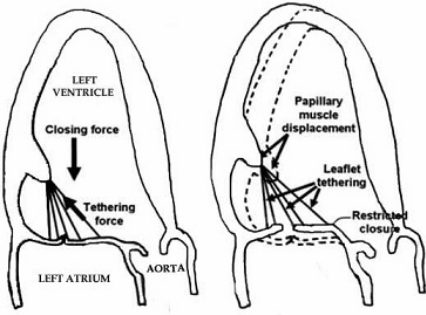
AVR indicates aortic valve replacement; CABG, coronary artery bypass graft; COR, Class of Recommendation; LOE, Level of Evidence; MR, mitral regurgitation; MV, mitral valve; N/A, NYHA, New York Heart Association.

Important Questions

- Should concomitant mitral valve surgery be performed at the time of surgical revascularization?
- If the mitral valve is to be addressed surgically, should the valve be repaired or replaced?
- If the mitral valve is repaired, what type of repair should be employed and how durable is the outcome?

Complete Coronary Revascularisation Mitral Intervention





Mechanism

- Incomplete mitral valve closure owing to the effect of LV remodeling
- Annular dilatation and/or chordal restriction of leaflets
- Fibrosis and atrophy of infarcted papillary muscles
- Anterior portion of annulus also dilates
- Intertrigonal distance and septolateral dimension of mitral annulus increases

Management

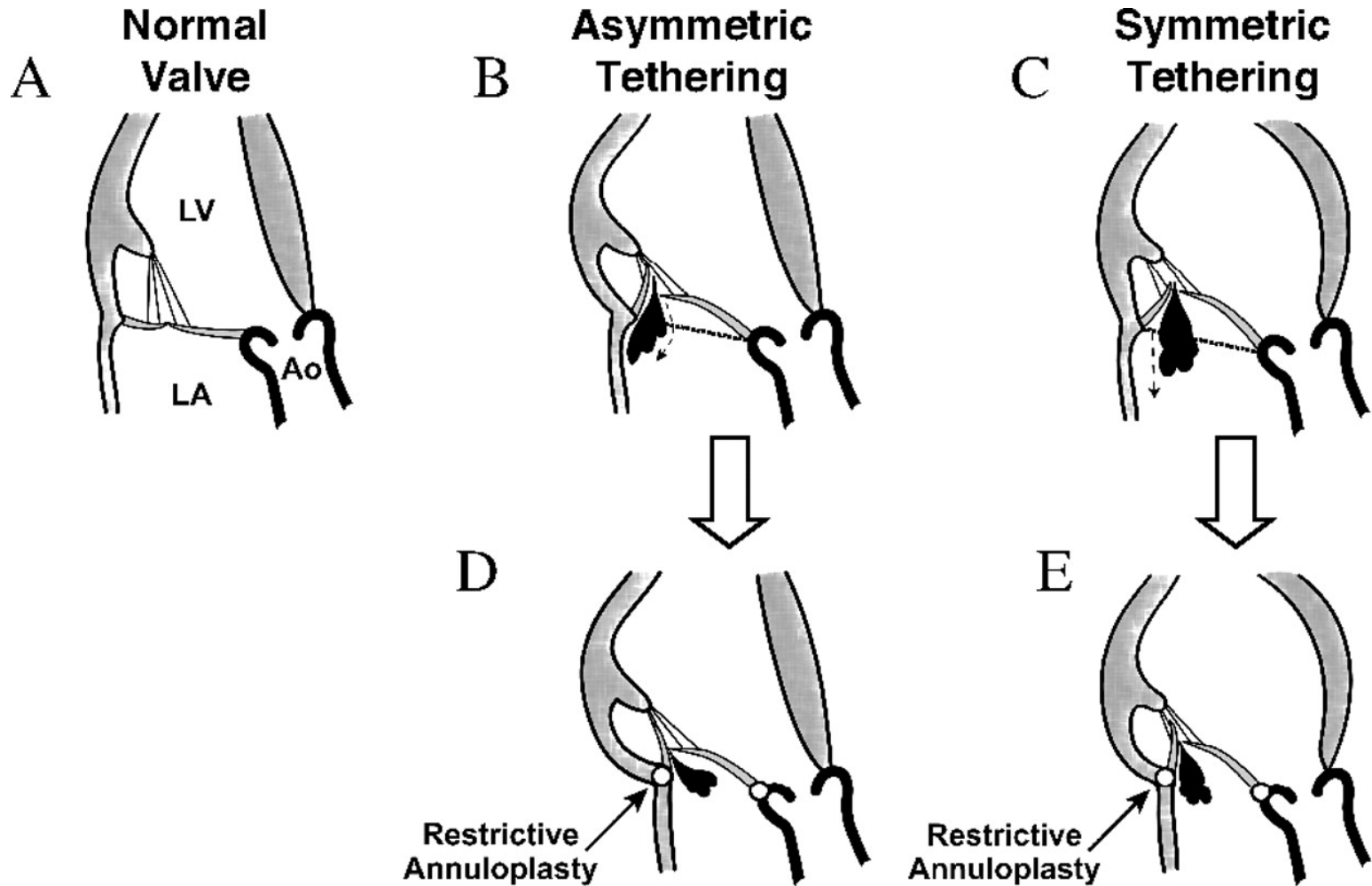
Repair if:

- Simple central regurgitant jet
- Minimally tethered leaflets
- No papillary muscle pathology

Replacement:

- If effectiveness/ durability of repair in question
- Preservation of chordal attachment is important

Figure 5. Description of the 2 main patterns of tethering.



Magne J et al. Circulation 2007;115:782-791

Repair Techniques

- Downsizing ring annuloplasty (Rigid vs. Flexible Ring)
- Leaflet Repair - Normal Leaflets
 - Edge-to-edge Repair
 - Posterior mitral leaflet augmentation
- Subvalvular repair approaches – Weak PM
 - Chordal cutting
 - Papillary muscle sling
 - Posterior papillary muscle relocation

Predictors of Recurrent Chronic Ischemic Mitral Regurgitation After Mitral Valve Repair Surgery

20

Marco Moscarelli and Prakash P. Punjabi

Abstract

Chronic ischemic mitral regurgitation rises from a multifactorial and dynamic etiology, thereby achieving a durable repair remains still a challenge. Recurrences in some series range from 10 to 30 % (McGee et al., *J Thorac Cardiovasc Surg* 128(6):916–924, 2004; Hung et al., *Circulation* 110(11 Suppl 1):II85–II90, 2004), besides there are reports of recrudescence even at 5 years from surgery (Gelsomino et al., *Eur Heart J* 29(2):231–240, 2008). It plays a crucial momentum the understanding of the predictors of repair and durability and some of them are already codified in the literature (Joint Task Force on the Management of Valvular Heart Disease of the European Society of C, European Association for Cardio-Thoracic S et al., *Eur Heart J* 33(19):2451–2496, 2012) as: left ventricular volume, tenting area, coaptation depth, interpapillary muscles distance, tethering angles, plus others ancillary. However these echocardiographic variables have been 'tested' mainly on patients undergoing restrictive annuloplasty alone, which although is the most performed repair technique, cannot address all the types of ischemic mitral regurgitation. New surgical strategies have been recently proposed (Boyd, *Circ J* 77(8):1952–1956, 2013) and adopted and, in the near future they might be considered as 'game changing' techniques, and depending on their result the predictors of failure of repair could be restructured.

Predictors of recurrent MR

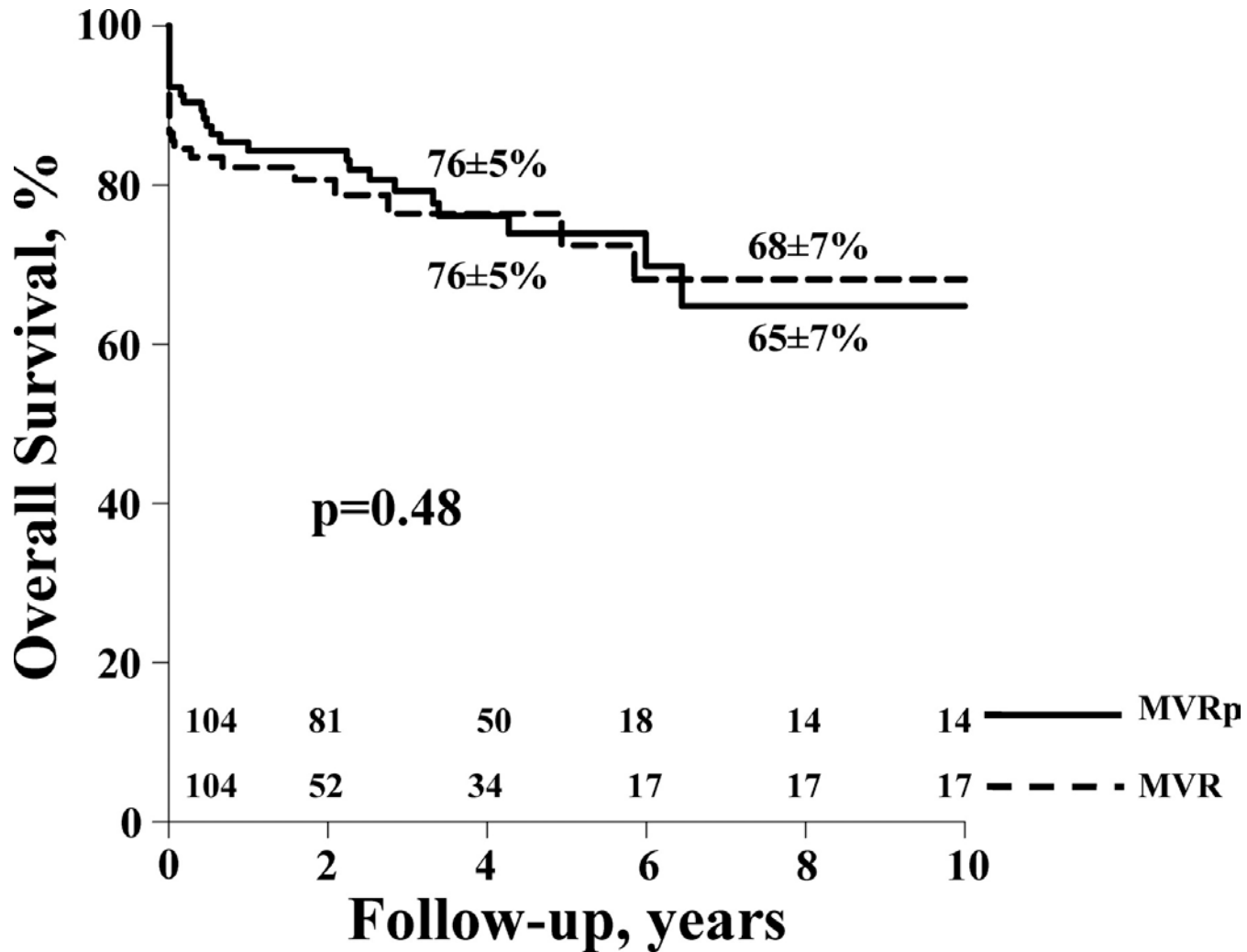
- Posterior leaflet angle >45 degrees
- Distal anterior leaflet angle >25 degrees
- Tenting height >10mm
- Tenting area more than 2.5cm²
- LVEDD >65mm
- Severe scarring of posterolateral ventricular wall

1. Ciarka A, Braun J, Delgado V, et al. Predictors of mitral regurgitation recurrence in patients with heart failure undergoing mitral valve annuloplasty. *Am J Cardiol* 2010; 106:395–401.

2. Magne J, Pibarot P, Dagenais F, et al. Preoperative posterior leaflet angle accurately predicts outcome after restrictive mitral valve annuloplasty for ischemic mitral regurgitation. *Circulation* 2007; 115:782–791.

3. Braun J, van de Veire NR, Klautz RJ, et al. Restrictive mitral annuloplasty cures ischemic mitral regurgitation and heart failure. *Ann Thorac Surg* 2008; 85:436–437.

Figure 2. Comparison of MVRp versus MVR with respect to overall survival in the propensity score-matched cohorts.



Magne J et al. Circulation. 2009;120:S104-S111

Repair or Replacement?

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ORIGINAL ARTICLE

Mitral-Valve Repair versus Replacement for Severe Ischemic Mitral Regurgitation

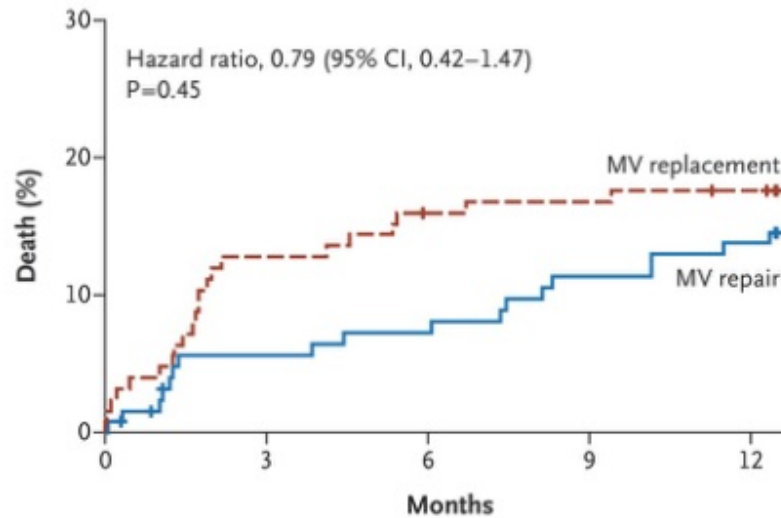
Michael A. Acker, M.D., Michael K. Parides, Ph.D., Louis P. Perrault, M.D., Alan J. Moskowitz, M.D., Annetine C. Gelijns, Ph.D., Pierre Voisine, M.D., Peter K. Smith, M.D., Judy W. Hung, M.D., Eugene H. Blackstone, M.D., John D. Puskas, M.D., Michael Argenziano, M.D., James S. Gammie, M.D., Michael Mack, 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*

Repair or Replacement?

- No difference in the degree of reverse remodeling and mortality
- Significantly more recurrent MR at 1 year with MV repair compared to chordal sparing MV replacement
- No difference in MACCE, overall SAEs, NYHA class, QoL

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

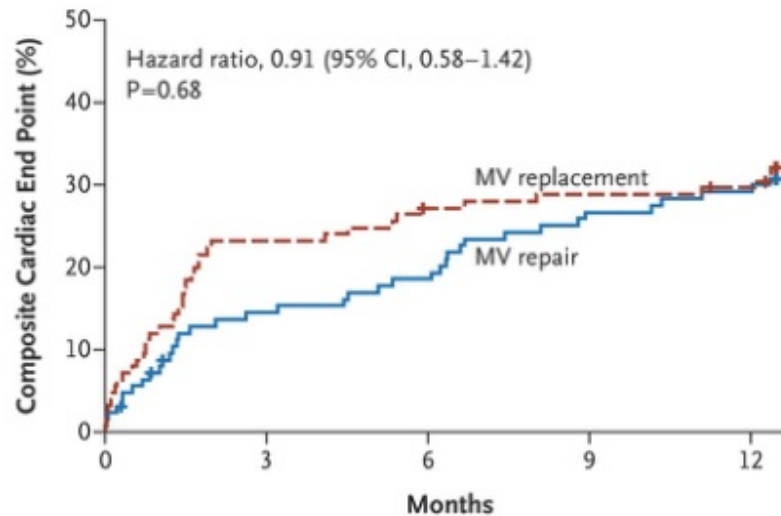
A Death



No. at Risk

MV repair	126	116	114	109	106
MV replacement	125	109	104	103	101

B Composite Cardiac End Point



No. at Risk

MV repair	126	105	100	90	87
MV replacement	125	96	90	88	86

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

Table 2. Clinical End Points, Serious Adverse Events, and Hospitalizations at 30 Days and 1 Year.

Clinical end point	30 Days			1 Year		
	Repair Group (N=126)	Replacement Group (N=125)	P Value	Repair Group (N=126)	Replacement Group (N=125)	P Value
	<i>no. of patients (%)</i>			<i>no. of patients (%)</i>		
Clinical end point						
Death	2 (1.6)	5 (4.0)	0.26	18 (14.3)	22 (17.6)	0.47
Stroke	3 (2.4)	4 (3.2)	0.72	6 (4.8)	5 (4.0)	0.77
Worsening in NYHA class of 1	10 (7.9)	10 (8.0)	0.99	6 (4.8)	6 (4.8)	0.99
Rehospitalization for heart failure	3 (2.4)	7 (5.6)	0.22	17 (13.5)	14 (11.2)	0.58
Mitral-valve reoperation	1 (0.8)	0	1.0	3 (2.4)	0	0.25
Composite major adverse event*	19 (15.1)	24 (19.2)	0.39	41 (32.5)	42 (33.6)	0.86
	<i>no. of events (rate/100 patient-yr)</i>			<i>no. of events (rate/100 patient-yr)</i>		
Serious adverse event						
Any	115 (1102.2)	131 (1277.3)	0.25	221 (202.1)	194 (189.0)	0.49
Heart failure	10 (95.8)	10 (97.5)	0.97	33 (30.2)	21 (20.5)	0.16
Stroke	3 (28.8)	4 (39.0)	0.69	6 (5.5)	5 (4.9)	0.84
Other neurologic dysfunction	3 (28.8)	2 (19.5)	0.67	4 (3.7)	2 (2.0)	0.46
Myocardial infarction						
Nonoperative	1 (9.6)	0	0.32	3 (2.7)	0	0.08
Perioperative	0	2 (19.5)	0.16	0	2 (2.0)	0.16
Renal failure	3 (28.8)	9 (87.8)	0.08	4 (3.7)	10 (9.7)	0.09
Bleeding	6 (57.5)	9 (87.8)	0.42	6 (5.5)	10 (9.7)	0.26
Arrhythmia						
Supraventricular	15 (143.8)	14 (136.5)	0.89	21 (19.2)	18 (17.5)	0.78
Ventricular	8 (76.7)	11 (107.3)	0.47	12 (11.0)	12 (11.7)	0.88
Localized infection	9 (86.3)	13 (126.8)	0.37	16 (14.6)	21 (20.5)	0.31
Sepsis	3 (28.8)	1 (9.8)	0.32	11 (10.1)	5 (4.9)	0.16
Respiratory failure	10 (95.8)	16 (156.0)	0.22	14 (12.8)	18 (17.5)	0.38
Hospitalization						
Any rehospitalization	15 (235.6)	27 (456.6)	0.04	106 (102.9)	85 (88.2)	0.29
Readmission for cardiovascular causes	6 (94.3)	14 (236.7)	0.05	56 (54.4)	38 (39.4)	0.12

* The composite major adverse event was death, stroke, hospitalization for heart failure, worsening heart failure, or mitral-valve reintervention.

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

Table 3. Quality of Life and Functional Status of Patients at 1 Year.*

Scale	Repair Group	Replacement Group	P Value
SF-12†			
Physical function			0.63
Score	43.6±8.1	44.2±7.1	
Patients evaluated — no./total no. (%)	93/105 (88.6)	85/102 (83.3)	
Mental function			0.92
Score	46.8±7.1	46.9±6.4	
Patients evaluated — no./total no. (%)	93/105 (88.6)	85/102 (83.3)	
Minnesota Living with Heart Failure questionnaire			0.12
Score	24.5±23.1	19.6±19.4	
Patients evaluated — no./total no. (%)	95/105 (90.5)	85/102 (83.3)	
EQ-5D‡			0.97
Score	73.7±16.3	73.9±20.1	
Patients evaluated — no./total no. (%)	91/105 (86.7)	80/102 (78.4)	
NYHA class — no./total no. (%)			0.28
All classes	100/105 (95.2)	93/102 (91.2)	
Class III or IV	9/100 (9.0)	13/93 (14.0)	
CCS classification — no./total no. (%)			0.42
All classes	96/105 (91.4)	89/102 (87.3)	
Class III or IV	3/96 (3.1)	2/89 (2.2)	

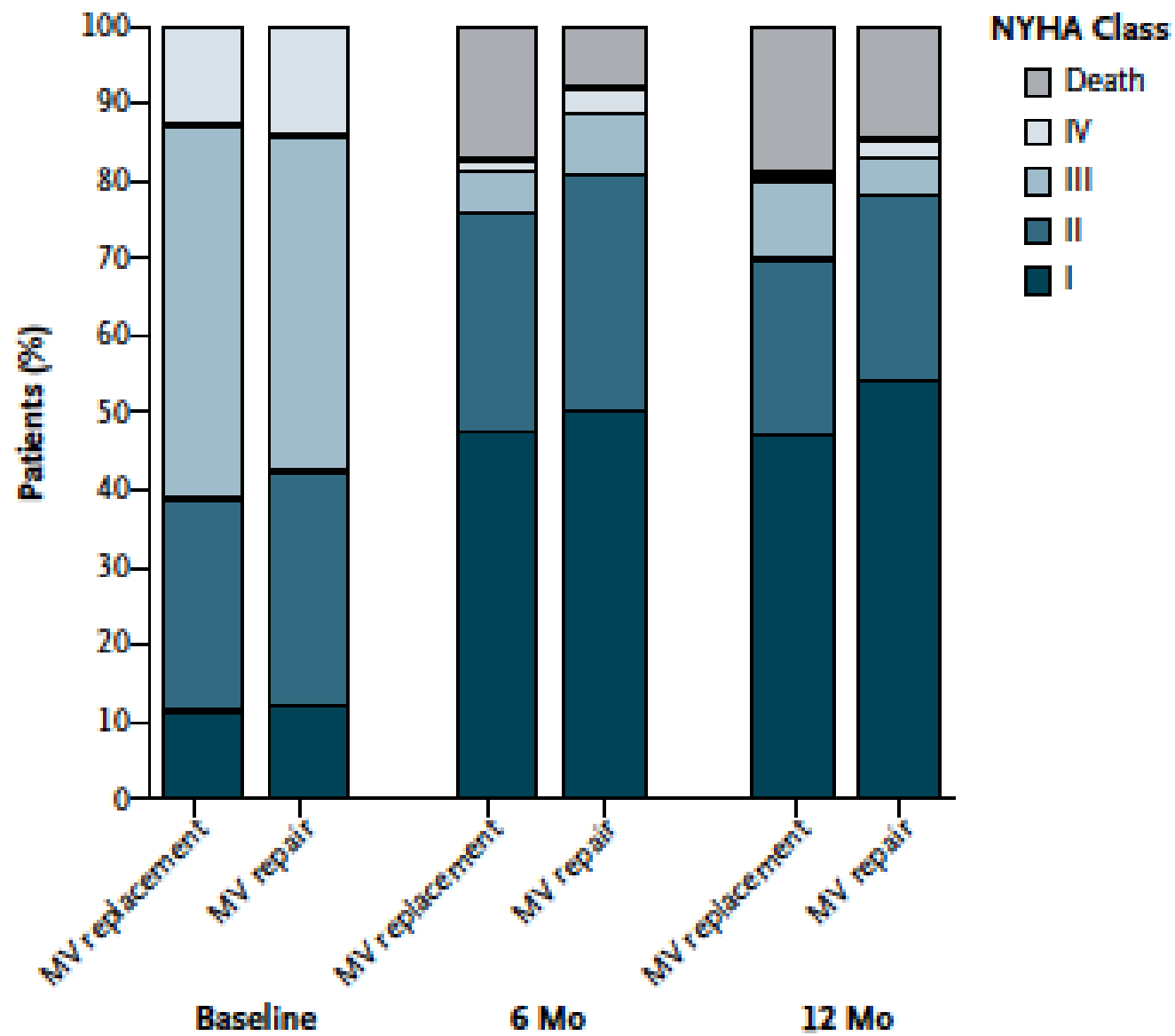


Figure 2. Rates of New York Heart Association Class and Death at Baseline, 6 Months, and 12 Months.

Indications for surgery in symptomatic HF

- Symptoms of CHF and depressed LV function is straightforward indication
- No difference in survival¹
- Reverse remodeling²⁻⁴

1. Wu AH, Aaronson KD, Bolling SF, et al: Impact of mitral valve annuloplasty on mortality risk in patients with mitral regurgitation and left ventricular systolic dysfunction. *J Am Coll Cardiol* 2005; 45:381.
2. Bax JJ, Braun J, Somer ST, et al: Restrictive annuloplasty and coronary revascularization in ischemic mitral regurgitation results in reverse left ventricular remodeling. *Circulation* 2004; 110:II-103.155.
3. Braun J, Bax JJ, Versteegh MI, et al: Preoperative left ventricular dimensions predict reverse remodeling following restrictive mitral annuloplasty in ischemic mitral regurgitation. *Eur J Cardiothorac Surg* 2005; 27:847.156.
4. Geidel S, Lass M, Schneider C, et al: Downsizing of the mitral valve and coronary revascularization in severe ischemic mitral regurgitation results in reverse left ventricular and left atrial remodeling. *Eur J Cardiothorac Surg* 2005; 27:1011.

Numbers

Get your facts first,
then you can distort
them as you please.

Mark Twain

Biography

Author Profession: [Author](#)

Nationality: [American](#)

Born: [November 30, 1835](#)

Died: [April 21, 1910](#)



SCTS

Society for Cardiothoracic Surgery in Great Britain & Ireland

The number of operations undertaken each year has changed over time, and the proportion of different types of surgery has also changed; for example a greater proportion of all cardiac surgery is now made up of valve replacements or repairs than it was 10 years ago and the proportion that is isolated coronary artery surgery is correspondingly smaller. In this section

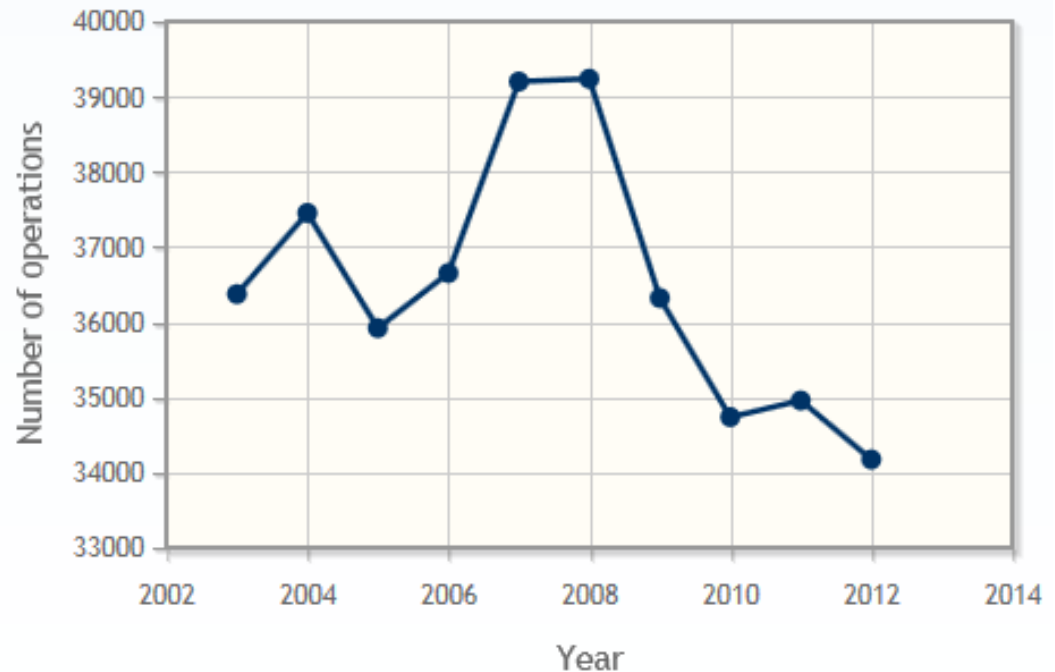
All Hospitals



All cardiac surgery



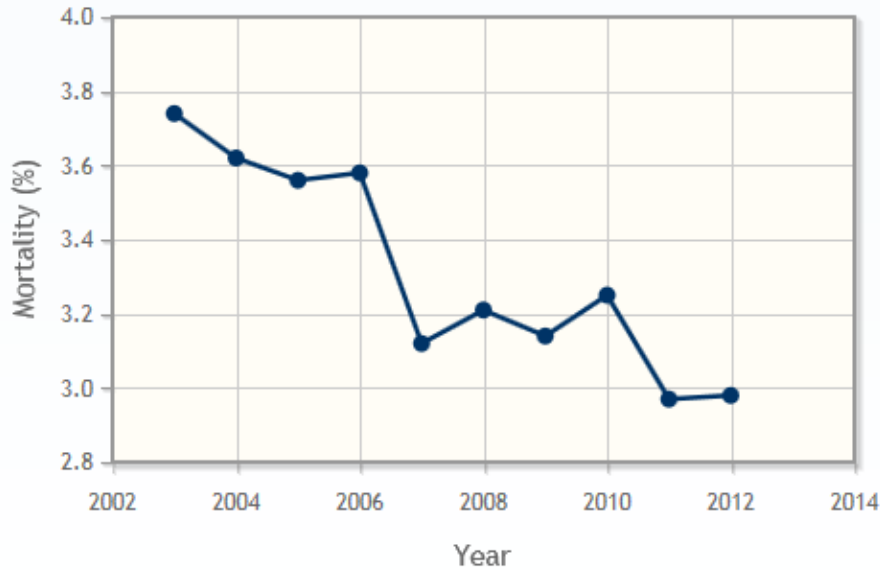
Year	Number of operations
2003	36,374
2004	37,453
2005	35,922
2006	36,654
2007	39,202
2008	39,239
2009	36,321
2010	34,737
2011	34,959
2012	34,174



Predicted vs Observed Mortality

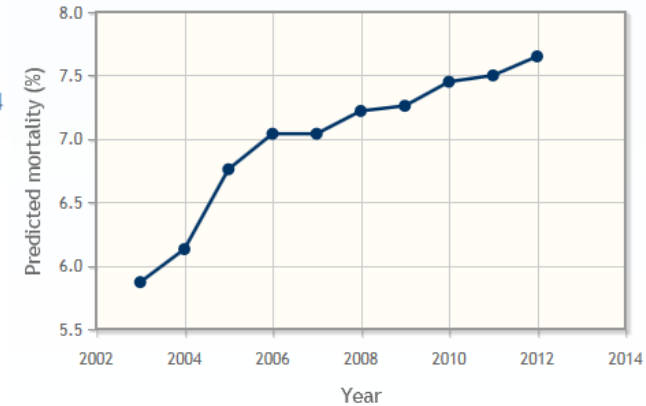
All cardiac surgery

Year	Mortality (%)
2003	3.74
2004	3.62
2005	3.56
2006	3.58
2007	3.12
2008	3.21
2009	3.14
2010	3.25
2011	2.97
2012	2.98

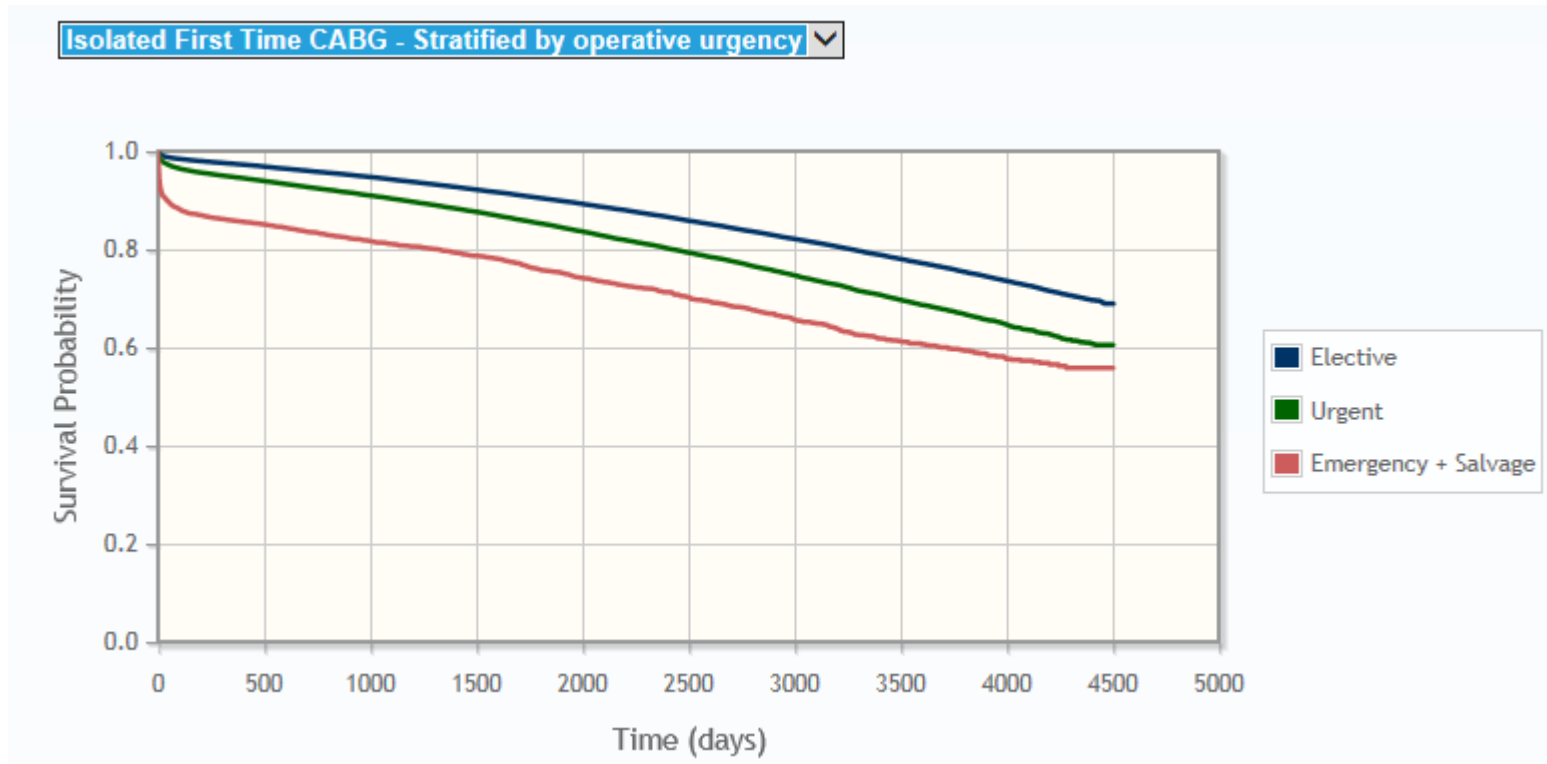


All cardiac surgery

Year	Predicted mortality (%)
2003	5.87
2004	6.13
2005	6.76
2006	7.04
2007	7.04
2008	7.22
2009	7.26
2010	7.45
2011	7.50
2012	7.65



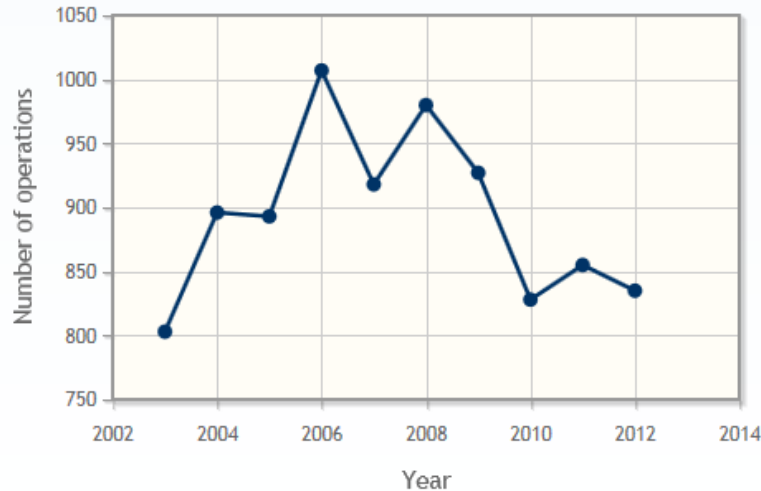
Survival Probability



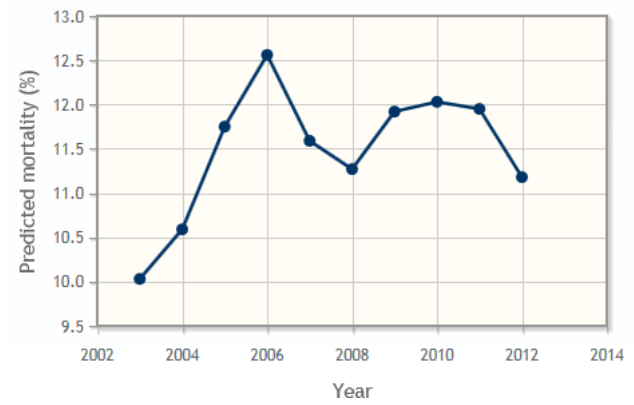
Isolated First time Mitral Intervention + CABG

All Hospitals

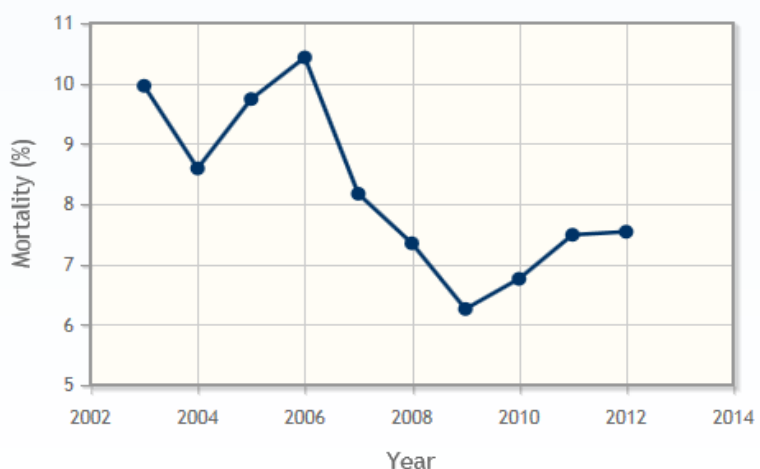
Year	Number of operations
2003	803
2004	896
2005	893
2006	1,007
2007	918
2008	980
2009	927
2010	828
2011	855
2012	835



Year	Predicted mortality (%)
2003	10.03
2004	10.59
2005	11.75
2006	12.56
2007	11.59
2008	11.27
2009	11.92
2010	12.03
2011	11.95
2012	11.18

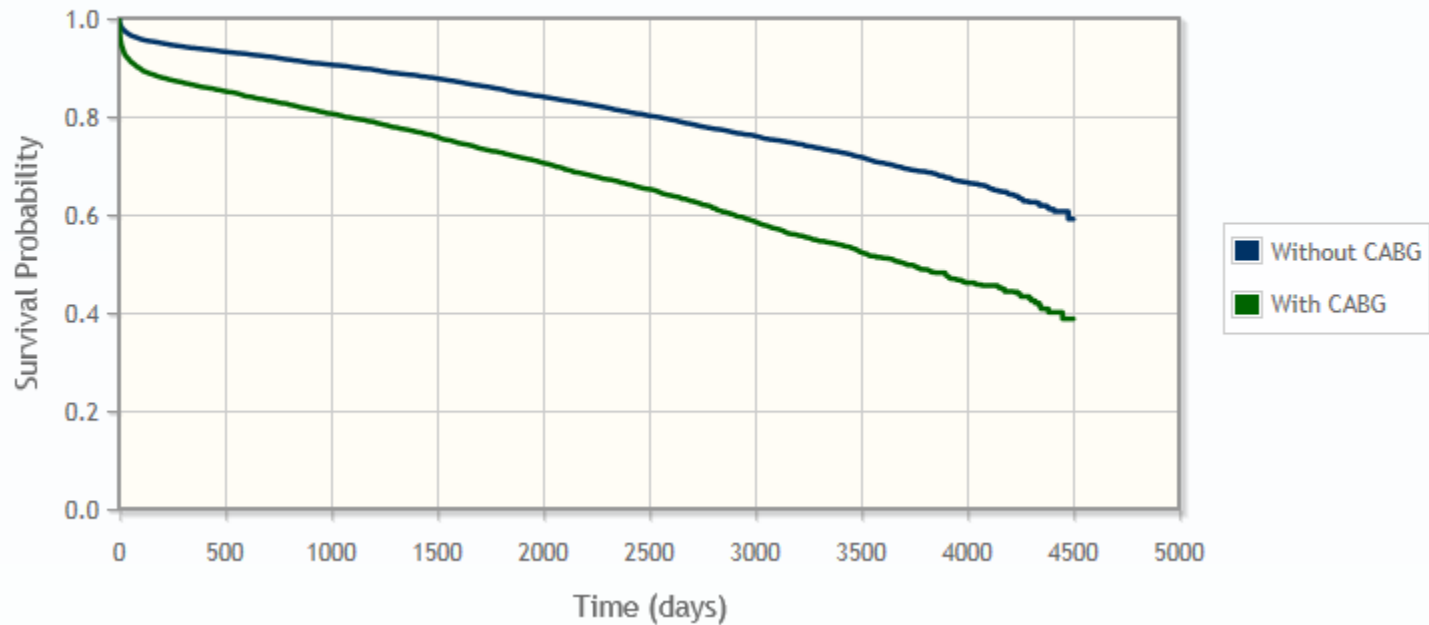


Year	Mortality (%)
2003	9.96
2004	8.59
2005	9.74
2006	10.43
2007	8.17
2008	7.35
2009	6.26
2010	6.76
2011	7.49
2012	7.54



Survival Probability

Isolated First Time Mitral Valve Surgery - With or without CABG



Risk Factors

Isolated first-time mitral procedure + CABG

Year	Repair		Replacement
	2012	2012	2012
? Age (years)	70.8	70.6	70.9
? Female (%)	29.7	25.3	41.4
? Emergency or salvage surgery (%)	4.0	1.5	10.3
? Other than isolated CABG (%)	100	100	100
? Chronic pulmonary disease (%)	16.3	17.2	15.1
? Extra-cardiac arteriopathy (%)	11.7	12.1	11.2
? Neurological dysfunction (%)	2.5	2.0	3.9
? Previous cardiac surgery (%)	0	0	0
? Creatinine > 200 µmol/l (%)	3.0	2.2	4.7
? Active endocarditis (%)	1.7	0.3	5.2
? Critical pre-operative state (%)	9.7	6.0	19.0
? Unstable angina requiring IV nitrates (%)	7.5	6.6	9.9
? LV function: fair (%)	36.3	37.6	33.6
? LV function: poor (%)	12.3	13.8	8.2
? Recent myocardial infarction (%)	19.9	20.2	19.4
? Pulmonary hypertension (%)	9.3	8.0	12.5
? Surgery on the thoracic aorta (%)	0	0	0
? Post-infarction VSD (%)	0	0	0

Adult Cardiac Surgery Database Public Reporting

Since its inception in 2010, the STS adult cardiac surgery public reporting initiative continues to grow, both in the number of voluntarily enrolled participants and the composite measures offered. STS now publicly reports outcomes for isolated coronary artery bypass grafting (CABG), isolated aortic valve replacement (AVR), and AVR+CABG surgeries. The Society plans to report outcomes for mitral valve replacement/repair and mitral valve replacement/repair + CABG composites in the future.

Isolated CABG:

[Search or browse star ratings for surgery groups](#)

[Search or browse star ratings for hospitals](#)

Isolated AVR:

[Search or browse star ratings for surgery groups](#)

[Search or browse star ratings for hospitals](#)

AVR+CABG:

[Search or browse star ratings for surgery groups](#)

[Search or browse star ratings for hospitals](#)



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Advocacy

Group name

Year:

July 2013 - June 2014

State:

<Any>

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Name ▲

Overall Composite Score (?)

Absence of Operative Mortality (?)

Absence of Major Morbidity (?)

Use of Internal Mammary Artery (?)

Receipt of Required Perioperative Medications (?)

Adena Cardiothoracic and Vascular Surgeons of Ohio Chillicothe, OH



Conclusion

- Patients with mod-severe ischemic MR should undergo CABG+MVR
- Mild MR should be left alone
- Patients with CHF appear to benefit from a concomitant procedure
- Replacement gives better long-term results in terms of less recurrence of MR

**Talent hits a target no
one else can hit; Genius
hits a target no one
else can see.**

Arthur Schopenhauer

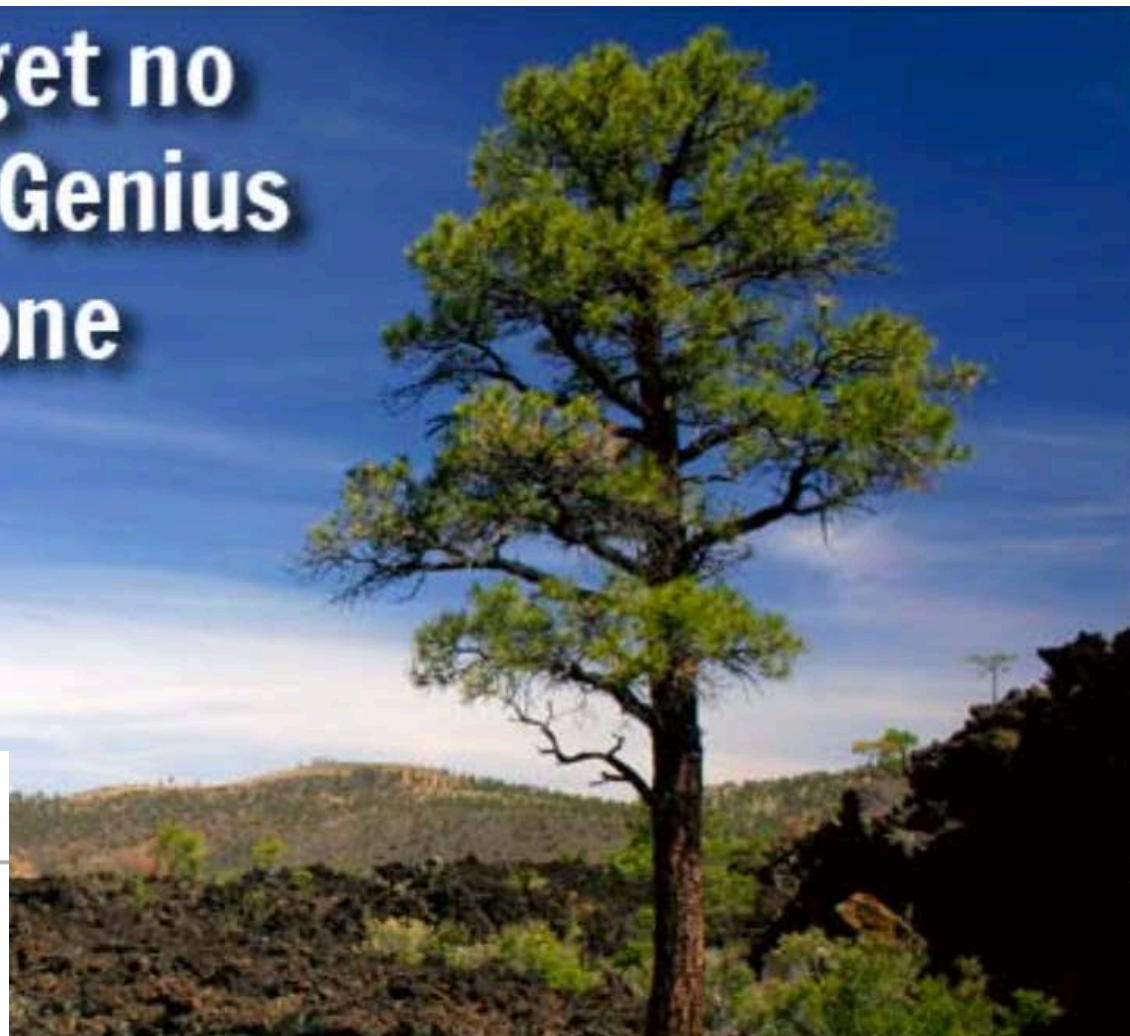
Biography

Author Profession: [Philosopher](#)

Nationality: [German](#)

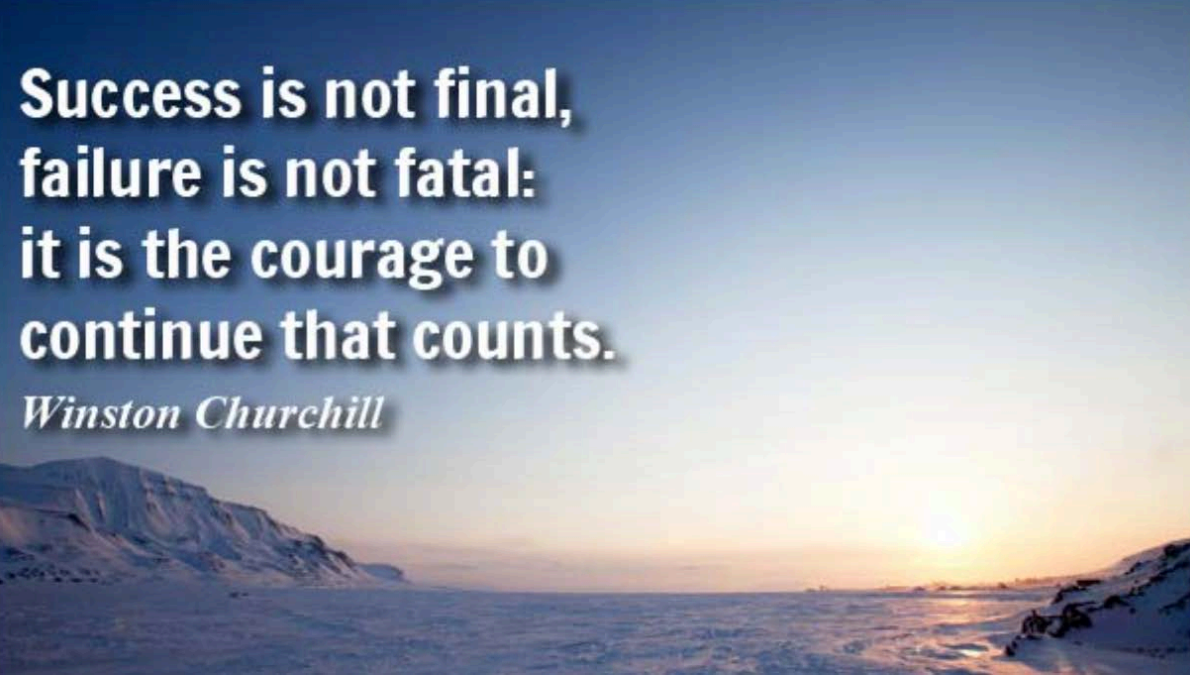
Born: [February 22, 1788](#)

Died: [September 21, 1860](#)



**Success is not final,
failure is not fatal:
it is the courage to
continue that counts.**

Winston Churchill



Biography

Author Profession: **Statesman**

Nationality: **English**

Born: **November 30, 1874**

Died: **January 24, 1965**

“You have enemies? Good. That means you've stood up for something, sometime in your life.

Winston Churchill

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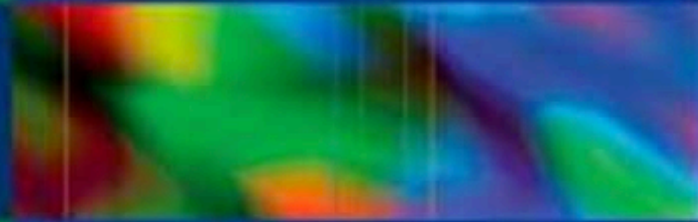
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Essentials of Operative Cardiac Surgery

 Springer

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The National Heart Failure Audit 2012/2013

Professor T A McDonagh, Kings College Hospital, London. UK



After data cleaning, the total number of records in the 2012/13 audit was 43,894. The audit represents 60% of all heart failure coded discharges or deaths in England and Wales. This comprises 41,932 heart failure admissions in England, 61% of the 68,654 patients coded as heart failure in Hospital Episode Statistics (HES), and 1,962 admissions in Wales, representing 47% of the 4,165 total recorded by the Patient Episode Database for Wales (PEDW).

Aetiology and Comorbidity

Medical History	LSVD (%)	Non-LSVD (%)	p-value
Ischaemic heart disease (IHD)	51	40	< 0.001
Atrial fibrillation	43	40	0.177
Acute myocardial infarction (AMI)	36	22	< 0.001
Valve disease	20	29	< 0.001
Hypertension	53	60	< 0.001
Chronic renal impairment	27	20	< 0.001
Diabetes	31	30	0.084
Asthma	9	9	0.115
Coronary Obstructive Pulmonary Disease (COPD)	17	18	0.001

Echo diagnoses

Echo diagnosis	Total (%)
Normal echo	4
Left ventricular systolic dysfunction (LVSD)	72
Left ventricular hypertrophy (LVH)	6
Valve disease	25
Diastolic dysfunction	8
Other diagnosis	9

Echo diagnosis	Men (%)	Women (%)
Normal echo	3	5
Left ventricular systolic dysfunction (LVSD)	78	63
Left ventricular hypertrophy (LVH)	6	7
Valve disease	21	31
Diastolic dysfunction	7	10
Other diagnosis	8	10

Echo diagnosis	<75 years (%)	≥75 years (%)
Normal echo	4	4
Left ventricular systolic dysfunction (LVSD)	80	67
Left ventricular hypertrophy (LVH)	5	7
Valve disease	17	30
Diastolic dysfunction	7	9
Other diagnosis	8	9

Monitoring

>50%-referred to HF specialist services

Improvement on last year.

Service	Men (%)	Women (%)	
Cardiology follow-up	60	47	
Heart failure nurse follow-up	63	53	
Cardiac rehab	13	9	
Service	<75 years (%)	≥ 75 years (%)	
Cardiology follow-up	71	45	
Heart failure nurse follow-up	66	55	
Cardiac rehab	15	9	
Service	Cardiology ward (%)	General medical ward (%)	Other ward (%)
Cardiology follow-up	71	36	36
Heart failure nurse follow-up	68	48	54
Service	Seen by any HF specialist (%)	No specialist input (%)	
Cardiology follow-up	63	22	
Heart failure nurse follow-up	69	23	
Cardiac rehab	13	3	

Symptoms

Symptom/sign of heart failure	Total on admission (%)	Total on readmission (%)
NYHA class I/II	21	16
NYHA class III	44	44
NYHA class IV	35	40
No/mild peripheral oedema	50	45
Moderate peripheral oedema	32	33
Severe peripheral oedema	18	22

In Hospital Mortality 2012-2013

9.4%

Was 11.1% in 2011/12

RR of 15.3%

Absolute reduction of 1.7%

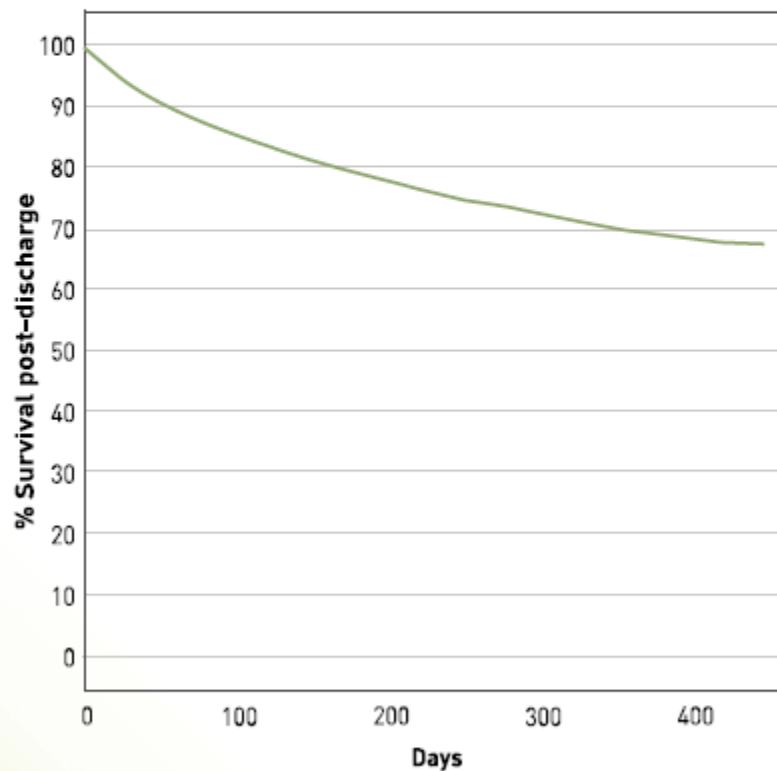
Very similar population to last year

Better prescription of drugs, more specialist in put (place of care and follow up)

ACM following discharge

24.7 % at end of FU (median 180 days)

Reduced from 26.2% last year (6.25 % RR)



7 Research use of data

The prime reason for clinical audit is to improve patient care by revealing to providers and carers contemporary data on the current management and outcomes of patients with heart failure. Data collected by the National Heart Failure Audit (NHFA) audit provides this information.

These very aims also are supported and enhanced by associated research projects and programmes of research put forward both by contributors to the audit and by external individuals and agencies. These research opportunities have been greatly enhanced by the co-location at NICOR of all the cardiovascular audits and registries formerly initiated by the Central Cardiac Audit Databases (CCAD) programme. The NHFA research programme encompasses a range of differing but complementary approaches deemed by our internal research committee as being likely, directly or indirectly, to improve patient care.

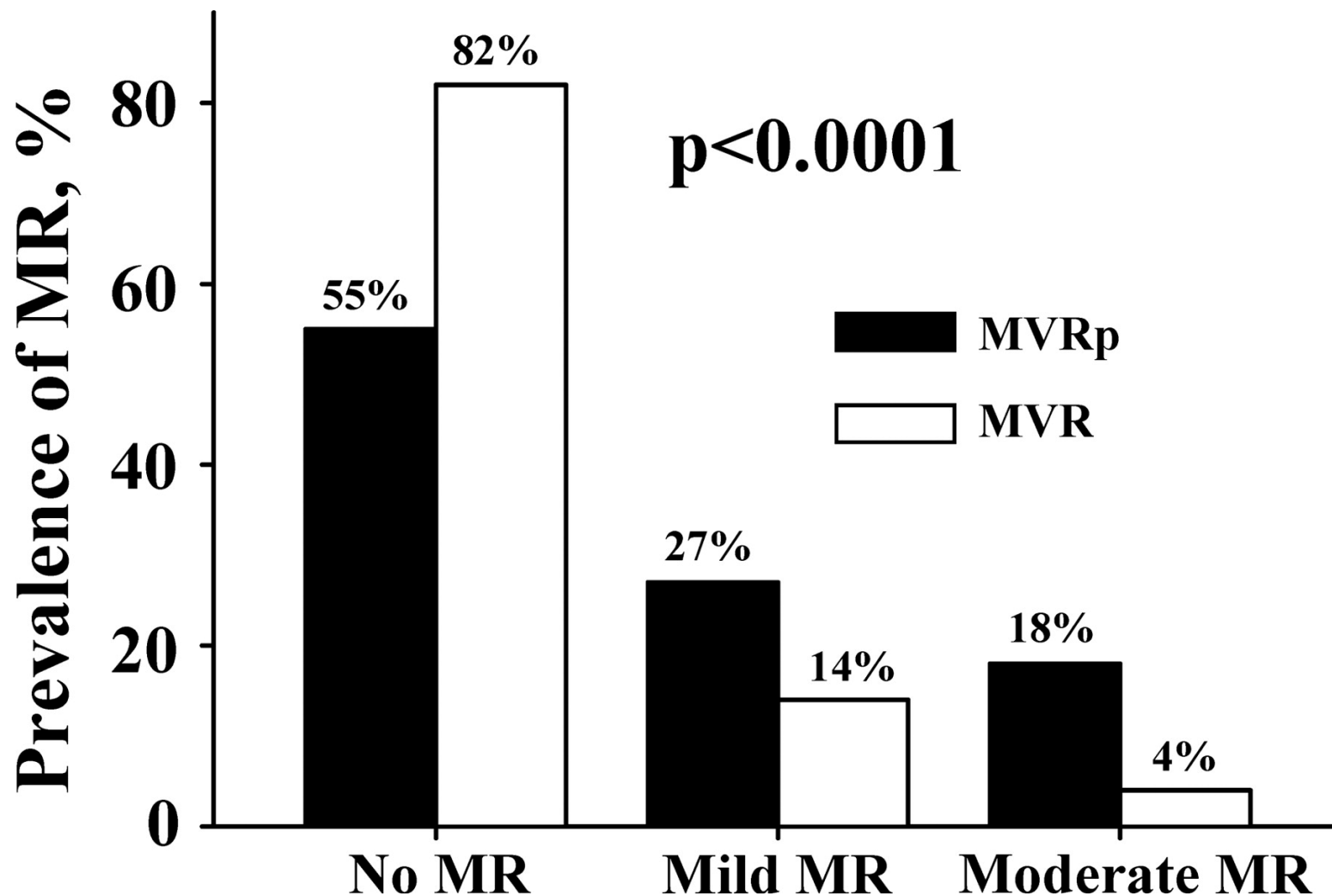
1. Data Sharing Agreements are collaborative projects both with personnel contributing to the audit and external academic institutions and agencies. Examples include:
 - a. The UNVEIL-CHF project from Oxford University which will describe associations between processes of care and outcomes
 - b. Impact of measurements of B type natriuretic peptide (BNP) on outcomes, a project from the University of Bristol
 - c. Differences in outcomes among patients with sinus rhythm and atrial fibrillation, both paroxysmal and established, and their relationships to heart rate, medications and other treatments, from a team working at Manchester University
 - d. A project at the University of Hull investigating outcomes according to severity of oedema on admission, particularly looking at those with severe oedema and mild breathlessness
2. Evaluation of Heart Failure Units based on the consistently better outcomes in terms of survival and readmission of patients who were managed in a specialist cardiology setting. To provide more information and support for a randomized controlled trial of Heart Failure Units compared to usual care, a 'Bootstrap' analysis of our current data which will allow for confounding factors is being performed by the audit team.
3. Collaborative studies among the various cardiovascular audits is a major reason for co-location at NICOR. Data from the NHFA clearly show that an unscheduled urgent admission to hospital for the treatment of worsening heart failure heralds an advanced stage of heart failure. Therefore, prevention of heart failure and

its progression to an advanced stage are priorities. In a major programme of work entitled 'MAPP' (Multiple Audit Prevention Programme) we shall identify people with various severities of heart failure from other cardiovascular audits including MINAP (Myocardial Infarction National Audit Programme) and Primary Care through the Clinical Practice Research Datalink (CPRD). The determinants of the onset and progression of cardiac dysfunction and its progression to heart failure will be identified. Following on from that could be large randomized clinical trials to prevent onset and progression of heart failure.

4. Improving our methodology has been a constant activity from the outset. In association with and with funding from the Heart Failure Association of the European Society of Cardiology (ESC) we have embarked on a project to embed the ESC Guideline on Heart Failure in our electronic audit platform. We believe this, together with other other changes including web enablement, will produce a simpler and more interesting audit tool that will facilitate both data capture, but also clinical practice.
5. After two decades of failure to show benefit in patients with acute heart failure, several 'new chemical entities' (potential new medicines) have shown promise in Phases 1-3 clinical trials. Sarelixin, an analogue of relaxin, the naturally occurring pregnancy hormone, has shown promise in clinical trials when given soon after admission to hospital. Therefore data on admission characteristics, especially blood pressure, are now essential if such medicines are to be used safely. The manufacturer of sarelixin has funded a study in three large centres in NHFA to estimate the likely proportion of patients suitable for sarelixin which has been helpful not only to them but also to our programme since, in future, the NHFA is to be a prospective rather than retrospective audit.

In conclusion, the NHFA is research active and it is likely that this aspect will continue to grow as further research questions arise. We welcome further proposals from direct contributors to the data collection and all others with something to contribute to the further success of this large national project.

Figure 3. Comparison of the prevalence of persistent MR at predischarge echocardiographic examination in the MVRp and MVR groups.

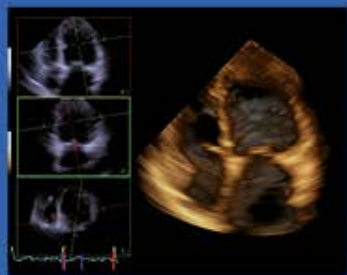


Magne J et al. Circulation. 2009;120:S104-S111

Management

- Mitral valve repair is generally not recommended^{1,2} and recommended^{3,4}
- Undersized ring annuloplasty
- Reimplantation of papillary muscle

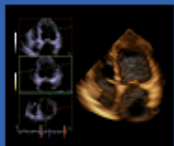
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4. Kono T, Sabbah HN, Stein PD, et al: Left ventricular shape as a determinant of functional mitral regurgitation in patients with severe heart failure secondary to either coronary artery disease or idiopathic dilated cardiomyopathy. *Am J Cardiol* 1991; 68:355.



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