Future Directions in MR Care

Primary / Secondary...Degenerative / Functional / Ischemic

How Do We Simplify MR Care?

Robert O. Bonow, MD, MS, MACC

Northwestern University Feinberg School of Medicine
Bluhm Cardiovascular Institute
Northwestern Memorial Hospital

No Relationships to Disclose
Mitral regurgitation

Degenerative MR: primary valve disease

Functional MR: primary myocardial disease
Mitral regurgitation

Primary mitral regurgitation
Secondary mitral regurgitation
Mitral regurgitation

Primary mitral regurgitation

Secondary mitral regurgitation
There is wide variability in quality of echo laboratories in assessing mitral valvular pathology and severity of mitral regurgitation.
Inadequate referral of appropriate patients with mitral regurgitation for mitral valve repair
Mitral regurgitation

Indications for mitral valve surgery for severe primary MR?

- Symptomatic patients
- Asymptomatic patients
  - LV systolic dysfunction
  - Pulmonary hypertension
  - Atrial fibrillation
Mitral regurgitation

Indications for mitral valve surgery for severe primary MR?

- Symptomatic patients
- Asymptomatic patients
  - LV systolic dysfunction
  - Pulmonary hypertension
  - Atrial fibrillation
  - *Normal LV function, repair feasible?*

*class I*  
*class I*  
*class IIa*  
*class IIa*
Mitral regurgitation

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MV repair to improve survival?
Mitral regurgitation

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  - Atrial fibrillation
  - *Normal LV function, repair feasible?*

**MV repair to improve survival?**

**What is the natural history?**
Mitral regurgitation

Indications for mitral valve surgery for severe primary MR?

- Symptomatic patients
- Asymptomatic patients
  - LV systolic dysfunction
  - Pulmonary hypertension
  - Atrial fibrillation
  - Normal LV function, repair feasible?

Asymptomatic severe degenerative MR:
- 50% come to surgery in 5 years because of symptoms, LV dysfunction, pulmonary hypertension or AF
Mitral regurgitation

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  - LV systolic dysfunction
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  - Atrial fibrillation
  - Normal LV function, repair feasible?

Asymptomatic severe degenerative MR:
- 50% come to surgery in 5 years because of symptoms, LV dysfunction, pulmonary hypertension or AF
- Long-term postoperative survival is worse if surgery is performed after patients become symptomatic
Late Outcomes of Mitral Valve Repair for Mitral Regurgitation Due to Degenerative Disease

Tirone E. David, MD; Susan Armstrong, MSc; Brian W. McCrindle MD; Cedric Manlhiot, BSc

Background—The pathologic spectrum of mitral regurgitation (MR) is broad, and there are many causes and pathologies. This study examined the outcomes of all patients undergoing mitral valve surgery.

Methods and Results—All patients were prospectively followed for 10.4 years. Clinical, hemodynamic, and echocardiographic data were recorded. Survival was analyzed by multivariable analysis. Mitral valve repair was performed in 840 patients. Mitral valve replacement was performed in 355 patients. MR developed in 32% of patients, with severe MR developing in 16%. The degree of myxomatous changes was associated with increased risk of death and freedom from moderate or severe MR.

Conclusions—MV repair for regurgitation is associated with improved long-term outcomes. (Circulation. 2013;127:1485-1492)
Mitral regurgitation

Indications for MV repair for asymptomatic primary MR:

- Chronic severe MR
- Preserved LV function
- Experienced surgical center
- Likelihood of durable repair without residual MR > 95%

class Ila
Indications for MV repair for asymptomatic primary MR:

- Chronic severe MR
- Preserved LV function
- Experienced surgical center
- Likelihood of durable repair without residual MR > 95%.

- Repair better than mitral valve replacement
- Patients should be referred to centers experienced in repair

**class I**

**class IIa**
Mitral regurgitation: Determinants of referral for cardiac surgery by Canadian cardiologists

Karine Toledano MD, Lawrence G Rudski MD, Thao Huynh MD, François Béïque MD, John Sampalis MD, Jean-François Morin MD


La régurgitation mitrale : Les déterminants d’aiguillage en chirurgie cardiaque par les cardiologues canadiens
Mitral regurgitation: Determinants of referral for cardiac surgery by Canadian cardiologists

Karine Toledano MD, Lawrence G Rudski MD, Thao Huynh MD, François Béique MD,


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## CLINICAL STUDIES

### Mitral regurgitation: Determinants of referral for cardiac surgery by Canadian cardiologists

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Practice Variation Among Cardiovascular Physicians in Management of Patients With Mitral Regurgitation

Kevin M. Harris, MD\textsuperscript{a,*}, Catherine A. Pastorius, BA\textsuperscript{a}, Sue Duval, PhD\textsuperscript{a,b}, Eileen Harwood, PhD\textsuperscript{b}, Timothy D. Henry, MD\textsuperscript{a}, Blasé A. Carabello, MD\textsuperscript{c}, and Alan T. Hirsch, MD\textsuperscript{a,b}

Am J Cardiol 2009;103:255–261
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Am J Cardiol 2009;103:255–261

<table>
<thead>
<tr>
<th>Percent</th>
<th>n=1062</th>
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<tr>
<td>Routinely measure ERO</td>
<td>35%</td>
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<tr>
<td>Avoid non-indicated drugs</td>
<td>35%</td>
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<tr>
<td>Use I or IIa surgical indications</td>
<td>79%</td>
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<table>
<thead>
<tr>
<th>Percent</th>
<th>&gt;85%</th>
<th>&lt;85%</th>
<th>Don't know</th>
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<tbody>
<tr>
<td>Success of your surgeon in repair of posterior leaflet prolapse</td>
<td>46%</td>
<td>29%</td>
<td>25%</td>
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</table>
Failure of Guideline Adherence for Intervention in Patients With Severe Mitral Regurgitation

David S. Bach, MD, Mazen Awais, MD, Hitinder S. Gurm, MD, Sarah Kohnstamm, MD

J Am Coll Cardiol 2009;54:860–5

<table>
<thead>
<tr>
<th></th>
<th>All Patients</th>
<th>Unoperated</th>
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<tr>
<td>n</td>
<td>112</td>
<td>53</td>
</tr>
<tr>
<td>Symptoms</td>
<td>53</td>
<td>24</td>
</tr>
<tr>
<td>LVIDS $\geq$45 mm</td>
<td>11</td>
<td>6</td>
</tr>
<tr>
<td>LVEF $\leq$60%</td>
<td>50</td>
<td>24</td>
</tr>
<tr>
<td>Atrial fibrillation</td>
<td>26</td>
<td>12</td>
</tr>
<tr>
<td>RVSP $&gt;$50 mm Hg</td>
<td>25</td>
<td>16</td>
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Mitral regurgitation

Primary mitral regurgitation

Secondary mitral regurgitation

- Diagnostic dilemmas
- Therapeutic dilemmas
Imprecision in grading severity of secondary MR

REVIEW TOPIC OF THE WEEK

Defining “Severe” Secondary Mitral Regurgitation
Emphasizing an Integrated Approach

Paul A. Grayburn, MD,† Blasé Carabello, MD,‡ Judy Hung, MD,§ Linda D. Gillam, MD,∥ David Liang, MD,¶ Michael J. Mack, MD,# Patrick M. McCarthy, MD,** D. Craig Miller, MD,†† Alfredo Trento, MD,‡‡ Robert J. Siegel, MD††

J Am Coll Cardiol 2014;54:2792-2801

What is “severe” secondary MR?
Ischemic Mitral Regurgitation
Long-Term Outcome and Prognostic Implications With Quantitative Doppler Assessment

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

* Circulation, 2001;103:1759-1764.*

Survival After MI

- MI without MR
- $\text{ERO} \leq 19$: 61%
- $\text{ERO} \geq 20$: 29%

$p < 0.001$
Independent prognostic value of functional mitral regurgitation in patients with heart failure. A quantitative analysis of 1256 patients with ischaemic and non-ischaemic dilated cardiomyopathy

Andrea Rossi,1 Frank L Dini,2 Mariantonietta Cicoira,1 Silvia Stefano Ghio,5 Maurice Enriquez-Sarano3

*Heart* 2011;97:1675–1680

Rossi et al. *Heart* 2011;97:1675-1680
Mitral regurgitation

What is *severe* MR?

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<tr>
<th></th>
<th>RV (ml)</th>
<th>ERO (cm²)</th>
</tr>
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<tbody>
<tr>
<td>Primary (degenerative)</td>
<td>&gt;60</td>
<td>&gt;0.4</td>
</tr>
<tr>
<td>Secondary (functional)</td>
<td>&gt;30</td>
<td>&gt;0.2</td>
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Does this help?
Prevalence of MR in Patients with LV Dysfunction

<table>
<thead>
<tr>
<th>Study</th>
<th>Journal</th>
<th>N</th>
<th>MR</th>
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*Patients with moderate to severe MR
Independent prognostic value of functional mitral regurgitation in patients with heart failure. A quantitative analysis of 1256 patients with ischaemic and non-ischaemic dilated cardiomyopathy

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Heart 2011;97:1675–1680

Ischemic or Nonischemic Cardiomyopathy

Hospital-Free Survival (%)

Time (years)

ERO >20

Severe FMR

Mild-Mod FMR

No FMR

Rossi et al. Heart 2011;97:1675-1680

p<0.0001

51%

24%

11%
Independent prognostic value of functional mitral regurgitation in patients with heart failure. A quantitative analysis of 1256 patients with ischaemic and non-ischaemic dilated cardiomyopathy

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Rossi et al. Heart 2011;97:1675-1680
Valvular Heart Disease

Influence of Mitral Regurgitation Repair on Survival in the Surgical Treatment for Ischemic Heart Failure Trial

Marek A. Deja, Paul A. Grayburn, Benjamin Sun, Vivek Rao, Lilin She, Michal Krejca, Anil R. Jain, Yeow Leng Chua, Richard Daly, Michele Senni, Krzysztof Mokrzycki, Lorenzo Menicanti, Jae K. Oh, Robert Michler, Krzysztof Wróbel, André Lamy, Eric J. Velazquez, Kerry L. Lee and Robert H. Jones

_Circulation_. 2012;125:2639-2648

*Ischemic Cardiomyopathy*

- No MR
- Mild MR
- Mod-Severe MR

Mortality (percent) vs Time (years)

- No MR: 30%
- Mild MR: 47%
- Mod-Severe MR: 55%

p<0.001

Deja et al. *Circulation* 2012;125:2639-2648
Valvular Heart Disease

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Ischemic Cardiomyopathy

Deja et al. Circulation 2012;125:2639-2648
Secondary mitral regurgitation:
...a marker of a sicker LV
- or -
...a contributor to a sicker LV?
Secondary mitral regurgitation:
...a marker of a sicker LV
- or -
...a therapeutic target?

Therapies that produce beneficial reverse remodeling also reduce severity of functional MR
Baseline

Optimized Medical Therapy and Biventricular Pacing
## Prevalence of MR in Patients with LV Dysfunction

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* Patients with moderate to severe MR
Prevalence of Heart Failure
United States

Source: NHANES, CDC, and American Heart Association
Atrial Fibrillation: Prevalence with Aging

The ATRIA Study

Go et al, *JAMA* 2001;285:2370-2375
Prevalence of Mitral Valve Disease

Olmstead County (n=16,501) vs. CARDIA, ARIC, CHS (n=11,911)

- Olmstead County: 9.6%
- CARDIA, ARIC, CHS: 6.4%

28,412 subjects

STATE-OF-THE-ART PAPER

Integrating Quality Into the Cycle of Therapeutic Development

Robert M. Califf, MD, FACC,* Eric D. Peterson, MD, MPH, FACC,* Raymond J. Gibbons, MD, FACC,† Arthur Garson, Jr, MD, MPH, FACC,‡ Ralph G. Brindis, MD, MPH, FACC,§ George A. Beller, MD, FACC,‖ Sidney C. Smith, Jr, MD, FACC¶

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Mitral Regurgitation
Improving Quality of Care

- Clinical research networks to develop prospective randomized trials
- Clinical practice guidelines based on scientific evidence rather than expert consensus
- Establishment of centers of excellence in heart valve disease
- Development of clinical quality performance measures
- Outcomes and comparative effectiveness research