The ACC/AHA Guidelines for Management of Aortic Insufficiency: Pitfalls and Nuances

Robert O. Bonow, MD, MS

Northwestern University Feinberg School of Medicine
Bluhm Cardiovascular Institute
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No Relationships to Disclose
The 5 Most Controversial Recommendations for AR Management in the US and European Guidelines

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2008 Focused Update Incorporated Into the ACC/AHA 2006 Guidelines 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 (Writing Committee to Revise the 1998 Guidelines for the Management of Patients With Valvular Heart Disease)

Endorsed by the Society of Cardiovascular Anesthesiologists, Society for Cardiovascular Angiography and Interventions, and Society of Thoracic Surgeons

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

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Paul Sorajja, MD, FACC, FAHA#
Thorsfl M. Sundt III, MD**
James D. Thomas, MD, FASE, FACC, FAHA***

ESC/EACTS GUIDELINES

ESC/EACTS Guidelines on the Management of valvular heart disease

Jean-Francois Dumesnil (Chairperson) (France), Ottavio Alfieri (Chairperson) (Italy), Piera Andrea Santamaria (Italy), Manuel J. Antunes (Portugal), Gonzalo Barón-Escuivias (Spain), Helmut Baumgartner (Germany), Michael Andrew Borger (Germany), Thierry P. Carrel (Switzerland), Michele De Bonis (Italy), Arturo Evangelista (Spain), Volkmar Falk (Switzerland), Bernard Iung (France), Patrizio Lancellotti (Belgium), Luc Pierard (Belgium), Susanna Price (UK), Hans Joachim Schäfers (Germany), Gerhard Schuler (Germany), Janina Stepinska (Poland), Karl Swedberg (Sweden), Johanna Takkenberg (The Netherlands), Ulrich Otto Von Oppell (UK), Stephan Windecker (Switzerland), Jose Luis Zamorano (Spain), Marian Zembala (Poland)
The 5 most controversial recommendations:

- Evidence-based recommendations?
- Surgery for BAV with aortic aneurysms?
- The asymptomatic patient with severe AR?
- LV volume assessment: M-mode vs 3D?
- Selection of a valve prosthesis?
Aortic Regurgitation

The 5 most controversial recommendations:

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In the absence of randomized clinical trials, virtually all of the recommendations for AR are based on expert consensus

--- Level of Evidence C
The 5 most controversial recommendations:

- Evidence-based recommendations?
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- Selection of a valve prosthesis?
Bicuspid aortic valves

Indications for aortic surgery

• Aortic / aortic root dilatation:
  Ao diameter >55 mm  
  Ao diameter >50 mm with risk factors
Bicuspid aortic valves

Indications for aortic surgery
• Aortic / aortic root dilatation:
  Ao diameter >55 mm
  Ao diameter >50 mm with risk factors

New 2014
Bicuspid aortic valves

Indications for aortic surgery

• Aortic / aortic root dilatation:
  Ao diameter >55 mm  class I
  Ao diameter >50 mm with risk factors  class IIa
  Rate of increase  class IIa
Bicuspid aortic valves

Indications for aortic surgery

• Aortic / aortic root dilatation:
  Ao diameter >55 mm  
  Ao diameter >50 mm with risk factors
  Rate of increase

• Patients with criteria for AVR:
  Ao diameter >45 mm  

class I

class IIa

class IIa

class IIa
### Bicuspid Aortic Valves

#### Indications for Aortic Surgery

- **Aortic / Aortic Root Dilatation:**
  - Ao diameter >55 mm
  - Ao diameter >50 mm with risk factors
  - Rate of increase

- **Patients with Criteria for AVR:**
  - Ao diameter >45 mm

<table>
<thead>
<tr>
<th>Class I</th>
<th>Class Ila</th>
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<tbody>
<tr>
<td><strong>Aortic / Aortic Root Dilatation:</strong></td>
<td></td>
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<tr>
<td>Ao diameter &gt;55 mm</td>
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<tr>
<td>Ao diameter &gt;50 mm with risk factors</td>
<td></td>
</tr>
<tr>
<td>Rate of increase</td>
<td></td>
</tr>
<tr>
<td><strong>Patients with Criteria for AVR:</strong></td>
<td></td>
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<tr>
<td>Ao diameter &gt;45 mm</td>
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</table>
Bicuspid aortic valves

Indications for aortic surgery

- Aortic / aortic root dilatation:
  - Ao diameter $>55$ mm  [class I]
  - Ao diameter $>50$ mm with risk factors  [class IIa]

Rate of increase

- Patients with criteria for AVR:
  - Ao diameter $>45$ mm  [class IIa]

≥5 mm/yr  [class IIa]
>2 mm/yr  [class IIa]
Bicuspid aortic valves

Indications for aortic surgery

• Aortic / aortic root dilatation:
  2008 valve disease GL
  2012 thoracic aortic GL
  2014 valve disease GL

50 mm

50 mm

55 mm
Surgery for Aortic Dilatation in Patients With Bicuspid Aortic Valves

A Statement of Clarification From the American College of Cardiology/American Heart Association Task Force on Clinical Practice Guidelines

2010 ACCF/AHA/ACR/ASA/SCA/SCAI/STS/SVM Guidelines for the Diagnosis and Management of Patients with Thoracic Aortic Disease

Loren F. Hiratzka, MD, FACC, FAHA, Chair
Mark A. Creager, MD, FACC, FAHA
Eric M. Isselbacher, MD, FACC
Lars G. Svensson, MD, PhD, FACC

2014 AHA/ACC Guidelines for the Management of Patients with Valvular Heart Disease

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Thoralf M. Sundt III, MD, FACC, FAHA
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- Selection of a valve prosthesis?
Aortic regurgitation

Indications for valve replacement

- Symptomatic patients

class I  class I
Aortic regurgitation

Indications for valve replacement

- Symptomatic patients
  - class I
- LV systolic dysfunction
  - class I
Aortic regurgitation

Indications for valve replacement

- Symptomatic patients
- LV systolic dysfunction
- Patients undergoing CABG
Aortic regurgitation

Indications for valve replacement

- Symptomatic patients
- LV systolic dysfunction
- Patients undergoing CABG
- Severe LV dilatation
Aortic regurgitation

Indications for valve replacement

- Symptomatic patients
- LV systolic dysfunction
- Patients undergoing CABG
- Severe LV dilatation

LVSD >50 mm
Aortic regurgitation

Indications for valve replacement

• Symptomatic patients  
  class I  
  class I

• LV systolic dysfunction  
  class I  
  class I

• Patients undergoing CABG  
  class I  
  class I

• Severe LV dilatation  
  class IIa  
  class IIa

LVSD >50 mm  
New 2014
Aortic regurgitation

Indications for valve replacement

- Symptomatic patients
- LV systolic dysfunction
- Patients undergoing CABG
- Severe LV dilatation
- Progressive LV dilatation, low risk for surgery

LVSD >50 mm
Indications for valve replacement

- Symptomatic patients
- LV systolic dysfunction
- Patients undergoing CABG
- Severe LV dilatation
- Progressive LV dilatation, low risk for surgery

LVSD >50 mm
LVDD >65 mm
LVDD >70 mm
**Aortic regurgitation**

Indications for valve replacement

- Symptomatic patients
  
  class I

- LV systolic dysfunction
  
  class I

- Patients undergoing CABG
  
  class I

- Severe LV dilatation
  
  class IIa

- Progressive LV dilatation, low risk for surgery
  
  class IIb

LVSD >50 mm

LVDD >65 mm

LVDD >70 mm

New 2014
Aortic Regurgitation

The 5 most controversial recommendations:

- Evidence-based recommendations?
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Aortic Regurgitation
Cardiac Events Based on Severity of AR

from Detaint et al. *J Am Coll Cardiol Img* 2008;1:1-11
Average hospital mortality:
- Low volume centers: 13.0%
- High volume centers: 6.0%

Data from national Medicare database 1994-1999

684 hospitals
142,488 AVRs

From Detaint et al. *J Am Coll Cardiol Img* 2008;1:1-11
Aortic Regurgitation
Cardiac Events Based on Severity of AR

![Graph showing survival rates for mild, moderate, and severe aortic regurgitation](image)

- **Mild AR**: 92% survival
- **Moderate AR**: 75% survival
- **Severe AR**: 69% survival

<table>
<thead>
<tr>
<th>Severity</th>
<th>RVol (ml)</th>
<th>ERO (mm²)</th>
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</thead>
<tbody>
<tr>
<td>Mild AR</td>
<td>&lt;30</td>
<td>&lt;10</td>
</tr>
<tr>
<td>Moderate AR</td>
<td>30-59</td>
<td>11-30</td>
</tr>
<tr>
<td>Severe AR</td>
<td>≥60</td>
<td>≥30</td>
</tr>
</tbody>
</table>

from Detaint et al. *J Am Coll Cardiol Img* 2008;1:1-11
Prospective Validation of the Prognostic Usefulness of B-Type Natriuretic Peptide in Asymptomatic Patients With Chronic Severe Aortic Regurgitation

Rodolfo Pizarro, MD, Oscar O. Bazzino, MD, Pablo F. Oberti, MD, Mariano L. Falconi, MD, Aníbal M. Arias, MD, Juan G. Krauss, MD, Arturo M. Cagide, MD

Buenos Aires, Argentina

J Am Coll Cardiol 2011; 58:1705-14

Multivariate analysis:
Predictors of cardiac events

<table>
<thead>
<tr>
<th>Predictor</th>
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<th>p-value</th>
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<tbody>
<tr>
<td>BNP</td>
<td>6.9</td>
<td>0.0001</td>
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<tr>
<td>ERO</td>
<td>3.4</td>
<td>0.001</td>
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<tr>
<td>LVESD</td>
<td>4.3</td>
<td>0.01</td>
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<tr>
<td>LVEDD</td>
<td>2.1</td>
<td>0.09</td>
</tr>
</tbody>
</table>
Imaging

Aortic Regurgitation Quantification Using Cardiovascular Magnetic Resonance Association With Clinical Outcome

Saul G. Myerson, MBChB, MD, MRCP, FESC; Joanna d’Arcy, MBChB, MRCP; Raad Mohiaddin, PhD, FRCR, FRCP, FESC; John P. Greenwood, MBChB, PhD; Theodoros D. Karamitsos, MD, PhD; Jane M. Francis, DCR(R), DNM; Adrian P. Banning, MBBS, MD, FRCP, FESC; Jonathan P. Christiansen, MBChB, MD, FRACP, FACC, FCSANZ; Stefan Neubauer, MD, FRCP, FACC, FMedSci

_Circulation. 2012;126:1452-1460_
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_Circulation, 2012;126;1452-1460_

<table>
<thead>
<tr>
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<th>Univariate</th>
<th>Multivariable</th>
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<tbody>
<tr>
<td></td>
<td>HR</td>
<td>B-Exp</td>
</tr>
<tr>
<td>Regurgitant fraction</td>
<td>16.0</td>
<td>6.7 – 38.3</td>
</tr>
<tr>
<td>Regurgitant volume</td>
<td>13.2</td>
<td>3.8 – 45.8</td>
</tr>
<tr>
<td>LVEDV</td>
<td>16.3</td>
<td>5.8 – 45.9</td>
</tr>
<tr>
<td>LVESV</td>
<td>7.0</td>
<td>3.2 – 15.3</td>
</tr>
<tr>
<td>LV mass</td>
<td>3.2</td>
<td>1.6 – 6.5</td>
</tr>
</tbody>
</table>
Aortic Regurgitation

The 5 most controversial recommendations:

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- LV volume assessment: M-mode vs 3D?
- Selection of a valve prosthesis?
Choice of valve intervention and prosthetic valve type should be a shared decision process

Bioprosthesis recommended in patients of any age for whom anticoagulation is contraindicated, cannot be managed or is not desired

Mechanical prosthesis reasonable in pts ≤60 yrs who do not have contraindication for anticoagulation

Bioprosthesis reasonable in pts >70 yrs

Either bioprosthetic or mechanical valve reasonable in pts between 60 yrs and 70 yrs

Ross procedure, when performed by an experienced surgeon, may be considered in young pts when anticoagulation contraindicated or undesirable

Northwestern Medicine
Aortic regurgitation: Have the guidelines filled the gap?
Aortic Regurgitation
Long-Term Survival After AVR

Survival (percent)

Time (years)

Guidelines +
Group A
n=60

Guidelines -
Group B
n=110

p<0.01

Tornos et al J Am Coll Cardiol 2006;26:1309-1313