A Surgeon’s Perspective —
Guidelines for the Management of Patients with
Valvular Heart Disease

Adapted from the
2006 ACC/AHA Guideline Revision

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Introduction

An updated version of the “ACC/AHA Guidelines for the Management of Patients with Valvular Heart Disease” was published in 2006. In general, guidelines typically follow a philosophy of “evidence-based medicine” which result in a set of streamlined criteria that help the physician with patient management decisions in his daily clinical practice.

From a cultural point of view, any revision or update of practice guidelines is an opportunity to verify and update diagnostic and therapeutic patient management protocols followed in each department. Nevertheless, direct references to the full-text of the 2006 ACC/AHA Revision can be quite demanding, time-consuming, and could result in controversial interpretations.

To overcome these drawbacks, the author has interpreted the recently published practice guidelines into a set of seven, easy-to-read flow charts for surgical management of the most commonly acquired heart valve diseases in the adult. In each chart, decision criteria were adapted from the full-text of the 2006 ACC/AHA Guidelines and were arranged into a simple, step-by-step decision tree. Special emphasis was given to the quantitative aspects of the Guidelines to improve user-friendliness of the data. In addition to the set of flow charts, this adaptation also includes a definition on the classification categories, as well as the surgical management recommendations for heart valve diseases in the adult.

It is my sincere hope that my colleagues involved in the care and management of patients with valvular disease will benefit from this work and that this adaptation will help to improve and facilitate daily clinical decision-making processes, which will help patients benefit from the advancements in the current scientific bodies of evidence related to the treatment of valvular heart disease.

Prof. Pino Fundarò, MD
## Classification of Recommendations

<table>
<thead>
<tr>
<th>Class</th>
<th>Treatment</th>
<th>Recommendation</th>
<th>Additional Information</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Class I</strong></td>
<td>SHOULD be performed.</td>
<td>procedure or treatment is useful and effective.</td>
<td>No additional studies needed.</td>
</tr>
<tr>
<td><strong>Class IIa</strong></td>
<td>REASONABLE to be performed.</td>
<td>in favor of procedure or treatment being useful and effective.</td>
<td>Additional studies with focused objectives needed.</td>
</tr>
<tr>
<td><strong>Class IIb</strong></td>
<td>MAY BE CONSIDERED.</td>
<td>usefulness and efficacy less well established.</td>
<td>Additional studies with broad objectives needed; additional registry data would be helpful.</td>
</tr>
<tr>
<td><strong>Class III</strong></td>
<td>SHOULD NOT be performed.</td>
<td>procedure or treatment is not useful and effective and may be harmful.</td>
<td>No additional studies needed.</td>
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<tr>
<td>Abbreviation</td>
<td>Description</td>
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<tr>
<td>AF</td>
<td>Atrial Fibrillation</td>
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<tr>
<td>AS</td>
<td>Aortic Stenosis</td>
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<td></td>
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<tr>
<td>AV</td>
<td>Aortic Valve</td>
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<td></td>
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<tr>
<td>AVA</td>
<td>Aortic Valve Area</td>
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<tr>
<td>AVR</td>
<td>Aortic Valve Replacement</td>
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<tr>
<td>CABG</td>
<td>Coronary Artery Bypass Graft Surgery</td>
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<tr>
<td>EDD</td>
<td>End-Diastolic Dimension</td>
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<tr>
<td>EF</td>
<td>Ejection Fraction</td>
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<tr>
<td>ESD</td>
<td>End-Systolic Dimension</td>
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<tr>
<td>LV</td>
<td>Left Ventricular</td>
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<tr>
<td>MR</td>
<td>Mitral Regurgitation</td>
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<tr>
<td>MV</td>
<td>Mitral Valve</td>
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<tr>
<td>MVA</td>
<td>Mitral Valve Area</td>
<td></td>
<td></td>
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<tr>
<td>NYHA</td>
<td>New York Heart Association</td>
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<td>PASP</td>
<td>Pulmonary Artery Systolic Pressure</td>
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<td>PMBV</td>
<td>Percutaneous Mitral Balloon Valvotomy</td>
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<tr>
<td>RF</td>
<td>Regurgitant Fraction</td>
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<tr>
<td>ROA</td>
<td>Regurgitant Orifice Area</td>
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<tr>
<td>RV</td>
<td>Regurgitant Volume</td>
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<td>TR</td>
<td>Tricuspid Regurgitation</td>
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<tr>
<td>TV</td>
<td>Tricuspid Valve</td>
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<tr>
<td>Vmax</td>
<td>Maximal Doppler Velocity Across Aortic Valve</td>
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</table>
Aortic Stenosis

**Mild**
- Vmax < 3 m/s
- AVA > 1.5 cm²
- Mean Gradient < 25 mmHg

**Moderate**
- Vmax < 4 m/s
- AVA = 1 - 1.5 cm²
- Mean Gradient = 25 - 40 mmHg

**Severe**
- Vmax > 4 m/s
- AVA < 1 cm²
- Mean Gradient > 40 mmHg

**Likelihood of rapid progression**
- Undergoing CABG or surgery on the aorta or other heart valves

**Symptoms?**
- Yes
- Undergoing CABG
- Expected op. mortality ≤ 1%
- Class I

- No
- Undergoing CABG or surgery on the aorta or other heart valves
- LV systolic dysfunction
- LV EF < 0.5
- Extremely severe AS
- LV systolic dysfunction
- LV EF < 0.5
- Extremely severe AS

**Exercise test abnormal**
- LV systolic dysfunction
- LV EF < 0.5
- Extremely severe AS

**Aortic Valve Replacement**
- Class I
- Class IIa
- Class IIb
- Class III

<table>
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<tr>
<th>Mild</th>
<th>Moderate</th>
<th>Severe</th>
</tr>
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<tbody>
<tr>
<td>Vmax &lt; 3 m/s</td>
<td>Vmax &lt; 4 m/s</td>
<td>Vmax &gt; 4 m/s</td>
</tr>
<tr>
<td>AVA &gt; 1.5 cm²</td>
<td>AVA = 1 - 1.5 cm²</td>
<td>AVA &lt; 1 cm²</td>
</tr>
<tr>
<td>Mean Gradient &lt; 25 mmHg</td>
<td>Mean Gradient = 25 - 40 mmHg</td>
<td>Mean Gradient &gt; 40 mmHg</td>
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**Symptoms?**
- Yes
- Undergoing CABG
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- No
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**Exercise test abnormal**
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**Aortic Valve Replacement**
- Class I
- Class IIa
- Class IIb
- Class III
Aortic Stenosis Considerations

Class III

AVR is not useful for the prevention of sudden death in asymptomatic patients with AS who have none of the findings listed under the class IIa/IIb recommendations.
Mitral Stenosis

- **Severe**
  - MVA < 1 cm²
  - Mean Gradient > 10 mmHg
  - PASP > 50 mmHg
  - Symptoms?
    - Yes: NYHA III - IV
    - No: NYHA I - II
  - NYHA III - IV
  - PMBV possible?
    - Yes: Mitral Valve Replacement
    - No: Mitral Valve Repair

- **Moderate**
  - MVA = 1 - 1.5 cm²
  - Mean Gradient = 5 - 10 mmHg
  - PASP = 30 - 50 mmHg
  - Symptoms?
    - Yes: MV repair possible?
      - Yes: Mitral Valve Replacement
      - No: Mitral Valve Repair
    - No: Follow-up

- Recurrent embolic events
  - Yes: MV repair possible?
    - Yes: Mitral Valve Replacement
    - No: Mitral Valve Repair
  - No: Follow-up

- Moderate or Severe MR
  - Yes: MV repair possible?
    - Yes: Mitral Valve Replacement
    - No: Mitral Valve Repair
  - No: Follow-up

- **Follow-up**
  - Class I
  - Class IIa
  - Class IIb

- Mitral Valve Replacement
  - Yes: MV repair possible?
    - Yes: Mitral Valve Replacement
    - No: Mitral Valve Repair
  - No: Follow-up

- Mitral Valve Repair
  - Yes: MV repair possible?
    - Yes: Mitral Valve Replacement
    - No: Mitral Valve Repair
  - No: Follow-up

- PMBV possible?
  - Yes: Mitral Valve Replacement
  - No: Mitral Valve Repair

- PMBV
  - Yes: Mitral Valve Replacement
  - No: Mitral Valve Repair

- MV repair possible?
  - Yes: Mitral Valve Replacement
  - No: Mitral Valve Repair

- Mitral Valve Replacement
  - Yes: MV repair possible?
    - Yes: Mitral Valve Replacement
    - No: Mitral Valve Repair
  - No: Follow-up

- Mitral Valve Repair
  - Yes: MV repair possible?
    - Yes: Mitral Valve Replacement
    - No: Mitral Valve Repair
  - No: Follow-up
Mitral Stenosis Considerations

Class III

1. MV repair for MS is not indicated for patients with mild MS.

2. Closed commissurotomy should not be performed in patients undergoing MV repair; open commissurotomy is the preferred approach.
Aortic Regurgitation Considerations

Class III

AV replacement/repair is not indicated for asymptomatic patients with mild, moderate, or severe AR and normal LV systolic function at rest (EF > 0.5) when degree of dilatation is not moderate or severe (EDD < 50 mm).

NOTES:
(*) AV repair should be considered only in those surgical centers that have developed the appropriate technical expertise, gained experience in patient selection, and demonstrated outcomes equivalent to those of valve replacement. The indications for valve replacement and repair do not differ.
Mitral Regurgitation

Mitral Valve Repair

Mitral Valve Replacement

Symptoms? Yes

NYHA II

EF > 0.6 and/or ESD < 40 mm

Pulmonary hypertension

MV repair possible?

Yes

Class I

No

Class Ia

Mitral Valve Replacement

Symptoms? No

NYHA III-IV

EF < 0.3 and/or ESD > 55 mm

Severe LV systolic dysfunction

Secondary MR

Yes

Class Ib

MV repair possible?

No

Class Ia

No

New onset AF

Likelihood of successful repair with no residual MR > 90%

MV repair possible?

Yes

Class I

No

Class I

PASP > 50 mmHg at rest or PASP > 60 mmHg with exercise

Preserved LV systolic function

EF > 0.6 and/or ESD < 40 mm

Mitral Valve Replacement

Mild to moderate LV systolic dysfunction

EF = 0.3 - 0.6 and/or ESD ≥ 40 mm

Mitral Valve Repair

EF < 0.3

Severe LV systolic dysfunction

Primary MR

No severe LV systolic dysfunction

No

EF < 0.3

Pulmonary hypertension

MV repair possible?

Yes

Class I

No

Class Ia

Severe RV ≥ 60 ml/b

RF ≥ 50%

ROA ≥ 0.4 cm

Mitral Regurgitation

Acute

Chronic

Symptoms?

Yes

NYHA II

EF > 0.6 and/or ESD < 40 mm

Pulmonary hypertension

MV repair possible?

Yes

Class I

No

Class Ia

New onset AF

Likelihood of successful repair with no residual MR > 90%

MV repair possible?

Yes

Class I

EF < 0.3

Severe LV systolic dysfunction

Primary MR

No severe LV systolic dysfunction

No

EF < 0.3

Pulmonary hypertension

MV repair possible?

Yes

Class I

No

Class Ia

No

Yes

Yes

Yes

Yes

MV repair possible?
Mitral Regurgitation Considerations

**Class I**

MV repair is recommended over MV replacement in the majority of patients with severe chronic MR who require surgery, and patients should be referred to surgical centers experienced in MV repair.

**Class III**

1. Mitral surgery is not indicated for asymptomatic patients with MR and preserved LV function (EF > 0.6 and ESD < 40 mm) in whom significant doubt about the feasibility of repair exists.

2. Isolated MV surgery is not indicated for patients with mild or moderate MR.
Tricuspid Regurgitation

Moderate
Vena contracta width ≤ 0.7 cm
Systolic flow normal in hepatic veins

Undergoing MV surgery

Pulmonary hypertension or Tricuspid annular dilatation

Severe
Vena contracta width > 0.7 cm
Systolic flow reversal in hepatic veins

Symptoms:

Yes

Diseased/Abnormal TV leaflets (*)

Normal TV leaflets (**)

TV repair possible?

No

Yes

Tricuspid Valve Replacement

Class IIa

Tricuspid Valve Repair

Class IIb

Class I

MV disease requiring surgery

Normal TV leaflets (**)

TV repair possible?

Yes

No

Class IIa
Class III

1. Tricuspid valve replacement or annuloplasty is not indicated in asymptomatic patients with TR whose PASP < 60 mmHg in the presence of normal MV.

2. Tricuspid valve replacement or annuloplasty is not indicated in patients with mild primary TR.

NOTES:
(*) "Secondary" in the original text.
(**) "Primary" in the original text.
Aortic Valve Prosthesis Selection

- Mitral or Tricuspid mechanical valve
- Age < 65
- Warfarin not contraindicated
- Preference for lifestyle considerations
- No risk factors for thromboembolism
- Woman of childbearing age
- Warfarin refused or contraindicated

Class I

- Mechanical Valve
- Class Ia
- Class Ib

Class IIa

- Biological Valve
- Class Ia
- Class Ib

Class Ia
Aortic Valve Prosthesis Selection Considerations

Class IIa

A bioprosthesis is reasonable for AVR in patients under 65 years of age who elect to receive this valve for lifestyle considerations after detailed discussions of the risks of anticoagulation versus the likelihood that a second AVR may be necessary in the future.

NOTES:
- Stented pericardial heterografts have better hemodynamic performance than porcine heterografts, especially in smaller sizes (less than 21 mm).
- In a randomized trial comparing stented porcine xenografts and stented pericardial valves, the reduced pressure gradients with the pericardial valve translated into greater reduction in LV mass at a mean 1.2 year follow-up period after AVR.
- Bovine pericardial valves appear to have a lower rate of structural valve deterioration, with 15 year data indicating that 77% of valves in surviving patients of all ages are functioning without explantation, and among patients undergoing primary AVR at any age > 65 years, fewer than 10% underwent valve explantation by 15 postoperative years.
Mitral Valve Prosthesis Selection

Age < 65
- Long-standing AF (Class Ia)
- Sinus rhythm (Class IIa)

Age ≥ 65
- Preference for lifestyle considerations (Class Ia)
- Warfarin refused or contraindicated (Class I)

Mechanical Valve

Biological Valve
Class IIa

A bioprosthesis is reasonable for MV replacement in patients under 65 years of age in sinus rhythm who elect to receive this valve for lifestyle considerations after detailed discussions of the risks of anticoagulation versus the likelihood that a second MV replacement may be necessary in the future.
REFERENCES