Les valvulopathies en sourdine: la valve mitrale
Quoi faire devant une régurgitation mitrale sévère asymptomatique de type dégénérative?

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Introduction

- Mitral regurgitation is the second most frequent valve disease after Aortic stenosis (prevalence of 2-3% of noteworthy regurgitation in the general population)
- **Organic or dystrophic MR**
  - also called degenerative (FED) or myxomatous (Barlow) MVD is the most common aetiology in Europe requiring surgery
- Evaluations of natural history and results of interventions raise the question of the optimal timing of intervention
The Pathophysiological Stages of MR

A. Normal
- EDV = 120
- ESV = 50
- LAP = 10
- TSV = 70
- FSV = 70
- EF = .58
- RSV = 0

B. Acute MR
- EDV = 120
- ESV = 40
- LAP = 25
- TSV = 100
- FSV = 50
- EF = .72
- RSV = 50

C. Chronic compensated MR
- EDV = 200
- ESV = 60
- LAP = 15
- TSV = 140
- FSV = 70
- EF = .70
- RSV = 70

D. Chronic decompensated MR
- EDV = 220
- ESV = 100
- LAP = 25
- TSV = 120
- FSV = 60
- EF = .55
- RSV = 60

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Clinical Manifestations

- Even with severe MR, most patients remain asymptomatic until there is left ventricular failure, pulmonary hypertension, or the onset of atrial fibrillation.

- Most common symptoms
  - Exertional dyspnea and fatigue due to decreased forward cardiac output and increase in LA pressure.
  - Intermittent or persistent AF.
Evaluation

• Importance of identifying the transition from asymptomatic to symptomatic MR in determining the timing of mitral valve surgery, a careful history is important to establish a good estimate of baseline exercise tolerance !!!

• In some cases, irreversible left ventricular dysfunction occurs in the absence of symptoms !!!
Carpentier classification according to different mechanisms

- **I**: normal leaflet mobility (e.g. perforation, congenital defect, pure annular dilation)
- **II**: exaggerated leaflet mobility (e.g. prolapse)
- **III (a/b)**: restricted leaflet mobility (e.g. rheumatic or chronic ischemic disease)
Etiologic Classification of degenerative mitral Valve Disease

Etiologic Classification of degenerative mitral Valve Disease

• **Barlow’s Disease**
  - Myxoid infiltration; Young (<60 years)
  - Long history
  - Sometimes familial history; Marfanoid features
  - Echo: bulky, **billowing leaflets, multi-segmental prolapse**
  - Surgery: **Excess tissue**, thickened leaflets, thick or thin chordae, chordal elongation/rupture, calcifications...
  - **Repair: more complex**

Barlow’s disease - 3DTEE

En face surgical view. Barlow. Bi-leaflet prolapse
Etiologic Classification of degenerative mitral Valve Disease

- **Fibroelastic Deficiency**
  - Impaired production of connective tissue
  - Older (60+ years); Short history
  - Echo: thin leaflets, prolapse of single segment, ruptured chord(s)
  - Surgery: Thin leaflets, excess tissue if present limited to prolapsing segment
  - **Repair: less complex**
Natural history of patients with severe chronic mitral regurgitation

- Data from **observational** studies

- Symptoms, age, atrial fibrillation, degree of MR (particularly ERO), LA dilatation, LV dilatation, low EF and progressive PH are **predictors of poor outcome**
Outcome in MR due to Flail Leaflet: Multicenter European Experience

Long-Term Outcome of Mitral Regurgitation Due to Flail Leaflet Under Medical Treatment

High Morbidity!

4 European centers. MIDA Investigators

Grigioni F et al. JACC Imaging 2008;1:142-4
Long-term survival with medical treatment in flail mitral leaflet according to symptoms and EF


Mayo Clinic. Retrospective study  
N=229

Early surgery for flail mitral leaflet improves outcome

Flail Leaflet and Sudden Death

Overall 1.8% per year (25% of deaths)

Data Mayo Clinic

Grigioni F et al. JACC 1999;34:2078-85
Postoperative outcome in severe organic MR


Tribouilloy et al et al. Circulation 1999;99:400-405
Postoperative outcome in severe organic MR

In asymptomatic or minimal symptomatic patients observed and expected survival showed identical curves


Tribouilloy et al et al. Circulation 1999;99:400-405
Operative Mortality in asymptomatic severe organic MR is low in highly experienced centers

Operative mortality in class I/II was extremely low for patients who had valve repair (0.6%) or were <75 years (0%) or did not require CABG (0%) whether valve repair or replacement was performed

It may be reasonable to consider surgery at the asymptomatic stage in selected patients

Tribouilloy et al et al. Circulation 1999;99:400-405
Operative risk

- Age and co-morbidities:
  http://www.euroscore.org/calc.html
Is the patient really asymptomatic?
Asymptomatic MR: reduced functional capacity by VO2 in 19%

Clinical outcome after cardiopulmonary exercise testing

Cardiopulmonary exercise testing in 134 asymptomatic patients with organic severe MR

Prospective study conservative management

Messika-Zeitoun et al. JACC 2006;47:2571-7
Asymptomatic severe organic mitral regurgitation

Factors affecting the decision to operate on the patient with MR

- Severity of MR
- Hemodynamic effects of MR on LV, LA and RV
- Feasibility of surgical repair
- Operative risk to the patient
Controversy: Benefits versus risks of surgery in patients with asymptomatic severe MR

<table>
<thead>
<tr>
<th>Benefits</th>
<th>Risks</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) Increased morbidity and mortality if surgery deferred until symptoms develop or LV dysfunction occurs</td>
<td>(1) En real life 1–2% operative mortality (even in low risk patients)</td>
</tr>
<tr>
<td>(2) High success rate of MV repair in experienced centers</td>
<td>(2) Not all valves are repairable</td>
</tr>
<tr>
<td></td>
<td>(3) Comorbidities in elderly patients</td>
</tr>
<tr>
<td></td>
<td>(4) Non-trivial recurrence of MR post-repair</td>
</tr>
</tbody>
</table>
Indications for Surgery in really asymptomatic Organic MR

- Operative risk (age, co-morbidities...)
- Degree of MR
- Reparability
- Left ventricular function
- Left atrial volume
- Pulmonary artery pressure
- Atrial fibrillation

Role of echocardiography
Evaluation: echocardiography

- Echocardiography is essential for establishing the etiology and hemodynamic consequences of mitral regurgitation.
- Echocardiography is the principal examination and must include an assessment of severity, mechanisms and reparability.
- Transthoracic imaging is diagnostic in most cases.
New EAE recommendations: assessment of valvular regurgitation

Is MR really severe?

Estimation of the severity of valvular regurgitation: recommendations

1. The colour flow area of the regurgitant jet is not recommended to quantify the severity of valvular regurgitation.

2. Both the vena contracta measurement and the PISA method are the recommended approaches to evaluate the severity of regurgitation when feasible.

3. Adjunctive parameters should be used when there is discordance between the quantified degree of regurgitation and the clinical context.

Criteria for the definition of severe valve regurgitation

**Multiparametric approach!**

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Mild</th>
<th>Moderate</th>
<th>Severe</th>
</tr>
</thead>
<tbody>
<tr>
<td>Qualitative</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MV morphology</td>
<td>Normal/Abnormal</td>
<td>Normal/Abnormal</td>
<td>Flail leaflet/Ruptured PMs</td>
</tr>
<tr>
<td>Colour flow MR jet</td>
<td>Small, central</td>
<td>Intermediate</td>
<td>Very large central jet or eccentric jet adhering, swirling and reaching the posterior wall of the LA</td>
</tr>
<tr>
<td>Flow convergence zone</td>
<td>No or small</td>
<td>Intermediate</td>
<td>Large</td>
</tr>
<tr>
<td>CW signal of MR jet</td>
<td>Faint/Parabolic</td>
<td>Dense/Parabolic</td>
<td>Dense/Triangular</td>
</tr>
<tr>
<td>Semi-quantitative</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>VC width (mm)</td>
<td>&lt;3</td>
<td>Intermediate</td>
<td>≥ 7 (&gt;8 for biplane)</td>
</tr>
<tr>
<td>Pulmonary vein flow</td>
<td>Systolic dominance</td>
<td>Systolic blunting</td>
<td>Systolic flow reversal</td>
</tr>
<tr>
<td>Mitral inflow</td>
<td>A wave dominant</td>
<td>Variable</td>
<td>E wave dominant (&gt;1.5 cm/s)</td>
</tr>
<tr>
<td>TVI mit / TVI Ao</td>
<td>&lt;1</td>
<td>Intermediate</td>
<td>&gt;1.4</td>
</tr>
<tr>
<td>Quantitative</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EROA (mm²)</td>
<td>&lt;20</td>
<td>20–29; 30–39</td>
<td>≥ 40</td>
</tr>
<tr>
<td>R Vol (mL)</td>
<td>&lt;30</td>
<td>30–44; 45–59</td>
<td>≥ 60</td>
</tr>
<tr>
<td>+ LV and LA size and the systolic pulmonary pressure</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Criteria for the definition of severe valve regurgitation

- Specific signs of severe regurgitation
- Supportive signs
- Quantitative parameters
Criteria for the definition of severe valve regurgitation

• **Specific signs**
  – Vena contracta width ≥ 7mm
  – Large central jet (area >40% of LA or with a wall impinging jet of any size, swirling in LA
  – Large flow convergence
  – Systolic reversal in pulmonary veins
  – Prominent flail MV or ruptured papillary muscle
Criteria for the definition of severe valve regurgitation

- **Supportive signs**
  - Dense, triangular CW-doppler MR jet
  - E-wave dominant mitral inflow \((E>1.2\, \text{m/s})\)
  - **Enlarged LV and LA size** (particularly when normal LV function is present)
Criteria for the definition of severe valve regurgitation

- **Quantitative parameters**
  - A regurgitant volume ≥ 60 mL
  - A regurgitant fraction ≥ 50 percent
  - A regurgitant orifice area ≥ 0.40 cm²
Quantification of valvular regurgitation
PISA Method

Aliasing line

\[ V_A = 40 \text{ cm/sec} \]

Area = \( 2 \pi r^2 \)
Flow = Area \( \times V_A \)
ERO = Flow / \( V_{MAX} \)
RV = ERO \( \times TVI \)

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Criteria for the definition of severe valve regurgitation

- Assessment of severity should not rely on one single parameter, but requires an approach integrating Doppler and morphologic information!!

- Regardless of echo-Doppler grading, severe chronic MR does not exist (with rare exceptions) without clear evidence of left atrial or left ventricular enlargement!!
Value of Echocardiography in prediction of etiology

- Echography in surgical mitral insufficiency
  Cormier et al, Arch Mal Coeur Vaiss. 1990; 83(3):345-50

- **TTE overall sensitivity for etiology 86%**
  (100% in rheumatic disease, 86% in degenerative or dystrophic disease, 44% in endocarditis, 87% in ischemic dysfunction)

- Advantage for TEE: abscess, vegetation, chordae rupture

- Type of surgery predicted by echo in 87%
Echocardiographic assessment of etiology and mechanism

Echocardiographic assessment of etiology and mechanism

New EAE recommendations: assessment of valvular regurgitation

Valve assessment: recommendations

1. TTE is recommended as the first-line imaging modality in valvular regurgitation.
2. TEE is advocated when TTE is of non-diagnostic value or when further diagnostic refinement is required.
3. 3D TEE or TTE is reasonable to provide additional information in patients with complex valve lesion.
4. TEE is not indicated in patients with a good-quality TTE except in the operating room when a valve surgery is performed.

Value of Echocardiography in prediction of reparability

**Table 1** Probability of successful mitral valve repair in organic mitral regurgitation based on echo findings

<table>
<thead>
<tr>
<th>Aetiology</th>
<th>Dysfunction</th>
<th>Calcification</th>
<th>Mitral annulus dilatation</th>
<th>Probability of repair</th>
</tr>
</thead>
<tbody>
<tr>
<td>Degenerative</td>
<td>II: Localized prolapse (P2 and/or A2)</td>
<td>No/Localized</td>
<td>Mild/Moderate</td>
<td>Feasible</td>
</tr>
<tr>
<td>Ischaemic/Functional</td>
<td>I or IIIa</td>
<td>No</td>
<td>Moderate</td>
<td>Feasible</td>
</tr>
<tr>
<td>Barlow</td>
<td>II: Extensive prolapse (≥ 3 scallops, posterior commissure)</td>
<td>Localized (annulus)</td>
<td>Moderate</td>
<td>Difficult</td>
</tr>
<tr>
<td>Rheumatic</td>
<td>Illa but pliable anterior leaflet</td>
<td>Localized</td>
<td>Moderate</td>
<td>Difficult</td>
</tr>
<tr>
<td>Severe Barlow</td>
<td>II: Extensive prolapse (≥ 3 scallops, anterior commissure)</td>
<td>Extensive (annulus + leaflets)</td>
<td>Severe</td>
<td>Unlikely</td>
</tr>
<tr>
<td>Endocarditis</td>
<td>II: Prolapse but destructive lesions</td>
<td>No</td>
<td>No/Mild</td>
<td>Unlikely</td>
</tr>
<tr>
<td>Rheumatic</td>
<td>Illa but stiff anterior leaflet</td>
<td>Extensive (annulus + leaflets)</td>
<td>Moderate/Severe</td>
<td>Unlikely</td>
</tr>
<tr>
<td>Ischaemic/Functional</td>
<td>IIIb but severe valvular deformation</td>
<td>No</td>
<td>No or Severe</td>
<td>Unlikely</td>
</tr>
</tbody>
</table>

Overall survival for mitral repair vs replacement

Mitral valve repair is better than replacement. MVR should be avoided especially in asymptomatic patients!!

Results of Surgery

- Absence of randomized comparison between replacement and repair
- Repair, when feasible, is the optimal surgical treatment
- Repair has lower perioperative mortality, improved survival, better preservation of postoperative LV function and lower long-term morbidity
- If replacement: chordal preservation!
Results of Surgery

- Best results if preoperative EF > 60% and ESD < 45mm

- Predictors of postoperative outcome after surgery
  - Symptoms
  - Age
  - Preoperative LV function
  - Reparability of the valve
Durability of MV repair. Reoperation after Surgery for MR due to MVP

Data Mayo Clinic

Mothy et al. Circulation 2001;104(suppl I):I1-I7
Durability of MV repair. Reoperation after Surgery for MR due to MVP

Mitral valve repair is durable, however less in Anterior leaflet prolapse

Data Mayo Clinic
Mothy et al. Circulation 2001;104(suppl I):I1-I7
Durability of MV repair. Recurrent MR after MV repair

At 8 years; survival 91%; Free from reoperation 94%

However recurrent severe grade III or IV MR 3.7% per year

European data from Leuven, Belgium
Trends in Mitral Valve Surgery in the United States: Results From The Society of Thoracic Surgeons Adult Cardiac Database

James S. Gammie, MD, Shubin Sheng, PhD, Bartley P. Griffith, MD, Eric D. Peterson, MD, J. Scott Rankin, MD, Sean M. O’Brien, PhD, and James M. Brown, MD

MV Repair Rate for Isolated Primary MR in real life

STS registry
2000-2007
N=58370

69% repaired in 2007

Influence of Age on Outcomes in Patients Undergoing Mitral Valve Replacement

Mortality of Mitral Valve Replacement according to age and risk

STS registry 1997-2000
N=31688

Mitral Valve Repair: Influence of Hospital Procedural Volume

STS registry 2000-2003
N=13614
475 North American centers

Variations in rates of mitral valve repair for degenerative MVD among 46 centres in the UK

Results of Surgery

• Probability of a durable valve repair is of crucial importance

• Degenerative MR due to segmental valve prolapse: low risk of reoperation

• Extensive prolapse, rheumatic lesions, leaflet calcification and extensive annulus calcification: results not consistent even in experienced hands

• Results of repair highly dependent on the experience of the surgeon and the centre
Importance of LV function: preoperative EF

Retrospective Mayo Clinic 1994
N=409
I/II: 32%
III/IV: 68%

Analyse MV: **EF best predictor of late survival**

Importance of LV function: preoperative EF

- I/II: 32%
- III/IV: 68%

Analyse MV: EF best predictor of late survival

Preoperative EF below 60% is associated with significant worse outcome

New EAE recommendations: assessment of valvular regurgitation

LV size and function: recommendations

(1) Quantitative assessment of LV diameters, volumes, and ejection fraction is mandatory.
(2) 2D measurement of LV diameters is strongly advocated if the M-mode line cannot be placed perpendicular to the long axis of the LV.
(3) The 2D-based biplane summation method of disc is the recommended approach for the estimation of LV volumes and ejection fraction.
(4) 3D echo assessment of LV function is reasonable when possible.
(5) Contrast echo is indicated in patients with poor acoustic window.
(6) Qualitative assessment of LV function is not recommended.

LV volume/EF: 3D TTE

Good image quality is a prerequisite for accurate quantification using semiautomatic border detection algorithms.
Importance of LV function: preoperative LV ESD

Propective N=278
Aetiology: rheumatic heart disease
MV replacement

Importance of LV function: preoperative LV ESD

MIDA Study: Mitral Regurgitation International Database

Survival Implication of Left Ventricular End-Systolic Diameter in Mitral Regurgitation Due to Flail Leaflets
A Long-Term Follow-Up Multicenter Study

Christophe Tribouilloy, MD, PhD,* Francesco Grigioni, MD, PhD,† Jean François Avierinos, MD,‡ Andrea Barbieri, MD,§ Dan Rusinaru, MD,* Catherine Szymanski, MD,* Marinella Ferlito, MD,† Laurence Tafanelli, MD,‡ Francesca Bursi, MD,§ Faouzi Trojette, MD,* Angelo Branzi, MD,† Gilbert Habib, MD,‡ Maria G. Modena, MD,§ Maurice Enriquez-Sarano, MD,‖ on behalf of the MIDA Investigators

Amiens and Marseille, France; Bologna and Modena, Italy; and Rochester, Minnesota

Retrospective identification of 739 consecutive patients diagnosed with MR due to flail leaflet
Association Between LVESD and the Risk of Overall Mortality Under Conservative Management

MIDA Study: Mitral Regurgitation International Database

Tribouilloy et al. JACC 2009
Risk Stratification in asymptomatic MR: contractile reserve

Event-free survival in surgically treated CR+ and CR- patients

Post exercise echo

$\Delta EF < 4\%$

Lee R et al. Heart
2005;91:1407-1412
Importance of Left Ventricular Longitudinal Function and Functional Reserve in Patients With Degenerative Mitral Regurgitation: Assessment by Two-Dimensional Speckle Tracking

Patrizio Lancellotti, MD, PhD, Bernard Cosyns, MD, Dimitris Zacharakis, MD,

Global longitudinal strain (GLS) pre-op predictor of postop EF <50%

Rest cut-off: 18.1% Exercise cut-off: 18.5%
Exercise induced changes cut-off: 1.9%

(J Am Soc Echocardiogr 2008;21:1331-1336.)
Risk Stratification in asymptomatic MR: Prognostic impact of LA size

Asymptomatic patients with organic MR in sinus rhythm at baseline, n= 492

Apical biplane area-length method

Le Trouneau T et al, JACC 2010 56:570-8
Risk Stratification in asymptomatic MR: Prognostic impact of LA size

Asymptomatic patients with organic MR in sinus rhythm at baseline, n= 492

In organic MR LA index at diagnosis predicts long-term outcome and should be measured in routine clinical practice for risk-stratification and decision making

Apical biplane area-length method

Le Trouneau T et al, JACC 2010 56:570-8
Risk Stratification in asymptomatic MR

Pulmonary hypertension

Echocardiography predictors and prognostic value of pulmonary artery systolic pressure in chronic organic mitral regurgitation

Le Tourneau et al. Heart 2010;96:1311-1317
Risk Stratification in asymptomatic MR

Pulmonary hypertension

Symptom-free survival according exercise PHT

N=78, at least moderate MR, LVESD <45mm and EF>60%

Risk Stratification in asymptomatic MR

Brain Natriuretic Peptide

N = 269. EF >60%. End point: CHF, LVD or death

Pizarro R et al. JACC 2009;54:1107-9
Asymptomatic Severe Organic MR

Indications of surgery

ACC/AHA 2006 and ESC 2007

• Left Ventricular Dysfunction (class I):
  LVEF <60% or LVESD >40mm (AHA/ACC)
  >45mm (ESC)

• AF and “preserved” LV function (IIa)

• Pulmonary hypertension (class IIa)
  – Systolic PAP >50mm Hg at rest
  – Exercise systolic PAP >60 mmHg (AHA/ACC)
Asymptomatic Severe Organic MR
Difficult and Controversial
Indications of surgery

- Asymptomatic patient
- In Sinus rhythm
- LVEF >60% and LVESD <40mm
- Valve repair feasible
- Truly severe MR
Asymptomatic Severe Organic MR Surgical Indication for patients in SR and normal LV function

• **ACC/AHA 2008: Class IIa** (Evidence B)
  – MV repair is reasonable in experienced surgical centers for chronic severe MR with preserved LV function (EF >0.60 and ESD <40mm) in whom the likelihood of successful repair without residual MR is >90%

• **ESC 2007: Class IIb** (Evidence B)
  – Asymptomatic patients with preserved LV function, high likelihood of valve repair, and low risk for surgery
Outcome of **asymptomatic** severe MR

**Survival – Watchful waiting strategy**

**Surgery**: symptoms, AF, SPAP >50mmHg, EF<60%, ESD >45mm (or 26mm/m²)

Surgery in 35 pts, MV repair in 83%, no operative mortality

EDD 56± 6 mm
ESD 34 ± 5 mm
No quantification of MR

Prospective study: close follow-up in valve clinic

132 asymptomatic patients (MVP or flail leaflet)

Rosenhek, R. et al. Circulation 2006;113:2238-2244
Outcome of **asymptomatic** severe MR

**Survival – poor outcome with waiting**

Kaplan-Meier Estimates of the Mean (±SE) Rates of Overall Survival among Patients with Asymptomatic Mitral Regurgitation under Medical Management, According to the Effective Regurgitant Orifice (ERO)

- **456 patients** enrolled prospectively
- Patients managed by their individual physicians

N=456; EF >50%

Outcome of asymptomatic severe MR

Survival – early surgery is better

Comparison of event-free survival rates between the operated (OP) and conventional treatment (CONV) groups in propensity-matched pairs

Prospective study

Average ERO >0.88 cm²

Early surgery in 161

447 asymptomatic patients (average 50 years)

Early surgery: within 6 months of initial echocardiography

## Asymptomatic severe MR

<table>
<thead>
<tr>
<th>Study</th>
<th>Year</th>
<th>n</th>
<th>Age (Years)</th>
<th>LVESD (mm)</th>
<th>LVEDD (mm)</th>
<th>EF</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sarano (Mayo clinic)</td>
<td>2005</td>
<td>198</td>
<td>61±14</td>
<td>37±6</td>
<td>61±6</td>
<td>≥50%</td>
</tr>
<tr>
<td>Kang (Seoul)</td>
<td>2009</td>
<td>286</td>
<td>51±15</td>
<td>35±4</td>
<td>57±6</td>
<td>≥60%</td>
</tr>
<tr>
<td>Rosenhekek (Vienna)</td>
<td>2006</td>
<td>132</td>
<td>55±15</td>
<td>34±5</td>
<td>56±6</td>
<td>≥60%</td>
</tr>
</tbody>
</table>
Indications of early surgery in Asymptomatic Severe Organic MR for Pts in SR with EF>60% and LVESD <40mm

- Truly severe MR (ERO>40mm²; RV >60ml)
- Very high likelihood of repair (P2, echo data..)
- Age <75 years
- Low comorbidity and operative risk (<2%; Euroscore)
- Surgeon and Patient

Class IIa ACC/AHA
Class IIb ESC

Adapted from C. Tribouilloy. Congrès international d’échocardiographie. Paris juin 2011
Indications of early surgery in Asymptomatic Severe Classes

- Truly severe MR (ERO >40mm²; RV >60ml)
- Very high likelihood of repair (P2, echo data...)
- Age <75 years
- Low comorbidity and operative risk (<2%; Euroscore)
- Surgeon and Patient

Class IIa ACC/AHA
Class IIb ESC

Adapted from C. Tribouilloy. Congrès international d’échocardiographie. Paris juin 2011
Moderate organic MR requires clinical examination every year and an echocardiogram every 2 years. In patients with severe organic MR, clinical assessment is needed every 6 months and an echocardiogram every 1 year. If the ejection fraction is 60–65% and/or if end-systolic diameter is closed to 40 or 22 mm/m², the echocardiogram should be performed every 6 months.\footnote{Progression of...}
Conclusions: asymptomatic severe organic chronic MR

- Definitive randomized prospective studies are not available
- However, it is possible to develop a rationale for the management
- This is based on physiopathology and stages of MR, the natural history, risk stratification and the therapeutic potential of medical and surgical treatments
MERCI pour votre attention