



CONGRESSO
SOCERGS
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Simpósio SGCCV/ SOCERGS 2018

***Insuficiência Mitral Isquêmica em Paciente Candidato a
CRM: Intervir ou não? Plastia ou troca?***

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Declaração de Potencial Conflito de Interesse

Nome do Palestrante:

Renato A. K. Kalil

Título da Apresentação:

Simpósio SGCCV/ SOCERGS 2018

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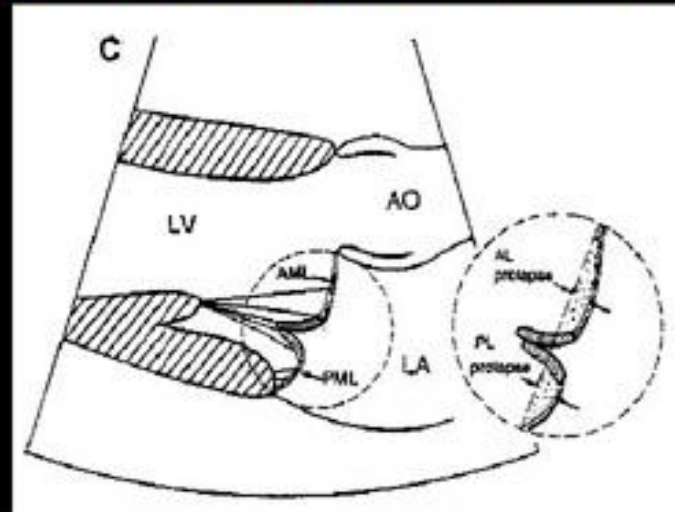
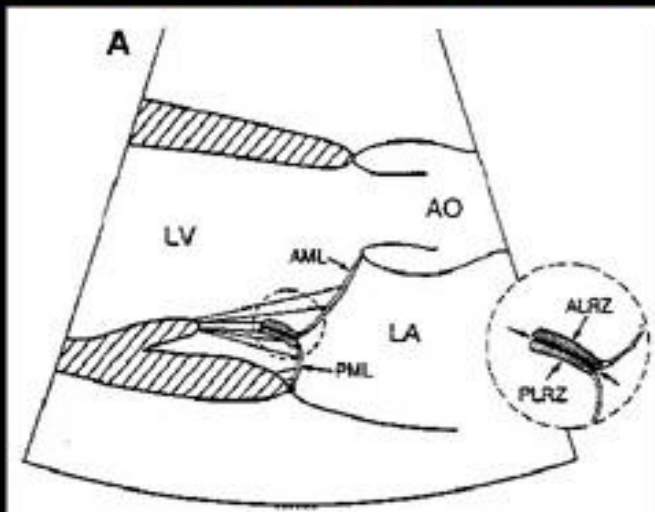
Não possuo nenhum conflito de interesse relacionado a esta apresentação

Mechanism of regurgitation

- Chordae and papillary muscles elongation
- Leaflet deformation, free edge deformation (anomalous clefts)
- Annular dilatation and calcification
- Chordal rupture



REDUCTION OF COAPTATION SURFACE



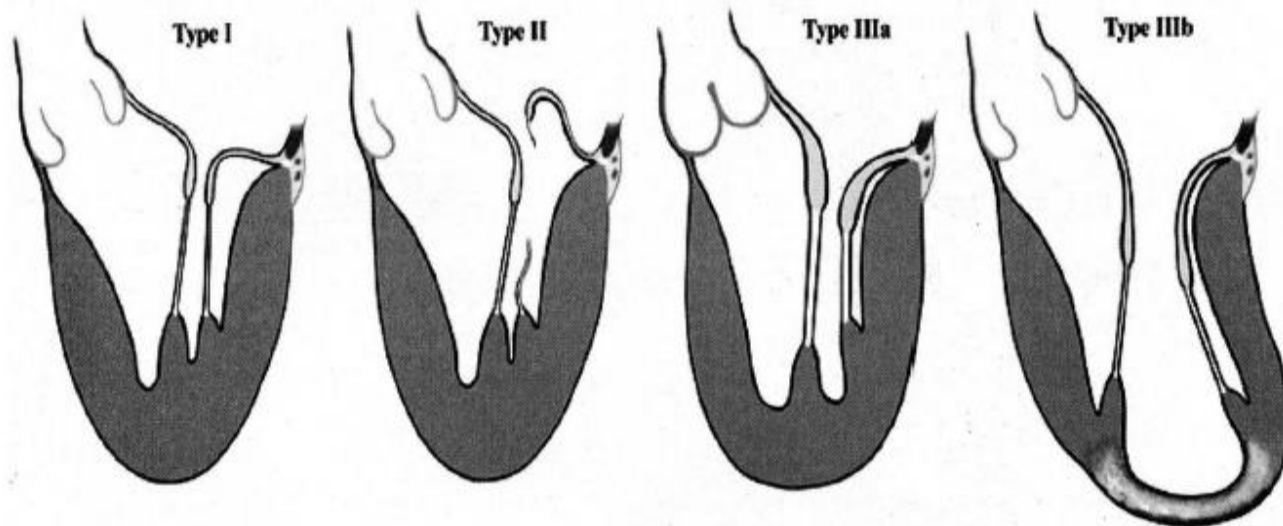


FIGURE 1. Carpentier's functional classification of mitral regurgitation. Type I is characterized by normal leaflet motion, with the mitral regurgitation being caused by annular dilatation or leaflet perforation; type II is caused by an increased leaflet motion such as leaflet prolapse, chordal rupture, or papillary muscle rupture; type IIIa has restricted leaflet motion caused by subvalvular fibrosis, and commissural fusion, as seen in patients with rheumatic heart disease; type IIIb dysfunction has restricted leaflet motion during systole, and is due to left ventricular enlargement and papillary muscle displacement. Reprinted with permission from *Am Heart Hosp J.* 2006;4:261–268.⁶

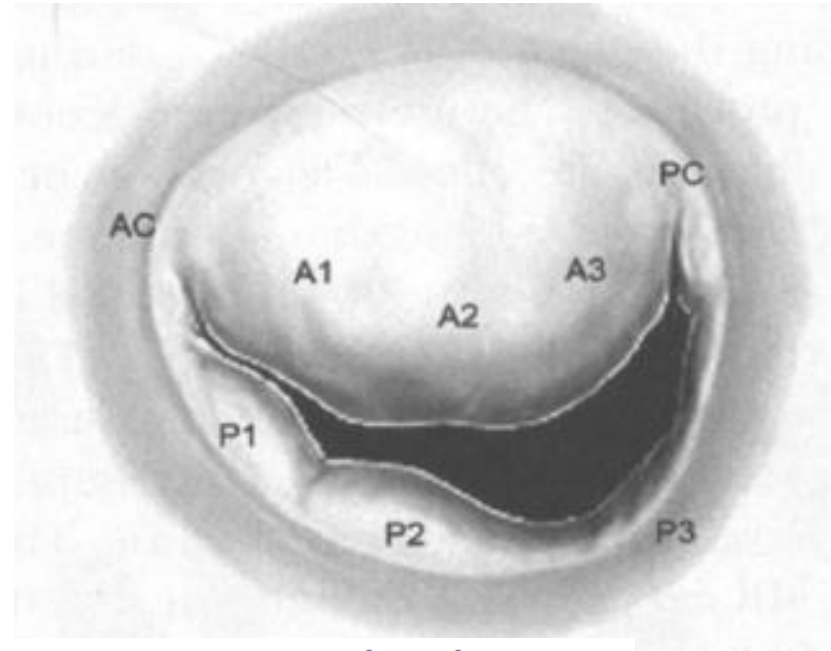
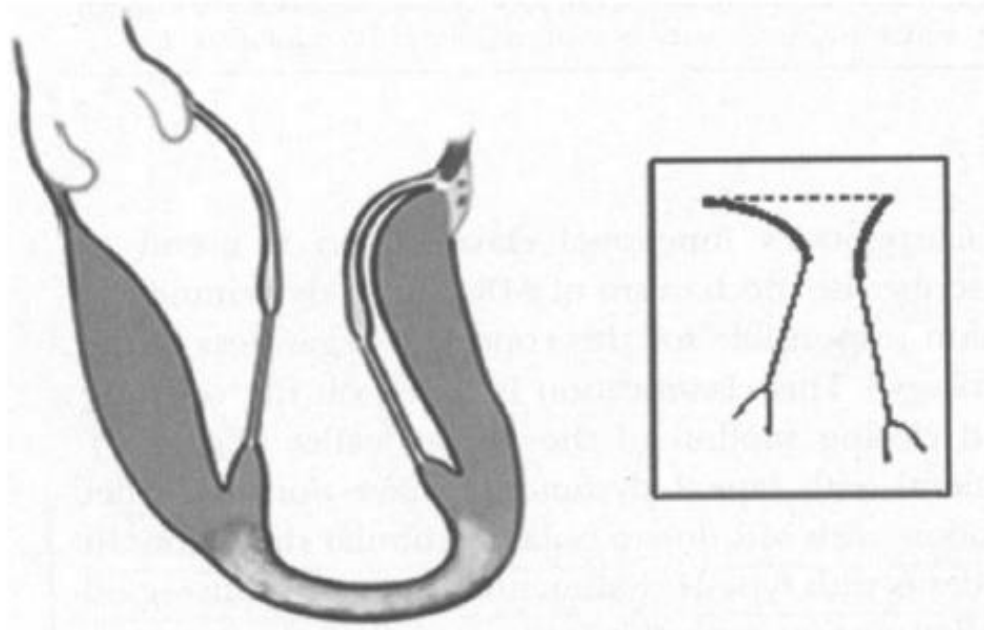
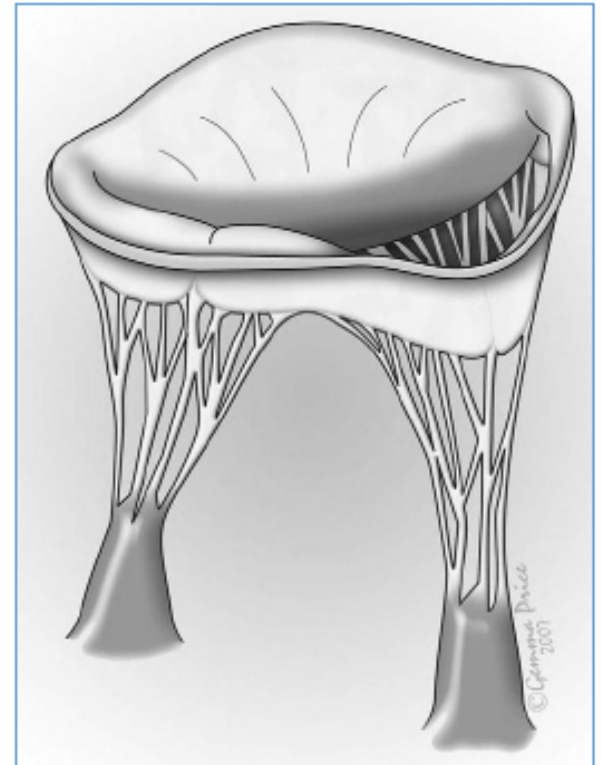


FIGURE 2. Restricted leaflet motion. It is noticed in the cross sectional view of the mitral valve that segments P3/P2 do not coapt due to restricted motion of the leaflet. Type IIIb dysfunction of Carpentier's classification. Reprinted with permission from *Am Heart Hosp J.* 2006;4:261–268.⁶

Background: Functional Ischemic MR

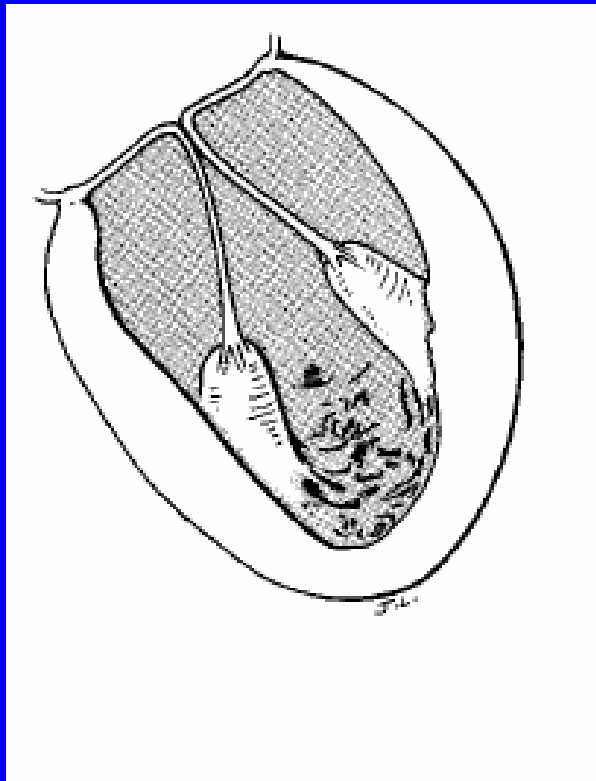
- Occurs in up to 40% of patients following myocardial infarction.
- Result of LV remodeling & dilatation.
- Mitral valve tethered and pulled apart.
- MR usually mild or moderate in severity.
- Heart failure and death increased up to 3x.
- Most have 3-vessel coronary artery disease, benefit from CABG.



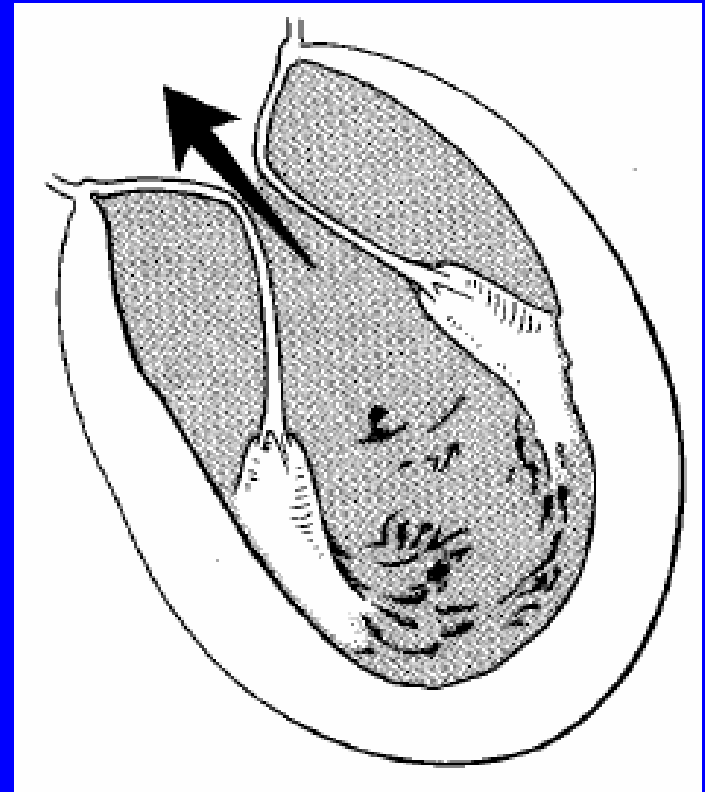
Chan KMJ, et al. Prog Cardiovasc Dis 2009; 51(6):460-471

- **Cardiomiopatas isquêmica e dilatada**

MR from Apical Tethering of Normal leaflets



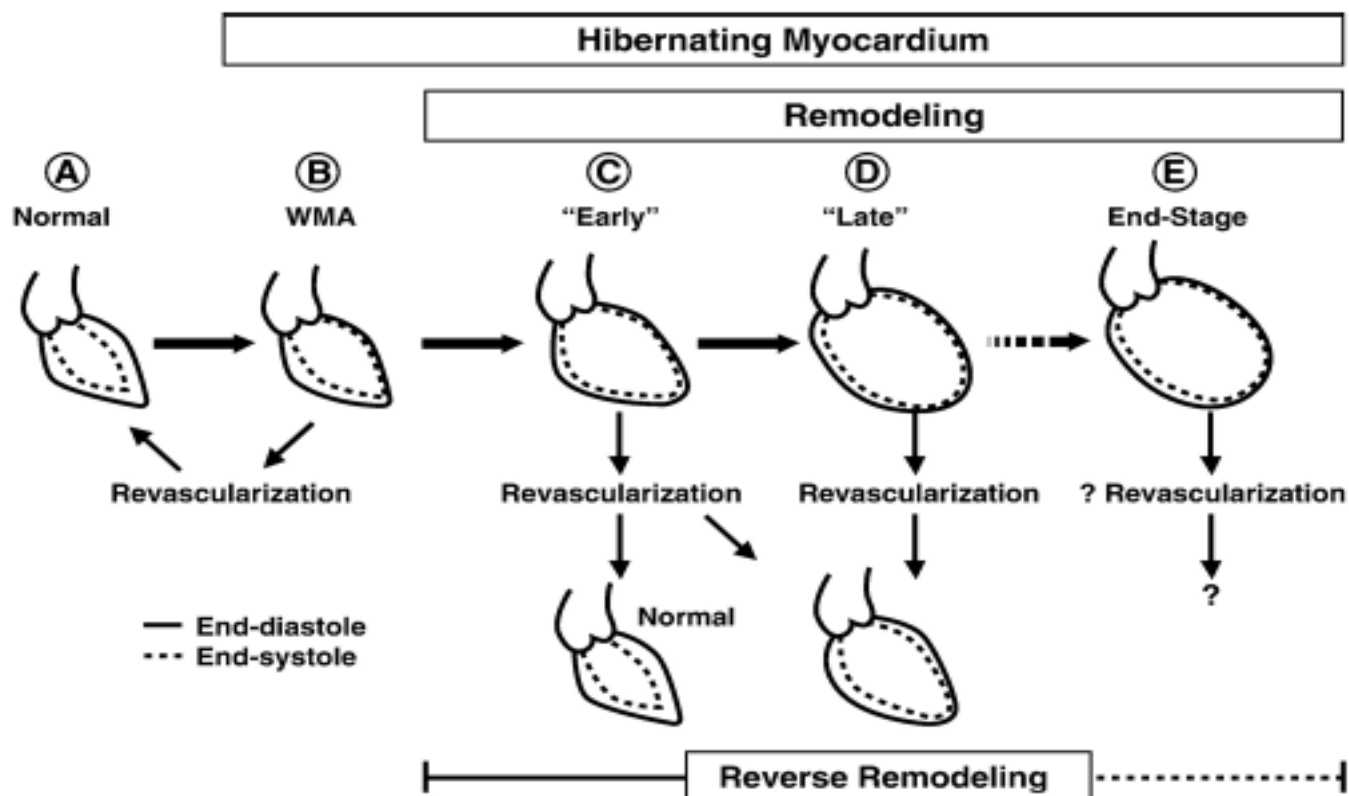
**Normal leaflet position
(for comparison)**



**Coaptation line
displaced Apically**

Heart Failure: Ischemic Cardiomyopathy

Figure 1



Diagrammatic representation of postulated progressive changes in a patient with hibernating myocardium and (A) no remodeling (B), mild to moderate remodeling (C and D), and end stage (E) of the disorder. WMA, Wall-motion abnormality. Reprinted with permission from *J Am Coll Cardiol* 2006;47:978-80. Copyright 2006, The American College of Cardiology Foundation.

***Insuficiência Mitral Isquêmica em
Paciente Candidato a CRM:
Intervir ou não? Plastia ou troca?***

***Insuficiência Mitral isquêmica,
ou funcional, ou secundária, é
uma doença do ventrículo
esquerdo.***

***A estrutura da valva é normal.
Pode ser secundária a FA e AE
dilatado.***

6.2.1 Evaluation. Echocardiography is essential to establish the diagnosis of secondary mitral regurgitation.

In secondary mitral regurgitation, lower thresholds have been proposed to define severe mitral regurgitation compared with primary mitral regurgitation [20mm² for effective regurgitant orifice area (EROA) and 30 ml for regurgitant volume], owing to their association with prognosis [135].

However, it is unclear if prognosis is independently affected by mitral regurgitation compared with LV dysfunction. So far, no survival benefit has been confirmed for reduction of secondary mitral regurgitation.

For isolated mitral valve treatment (surgery or percutaneous edge-to-edge repair) in secondary mitral regurgitation, thresholds of severity of mitral regurgitation for intervention still need to be validated in clinical trials.

The severity of secondary mitral regurgitation should be reassessed after optimized medical treatment. The severity of tricuspid regurgitation and RV size and function should also be evaluated.

Secondary mitral regurgitation is a dynamic condition; echocardiographic quantification of mitral regurgitation during exercise may provide prognostic information of dynamic characteristics.

Myocardial viability testing may be useful in patients with ischaemic secondary mitral regurgitation who are candidates for revascularization.

Limitações da valvoplastia na IM Isquêmica

- Alto índice de recidiva
- 28% retorno da IM em 6 meses
- Causa: dilatação e remodelamento ventricular com estiramento e perda de coaptação
- IM isquêmica é mais um problema ventricular que valvular.
 - Portanto, a fisiopatologia não favorece a intervenção direta sobre o aparelho valvar

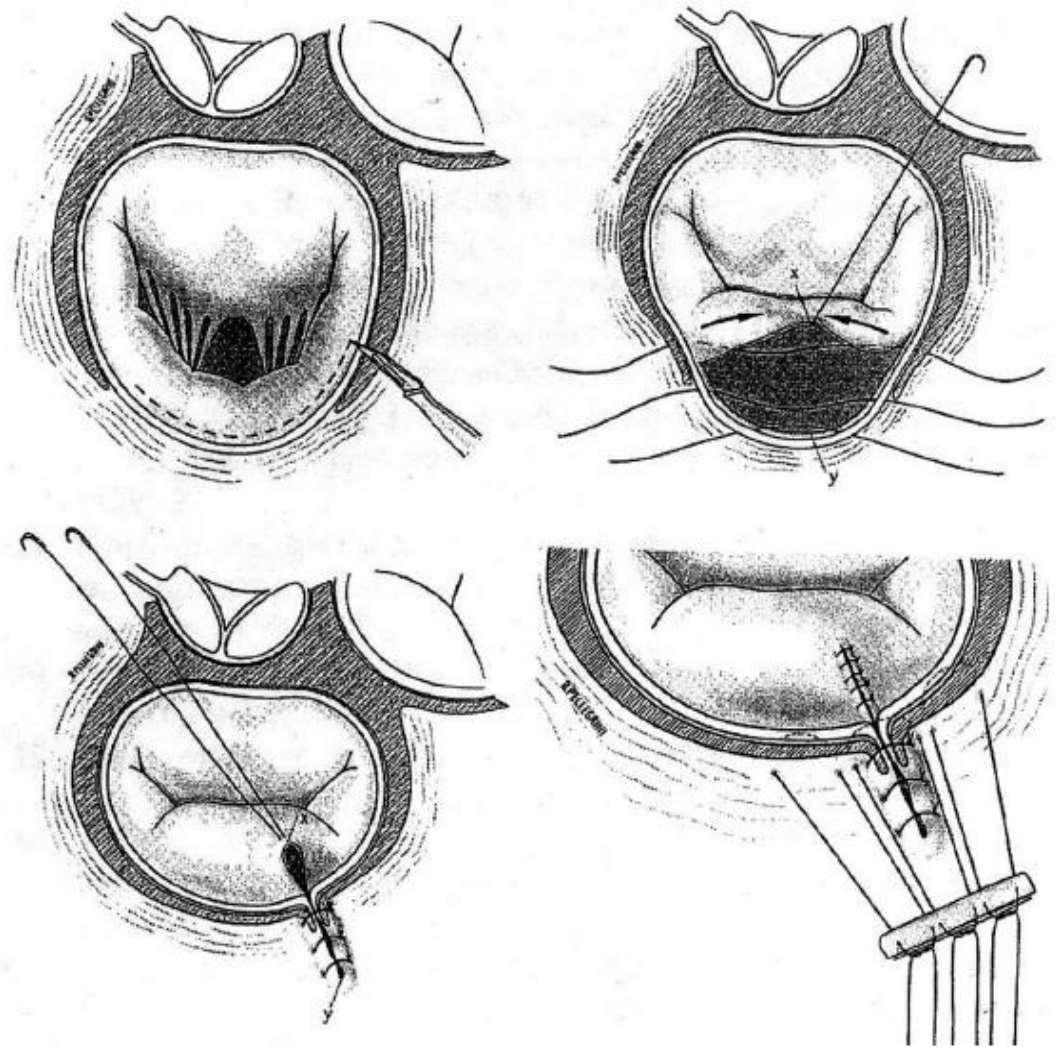


FIGURE 4. Posterior mitral valve restoration. To ameliorate posterior leaflet tethering and restore normal distensibility an incision at the base of the posterior leaflet is performed and the basal chordae are cut. Then a plication of posterior mitral annulus is performed. The leaflet is sutured reducing its size, and reinforced with Gore Tex strip or a posterior annuloplasty band. Reprinted with permission from *Ann Thorac Surg.* 2004;77:729–730.²⁸

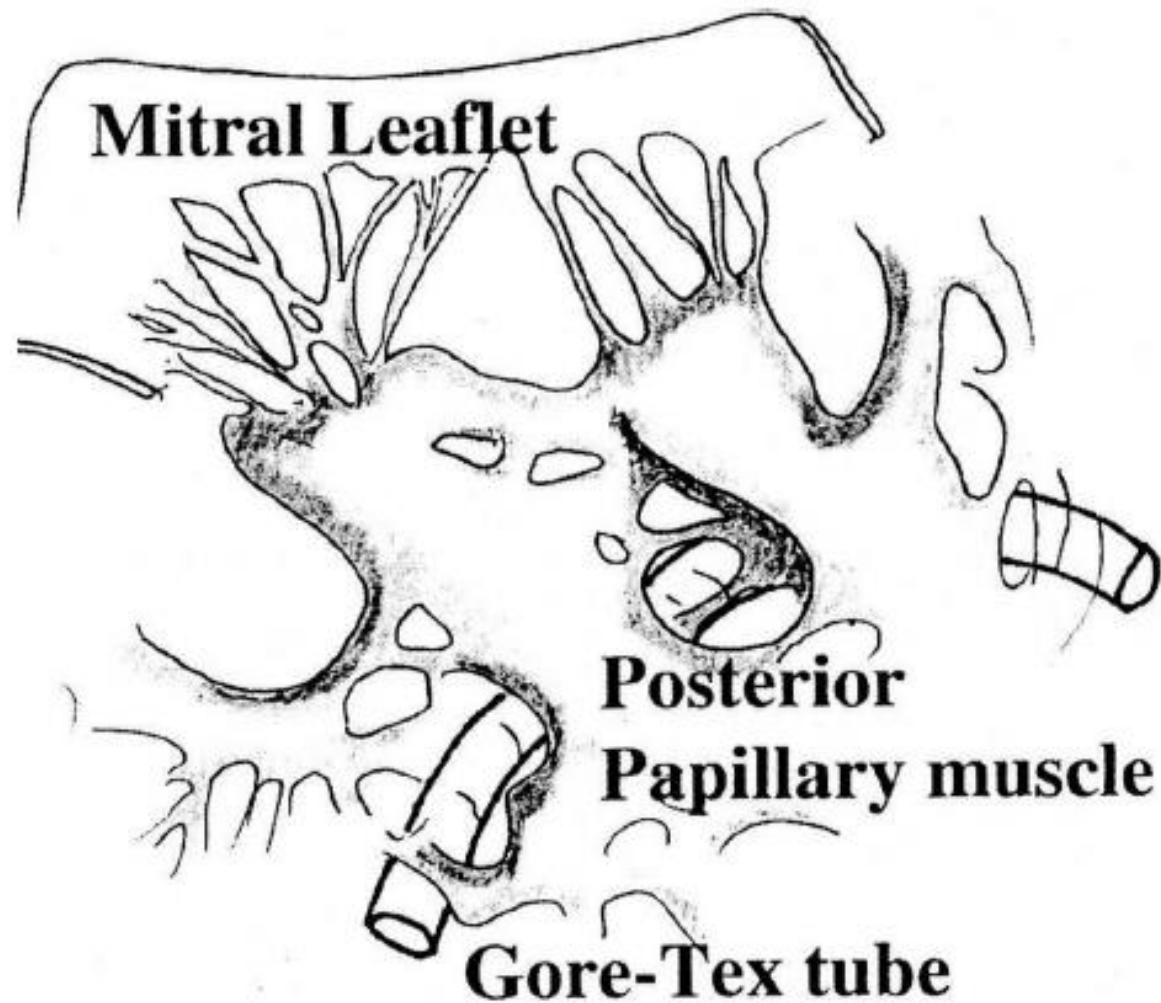


FIGURE 5. Papillary muscle sling. A 4-mm Gore-tex tube is placed encircling the papillary muscles. The Gore-tex is tightened to reduce the distance between the papillary muscles. Reprinted with permission from *Ann Thorac Surg.* 2003; 75:809–811.²⁹

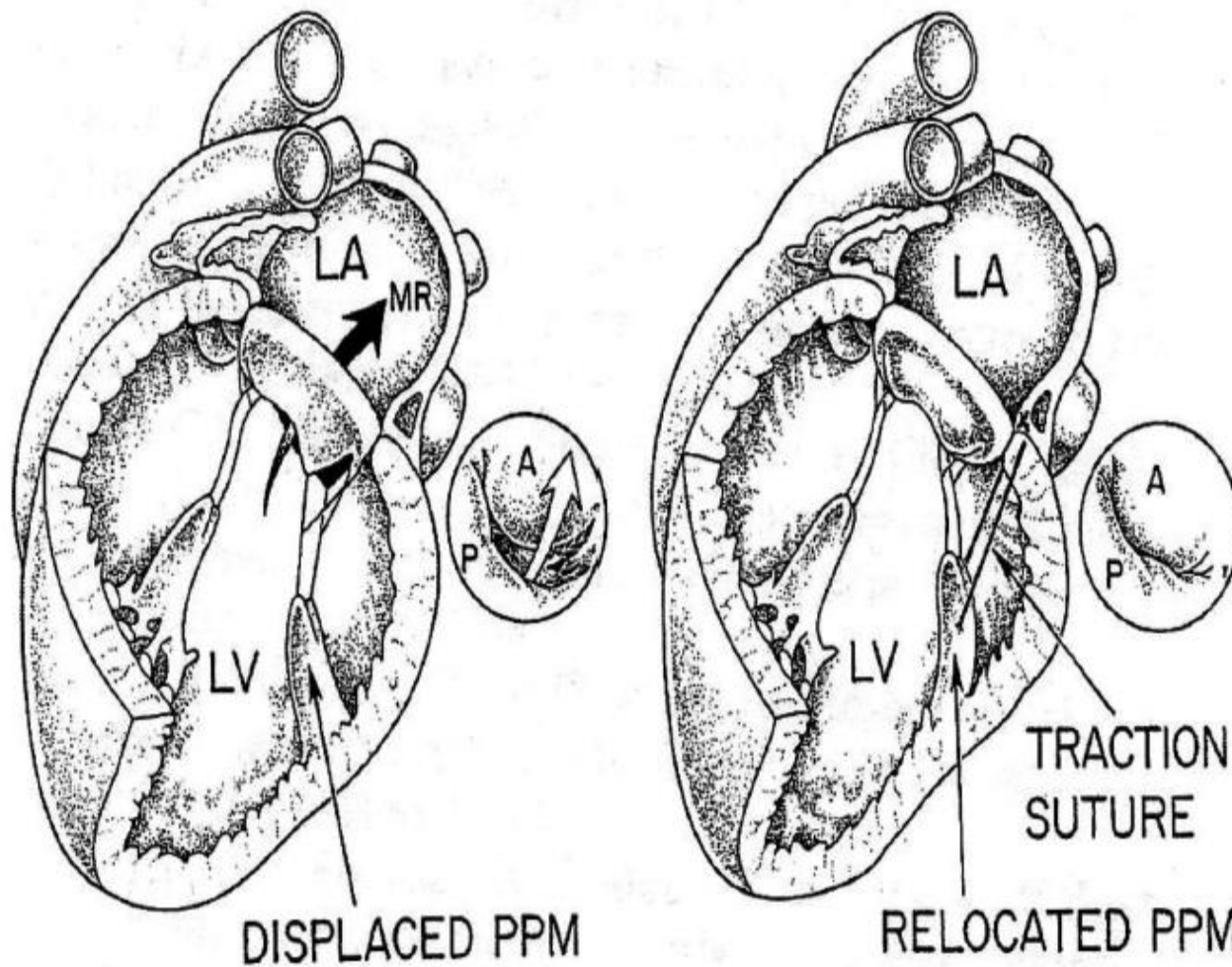


FIGURE 6. Surgical relocation of posterior papillary muscle. Two 3–0 Prolene sutures placed between the displaced PPM (posterior papillary muscle) and the posterior base of the mitral ring. The ascension of the PPM produces better coaptation of P2/P3 with the anterior valve. Reprinted with permission from *Ann Thorac Surg.* 2002;122:600–601.³⁴

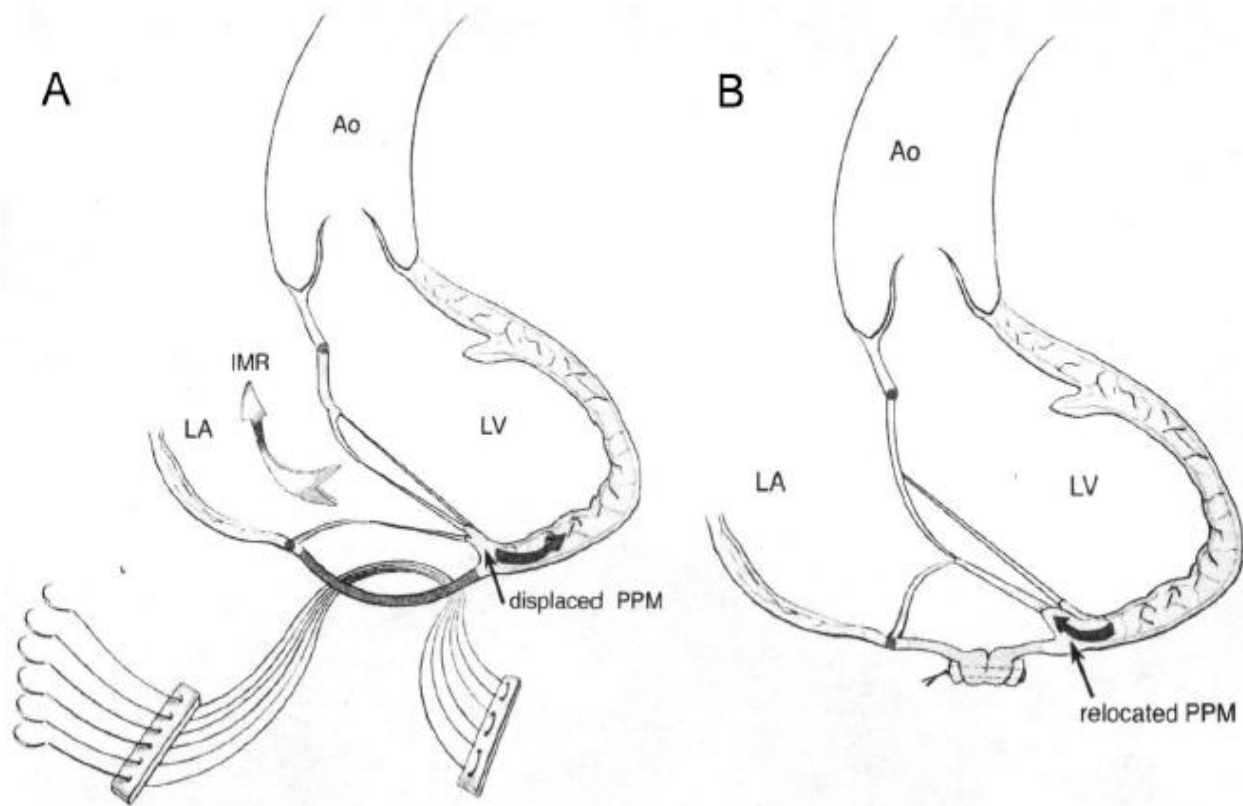


FIGURE 7. Infarct Plication. A, Schematic representation of the akinetic inferobasal segment with tethering of the posterior leaflet. The sutures are shown before tightening. B, Plication of the dyskinetic segment with relocation of the posterior papillary muscle. LA indicates Left atrium; LV, left ventricle; Ao, aorta; IMR, ischemic mitral regurgitation; PPM, posterior papillary muscle. Reprinted with permission from *J Thorac Cardiovasc Surg.* 2005;129:440–442.³⁵

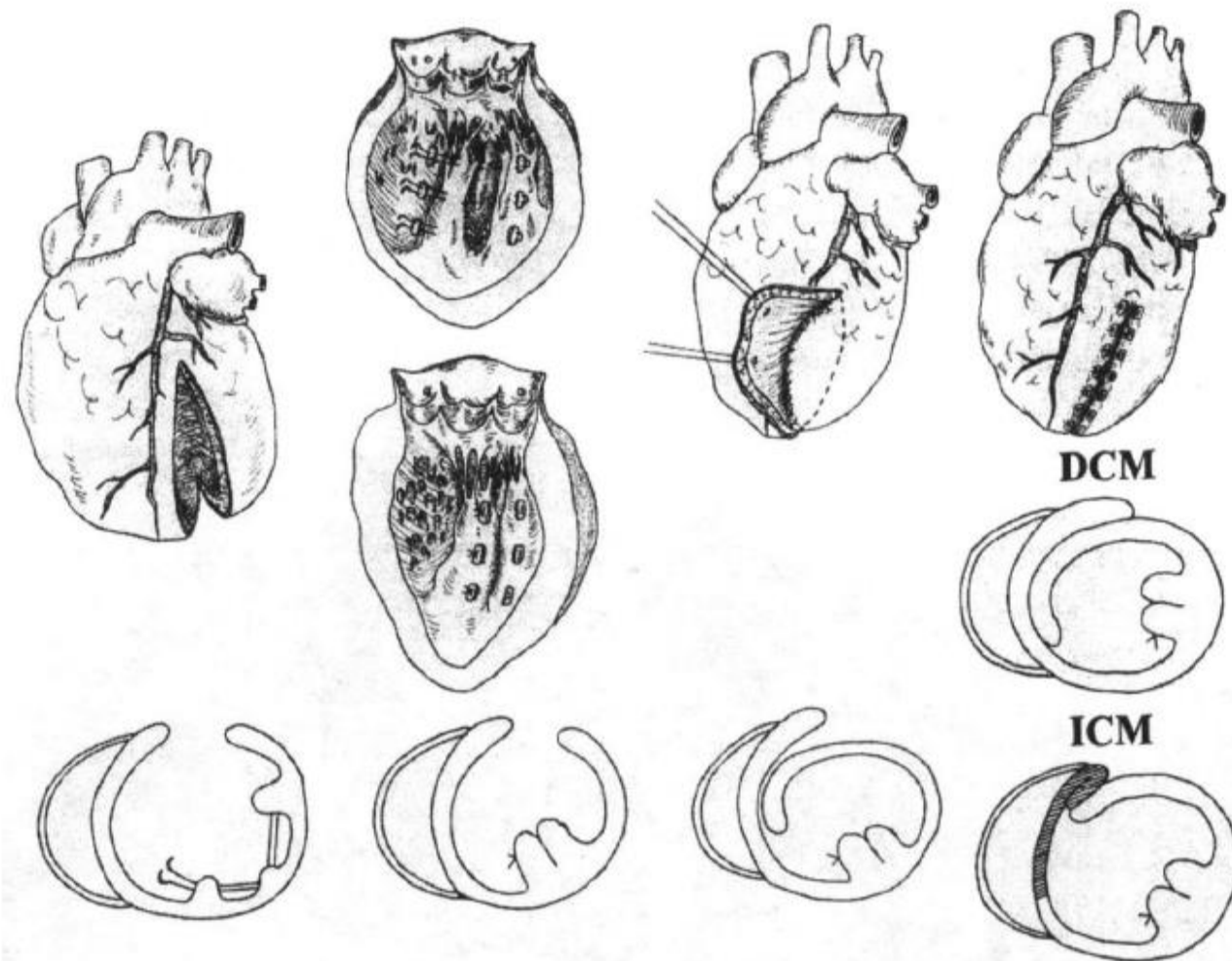


FIGURE 8. Integrated overlapping ventriculoplasty combined with papillary muscle plication. The excluded septum can be overlapped in cases of idiopathic dilated cardiomyopathy because it might assist in cardiac function, whereas in ischemic cardiomyopathy the right marginal incision is attached close to the suture line to achieve its reinforcement and hemostasis because the scarred septum might restrict the motion of the left anterior wall if overlapped extensively. Reprinted with permission from *J Thorac Cardiovasc Surg.* 2004;127:1221–1223.³⁶

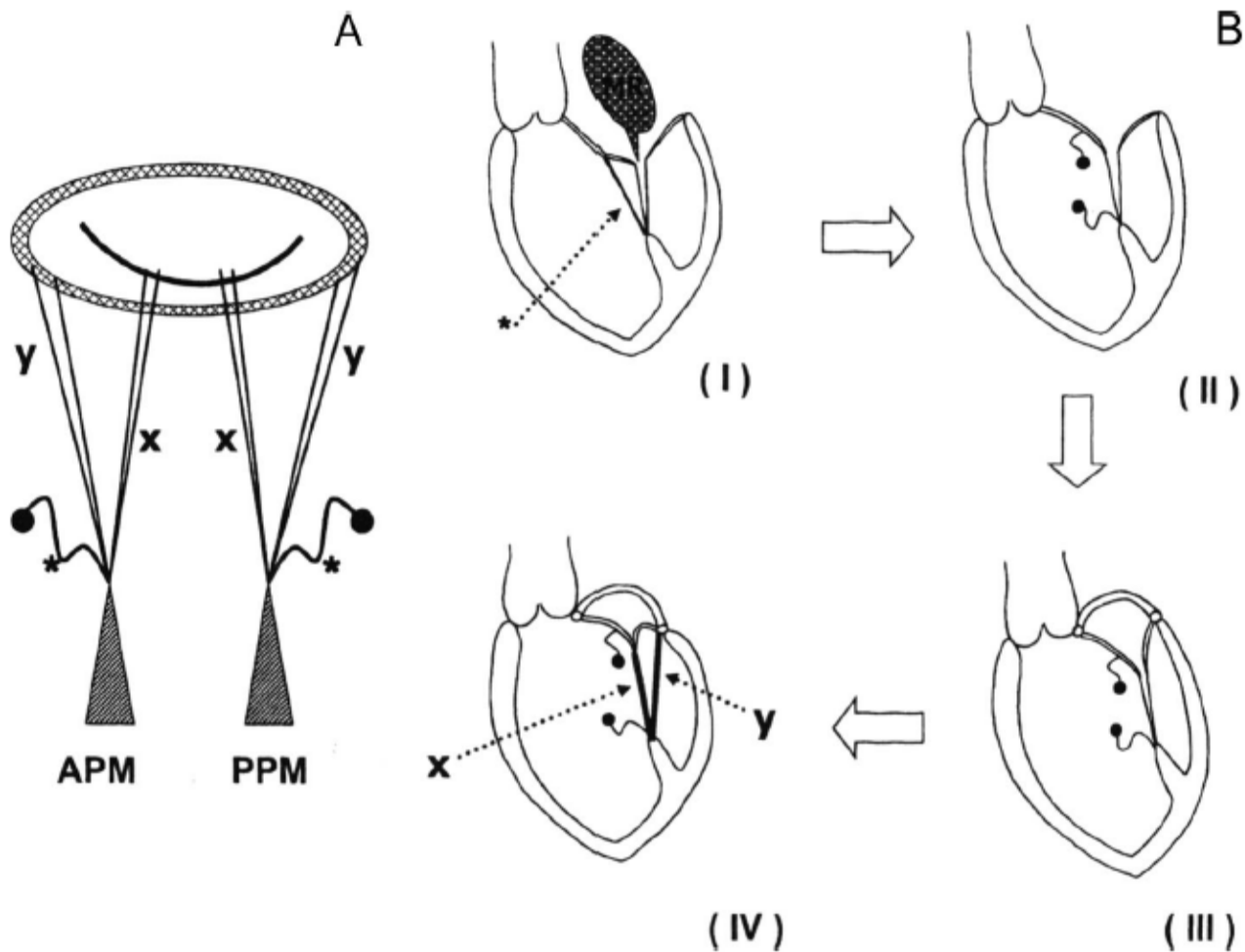
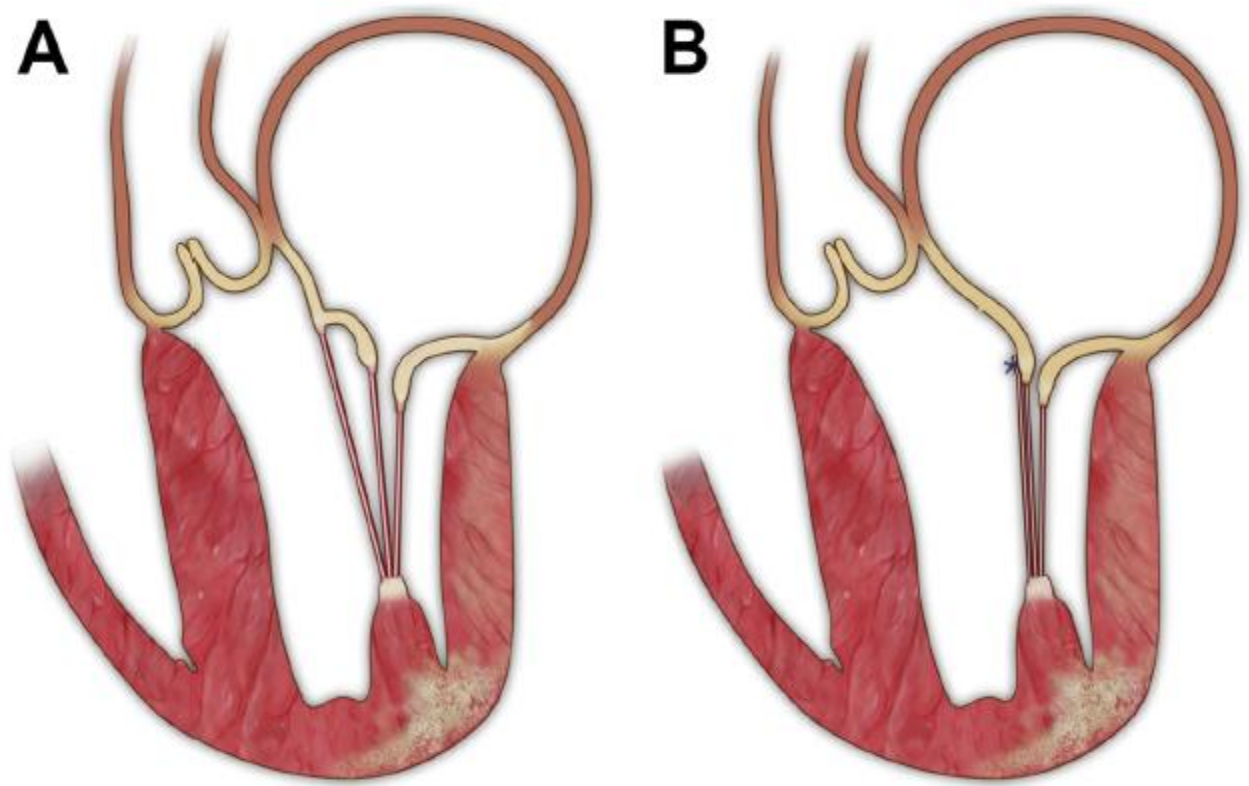


FIGURE 9. A, Mitral complex remodeling (APM indicates anterior papillary muscle; PPM, posterior papillary muscle). B, Mitral complex remodeling concept. (I) Functional mitral regurgitation due to leaflet tethering (MR=mitral regurgitation. (II) Division of secondary chords (*) restores convexo-concave curvature of the anterior leaflet. (III) Undersized annuloplasty approximates the anteroposterior distance but increases posterior leaflet tethering. (IV) Artificial chords of 5-0 Gore-Tex (W. L. Gore & Associates, Flagstaff, AZ) suture (x) to the anterior leaflet margin replace divided secondary chords. The 4-0 Gore-Tex relocation sutures (y) between both papillary muscles and posterior mitral annulus relocate both papillary muscles in relation to the mitral annulus, relieving anterior and posterior leaflet tethering. Reprinted with permission from *Ann Thorac Surg.* 2008;85:1820-1822.³⁷

Fig 1. (A) Ischemic mitral regurgitation with severe tethering of anterior and posterior mitral leaflets. (B) "Cut-and-transfer" technique: reimplanting secondary chordae of the anterior leaflet in primary position reduces the restriction of the anterior leaflet.



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

Deja et al Mitral Regurgitation and Survival in STICH Trial 2647

Assigned & treated MR

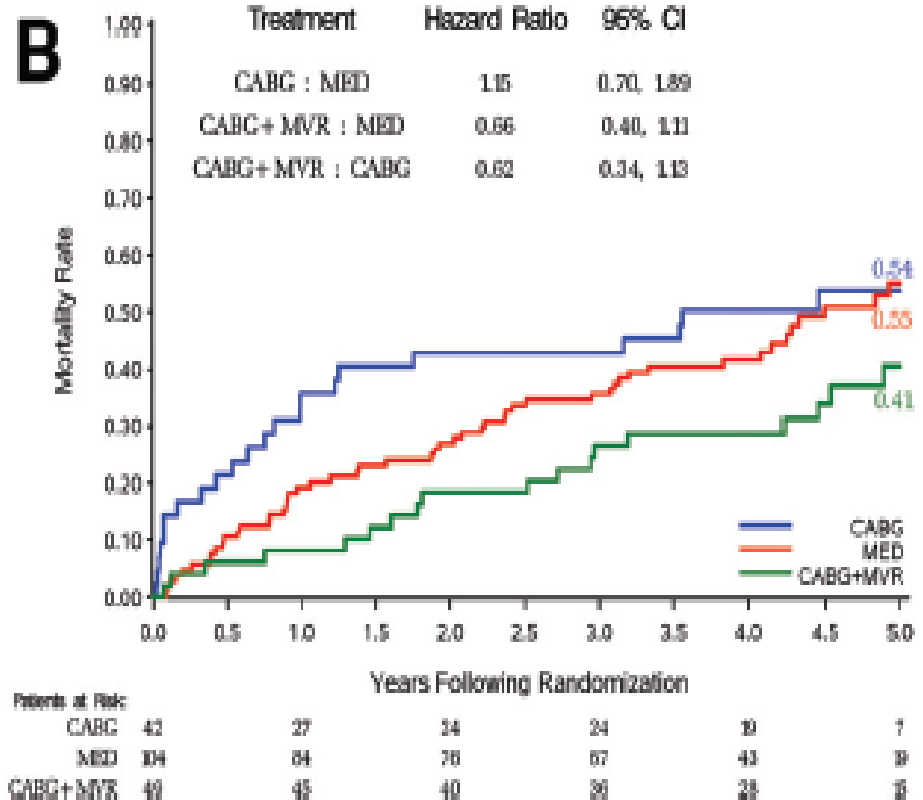


Figure 3. Kaplan-Meier estimates of death from any cause in patients with moderate to severe mitral regurgitation (MR) at baseline assigned to medical therapy (MED) or MED and coronary artery bypass grafting (CABG) who received or did not receive mitral valve procedures (A) and assigned and treated with MED or MED with CABG alone or MED with CABG and mitral valve procedure (B). CI indicates confidence interval; MVR, mitral valve repair.

Surgical Treatment of Moderate Ischemic Mitral Regurgitation

Ensaio Clínico Randomizado N=301 IM Moderada

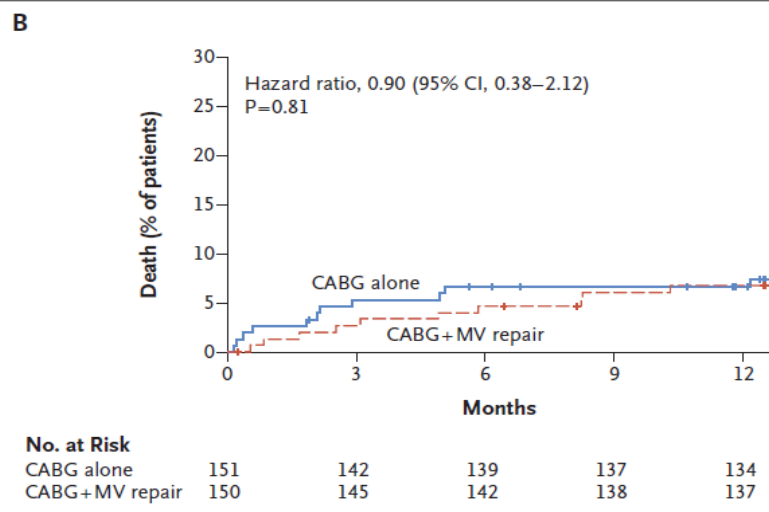
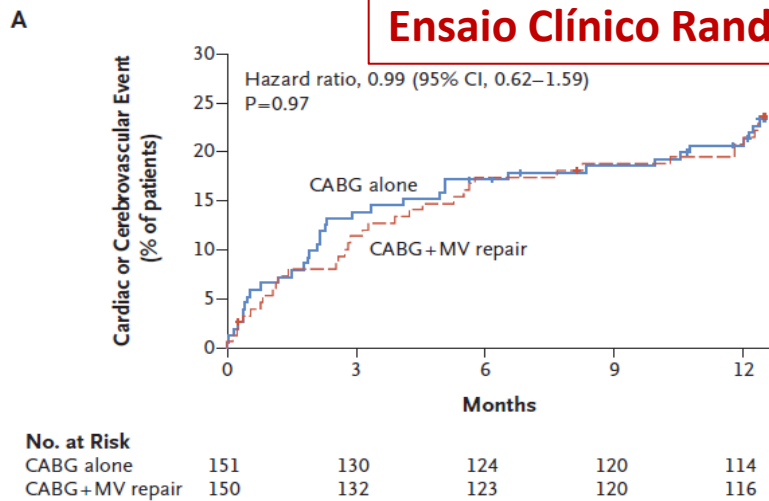


Figure 1. Time-to-Event Curves for the Composite End Point of Cardiac or Cerebrovascular Events and Death, According to Treatment Group. The composite end point of major adverse cardiac or cerebrovascular events included death, stroke, subsequent mitral-valve (MV) surgery, hospitalization for heart failure, and an increase of one or more classes in the

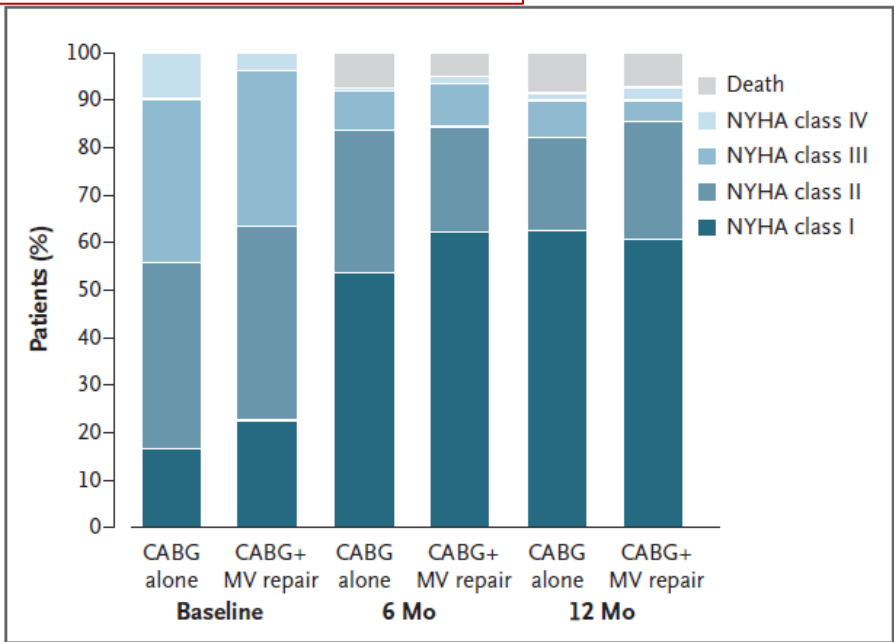


Figure 2. NYHA Class and Death, According to Treatment Group. The proportions of patients in each NYHA class are shown at baseline and at 6 and 12 months; the proportions of patients who died are shown at 6 and 12 months.

CONCLUSIONS: at 1 year, this trial did not show a clinically meaningful advantage of adding mitral-valve repair to CABG. Smith PK & CSTN. NEJM 2014

Mitral-Valve Repair versus Replacement for Severe Ischemic Mitral Regurgitation

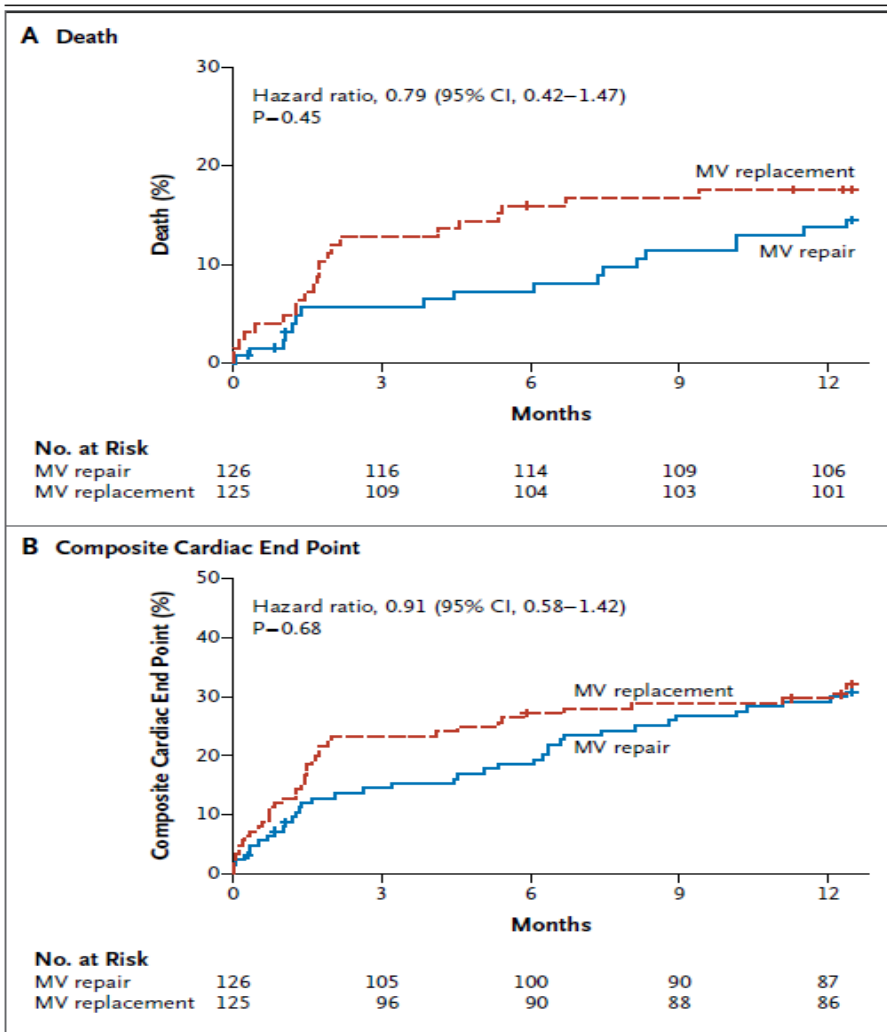
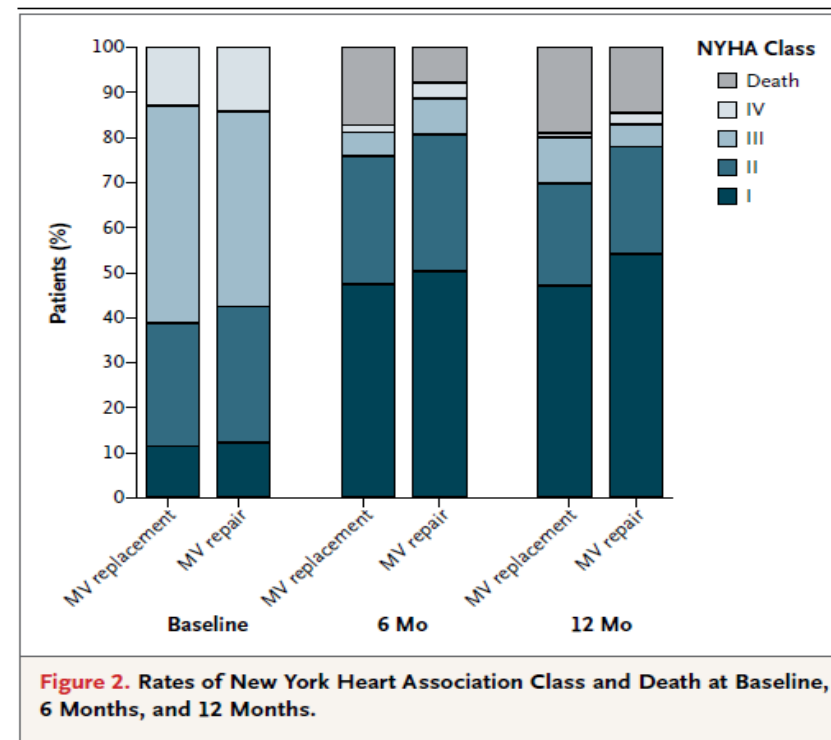


Figure 1. Rates of Death and the Composite Cardiac End Point.

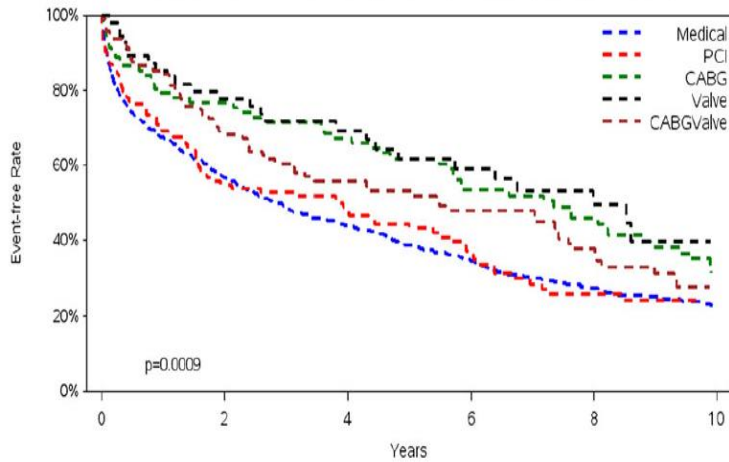
The composite end point of the rate of major adverse cardiac or cerebrovascular events included death, stroke, subsequent mitral-valve (MV) surgery, hospitalization for heart failure, and an increase in the New York Heart Association class of 1 or more. Crosses indicate that patients' data were censored at that point.



Ensaio Clínico Randomizado
N=251
Mitral regurgitation recurrence
Repair = 32,6%
Replacement = 2,3% p<0.001

Management and outcomes in patients with moderate or severe functional mitral regurgitation and severe left ventricular dysfunction

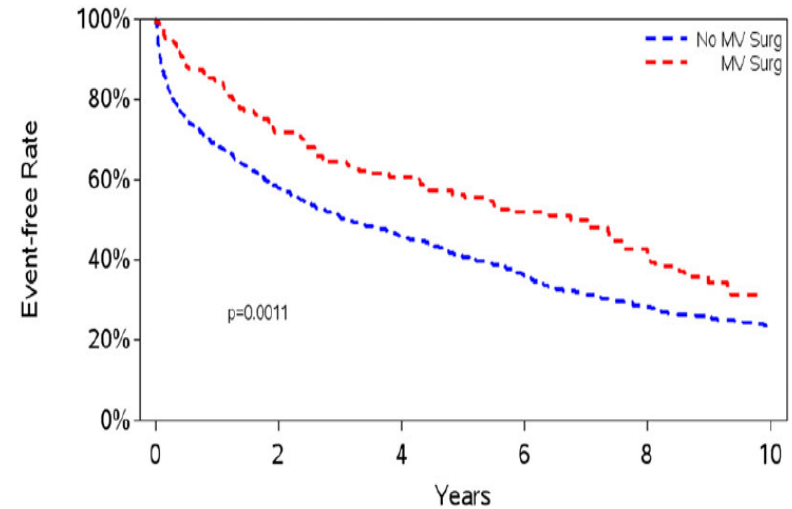
Event-free Survival (Death, Transplant, LVAD)



	0	2	4	6	8	10
Medical	1094	549	378	263	159	91
PCI	114	60	44	30	18	11
CABG	82	61	49	38	30	19
Valve	55	39	28	21	14	4
CABG+Valv	96	63	46	35	25	13

Unadjusted Kaplan–Meier event-free survival estimates for treatment groups. Event-free survival rates across treatment groups.

Event-free Survival (Death, Transplant, LVAD)



	0	2	4	6	8	10
No MV Surg	1290	670	471	331	207	120
MV Surg	151	102	74	56	39	17

Kaplan–Meier event-free survival estimates stratified by mitral valve surgery. Event-free survival rates across treatment groups.

Conclusion

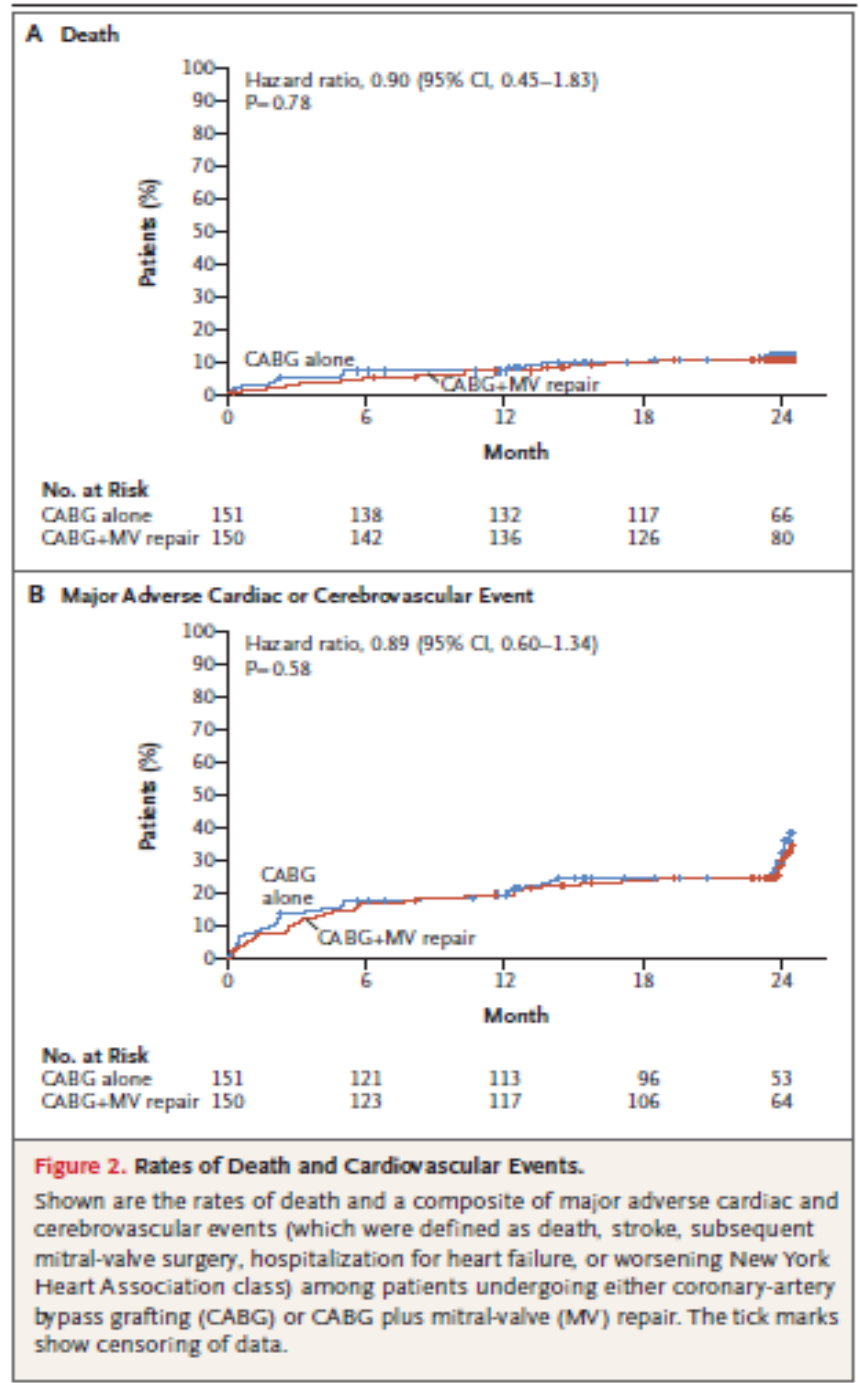
In patients with moderate or severe MR and severe LV dysfunction, mortality was substantial, and among those selected for surgery, MV surgery, though performed in a small number of patients, was independently associated with higher event-free survival.

Two-year outcomes of surgical treatment of moderate ischemic mitral regurgitation.

The addition of mitral-valve repair did not lead to significant differences in left ventricular reverse remodeling at 2 years.

Mitral-valve repair provided a more durable correction of mitral regurgitation but did not significantly improve survival or reduce overall adverse events or readmissions

and was associated with an early hazard of increased neurologic events and supraventricular arrhythmias.



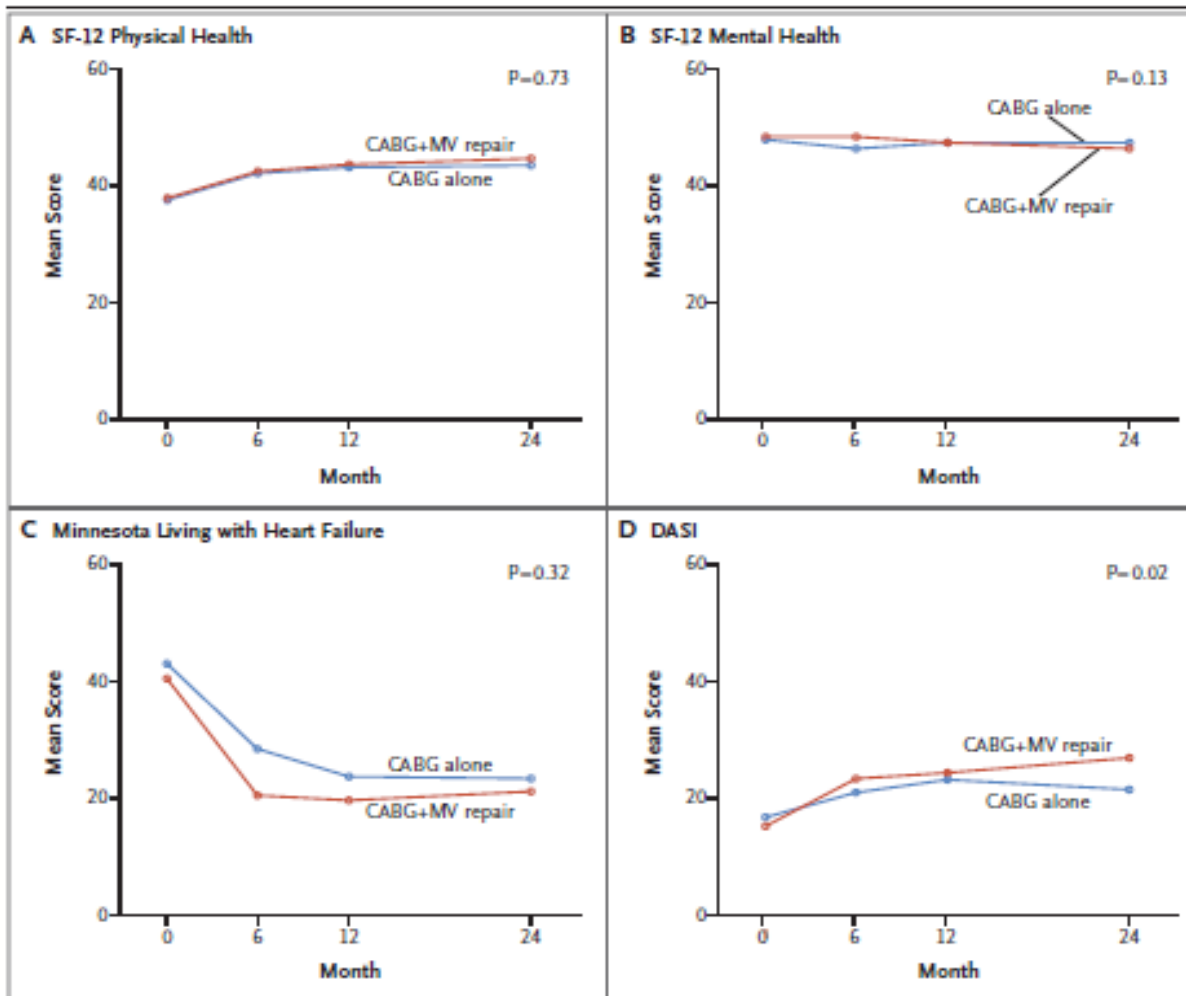


Figure 3. Quality-of-Life Scores.

Shown are the mean scores on the Medical Outcomes Study 12-item Short-Form General Health Survey (SF-12) for physical health (Panel A) and mental health (Panel B) for patients undergoing either CABG alone or CABG plus mitral-valve repair. The SF-12 scale ranges from 0 to 100, with higher scores indicating better health. Panel C shows mean scores on the Minnesota Living with Heart Failure questionnaire; scores can range from 0 to 105, with higher scores indicating a lower quality of life. Panel D shows mean scores on the Duke Activity Status Index (DASI), on which scores range from 0 to 58, with higher scores indicating a better activity level. On these measures of quality of life, the only significant between-group difference was on the DASI (P=0.02).

Michler RE, Smith PK, Parides MK, Ailawadi G, Thourani V, Moskowitz AJ et al. CTSN.

Two-year outcomes of surgical treatment of moderate ischemic mitral regurgitation.

N Engl J Med 2016;374:1932–1941.



Surgical and interventional management of mitral valve regurgitation: a position statement from the European Society of Cardiology Working Groups on Cardiovascular Surgery and Valvular Heart Disease

Executive summary

Summary statements: secondary mitral regurgitation

- Medical therapy is paramount in secondary MR.
- The role of surgery is controversial, particularly when concomitant revascularization is not an option,² owing to significant operative mortality, high rates of recurrent MR, and absence of proven survival benefit.^{42,52}
- Percutaneous EE repair is a lower risk option to reduce symptoms and induce reverse LV remodelling but commonly associated with residual and recurrent MR. Thus, it should only be considered in addition to optimal medical therapy (including cardiac resynchronization where appropriate) in patients who are symptomatic, fulfil anatomical criteria, and judged high-risk or inoperable by the Heart Team.

Indications for mitral valve intervention in chronic secondary mitral regurgitation^a

Recommendations	Class ^b	Level ^c
Surgery is indicated in patients with severe secondary mitral regurgitation undergoing CABG and LVEF >30%.	I	C
Surgery should be considered in symptomatic patients with severe secondary mitral regurgitation, LVEF <30% but with an option for revascularization and evidence of myocardial viability.	IIa	C
When revascularization is not indicated, surgery may be considered in patients with severe secondary mitral regurgitation and LVEF >30% who remain symptomatic despite optimal medical management (including CRT if indicated) and have a low surgical risk.	IIb	C
When revascularization is not indicated and surgical risk is not low, a percutaneous edge-to-edge procedure may be considered in patients with severe secondary mitral regurgitation and LVEF >30% who remain symptomatic despite optimal medical management (including CRT if indicated) and who have a suitable valve morphology by echocardiography, avoiding futility.	IIb	C
In patients with severe secondary mitral regurgitation and LVEF <30% who remain symptomatic despite optimal medical management (including CRT if indicated) and who have no option for revascularization, the Heart Team may consider a percutaneous edge-to-edge procedure or valve surgery after careful evaluation for a ventricular assist device or heart transplant according to individual patient characteristics.	IIb	C

CABG: coronary artery bypass grafting; CRT: cardiac resynchronization therapy; LVEF: left ventricular ejection fraction.

^aSee section 6.2.1 for quantification of secondary mitral regurgitation, which must always be performed under optimal treatment.

^bClass of recommendation.

^cLevel of evidence.

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

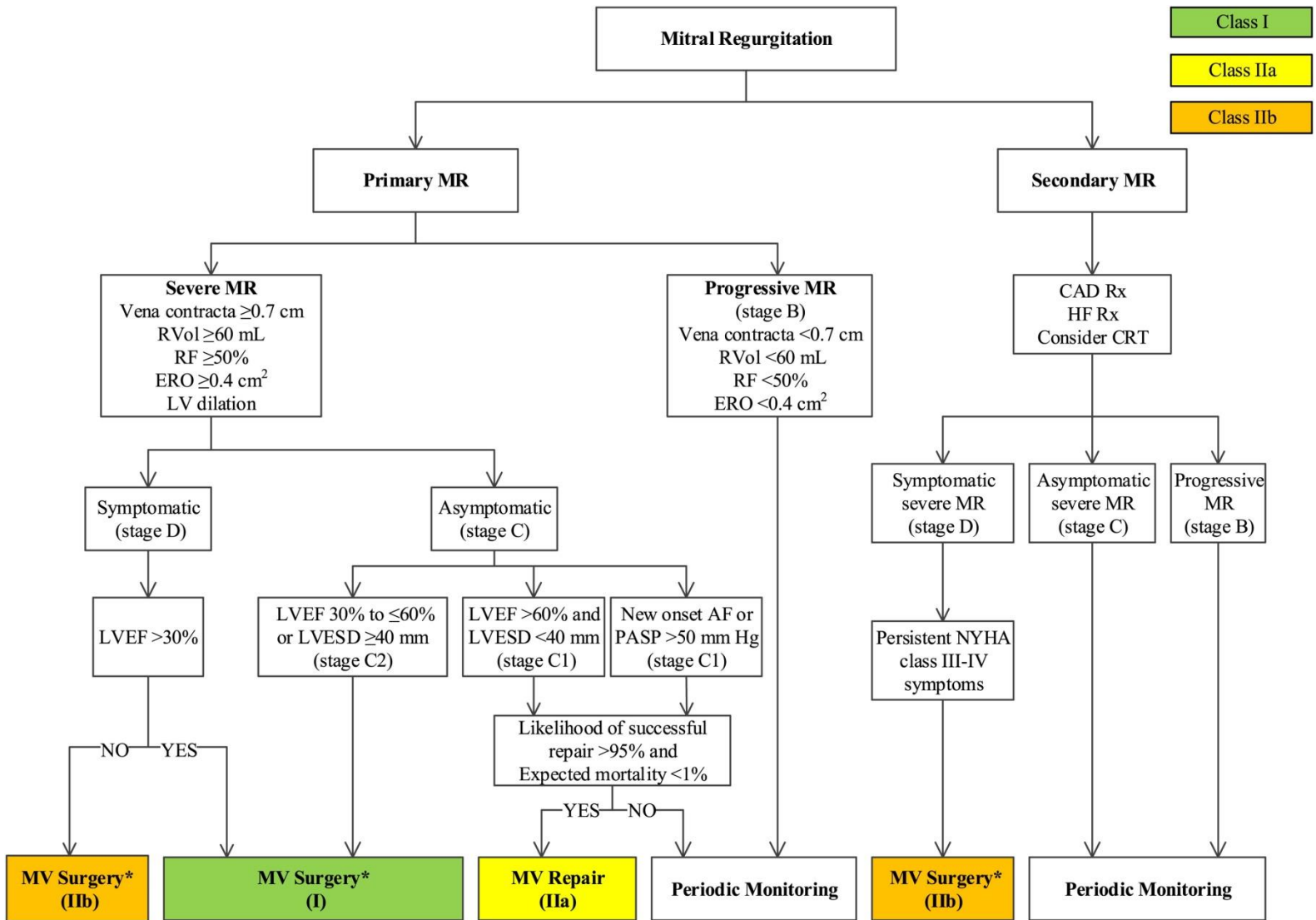
CLASS I

2. Cardiac resynchronization therapy with biventricular pacing is recommended for symptomatic patients with chronic severe secondary MR (stages B to D) who meet the indications for device therapy (446,447). (Level of Evidence: A)

Wall motion abnormalities are a common cause of chronic secondary MR, and their presence worsens the condition. The presence of conduction system abnormalities, especially left bundle-branch block, causes disordered LV contraction that exacerbates or is the primary cause of wall motion abnormalities. Electrical resynchronization may reduce or even eliminate wall motion abnormalities. Cardiac resynchronization therapy may also improve LV function and mitral valve closing force, which in turn leads to a reduction in chronic secondary MR in some cases. Thus, cardiac resynchronization therapy should be considered in symptomatic patients with chronic secondary MR who meet the indications for device therapy as outlined in the ACC/AHA guidelines for device-based therapy.

Supporting References: (446,447)





Isolated Mitral Valve Surgery: The Society of Thoracic Surgeons Adult Cardiac Surgery Database Analysis

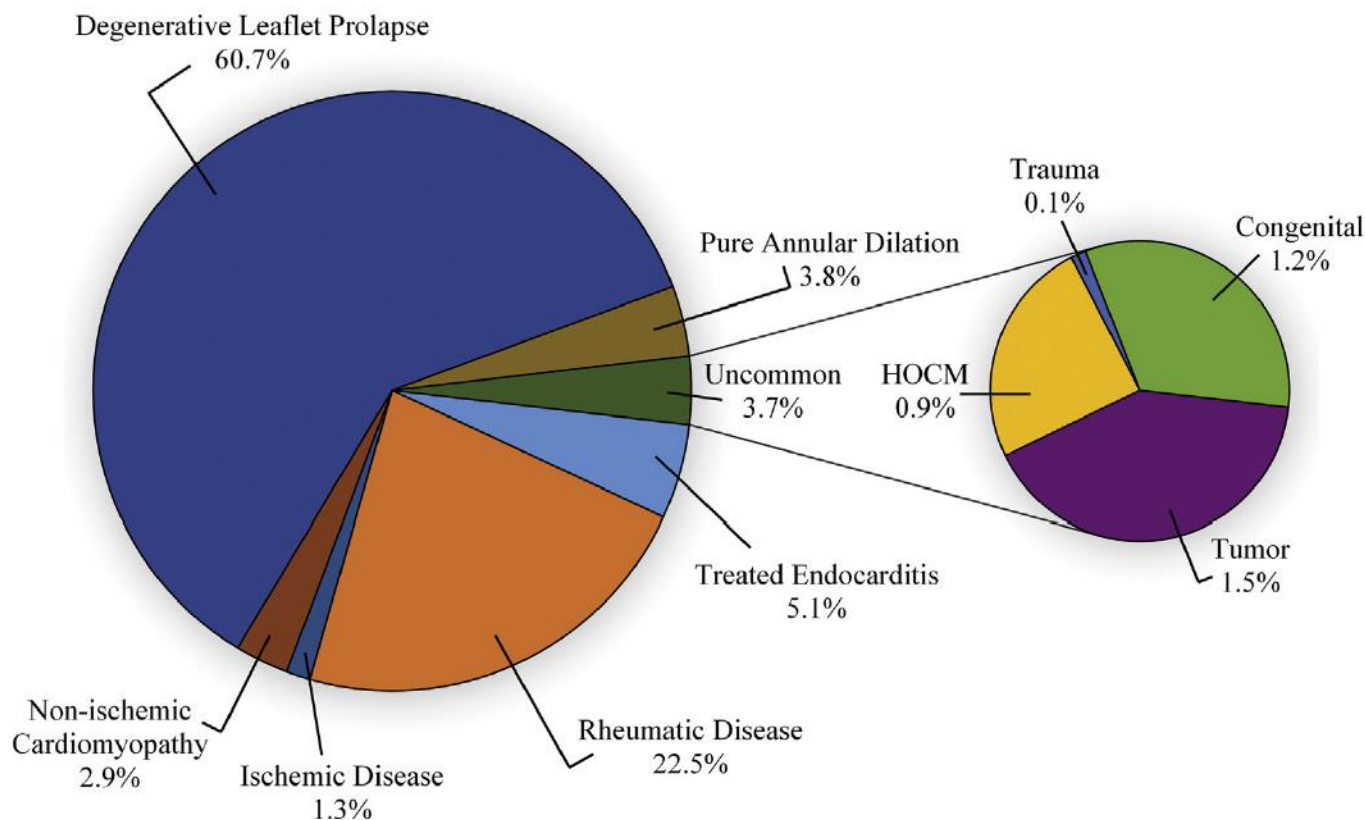


Fig 3. Proportion of patients undergoing isolated primary mitral valve operations (overall group) between 2011 and 2016 for each underlying etiology of mitral valve disease. The proportions were calculated from a subset of patients with known etiology ($n = 60,185$; unknown etiology = 31%; 27,029 of 87,214 patients). (HOCM = hypertrophic obstructive cardiomyopathy.)

Isolated Mitral Valve Surgery: The Society of Thoracic Surgeons Adult Cardiac Surgery Database Analysis

Table 1. Hierarchical Assessment of Etiologies Underlying Mitral Valve Disease and Proportion of Patients Undergoing Isolated Primary Mitral Valve Repair or Replacement Within Each Etiology Between 2011 and 2016

Etiology	Patients (n = 87,214)	Repair (%)	Replace (%)
Degenerative leaflet prolapse	36,554	82.7	17.3
Rheumatic disease	13,545	17.5	82.5
Endocarditis	3,085	48.1	51.9
Pure annular dilation	2,265	84.9	15.1
Uncommon diseases	2,219	68.2	31.8
Nonischemic cardiomyopathy	1,731	66.0	34.0
Ischemic disease	785	58.2	41.8
Unknown	27,029	67.0	33.0

CONCLUSÕES

- ***Insuf. Mitral isquêmica é uma afecção do VE e a estrutura de folhetos e cordoalha é normal***
- ***Se leve a moderada, pode regredir com a revascularização***
- ***Se moderada a grave: intervir com plastia ou prótese***
- ***Maior recidiva de regurgitação se plastia***
- ***MitraClip é opção em casos inoperáveis ou de alto risco***
- ***A correção melhora função VE imediata e qualidade de vida***
- ***Se grave, há evidências de melhor sobrevida se é tratada***
- ***Preferência biopróteses (idade e expectativa de vida)***