Dr. Diego ORNAGHI
UO di Cardiochirurgia
Istituto Clinico Humanitas – Rozzano

Insufficienza mitralica ischemica in operato di bypass criteri di indicazione e risultati

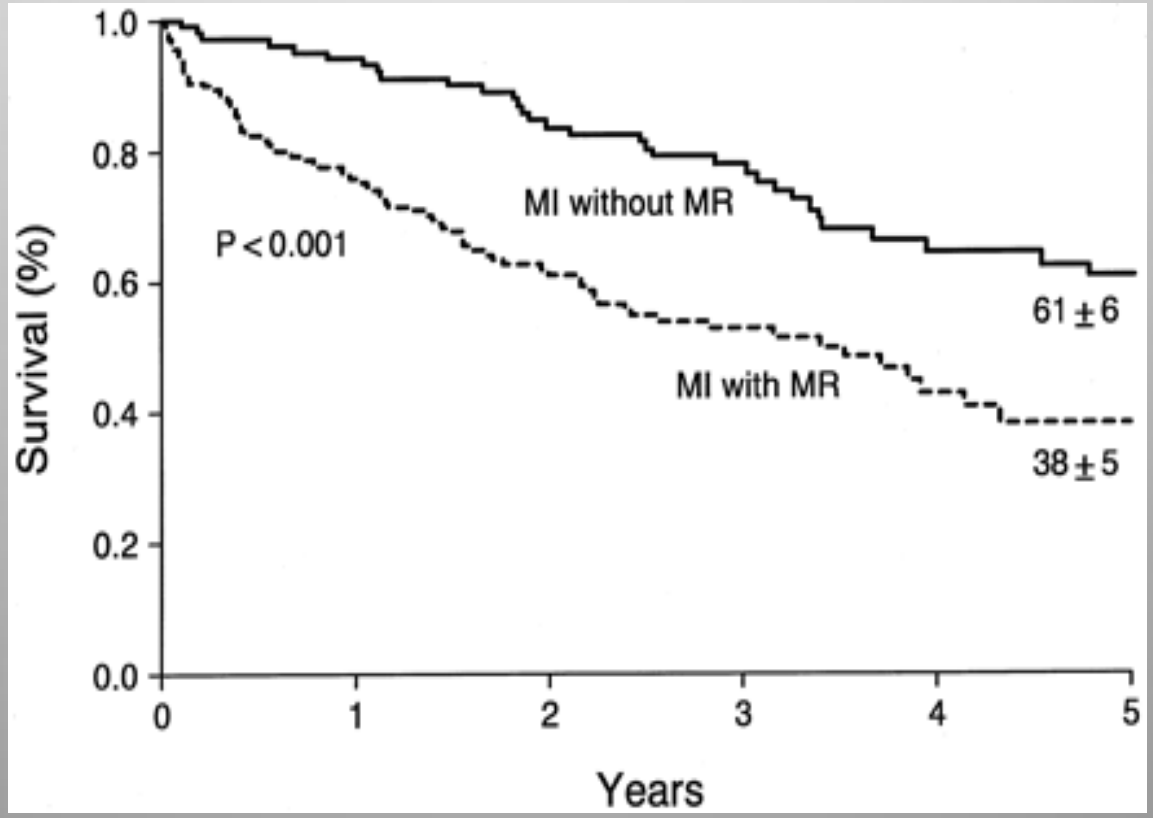
"Most often the entire valve appears normal…..There little to fix,yet the valve leaks……the valve is structurally normal;it need not be replaced, but currenly we do not know how to fix it it.."

L. Henry Edmunds,Jr

1997

Ischemic Mitral Regurgitation and Coronary Artery Bypass Grafting

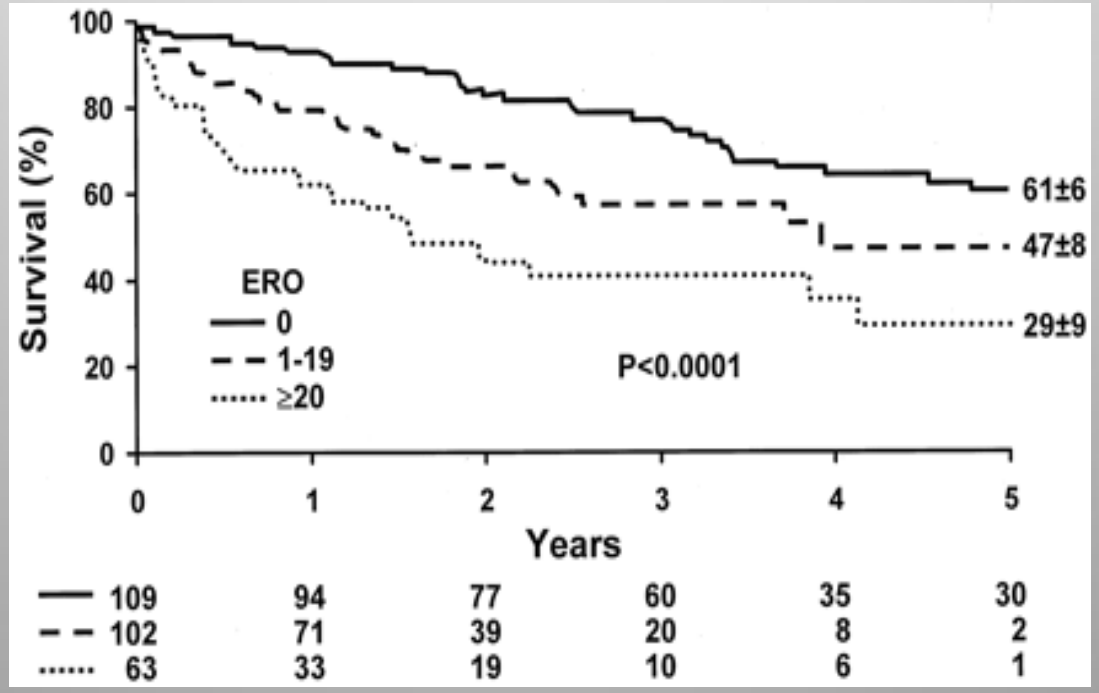
PROGNOSIS



Grigioni et al. Circulation 2001

Ischemic Mitral Regurgitation and Coronary Artery Bypass Grafting

PROGNOSIS



Grigioni et al. Circulation 2001

Ischemic Mitral Regurgitation and Coronary Artery Bypass Grafting

FREQUENCY of Ischemic MR

2.057 subjects with LV dysfunction (EF < 0.40;angiographic data)	
901 (43,8%)	None
1,156 56,2%	IMR (any grade)
811(70,1%)	Mild (grade 1-2+)
345 29,9%	Moderate-to-Severe (grade 3-4+)

Modified by Trichon BH et al Am J Cardiol 2003

Ischemic Mitral Regurgitation and Coronary Artery Bypass Grafting

CABG

MR+or less

MR 4+

?

Mild –Moderate
MR

Ischemic Mitral Regurgitation and Coronary Artery Bypass Grafting

European practice guidelines *recommend mitral valve repair*

(MVRep)in patients with severe or moderate ischemic MR and

an ejection fraction(EF) > 30% who are undergoing coronary artery bypass grafting (CABG)

Ischemic Mitral Regurgitation and Coronary Artery Bypass Grafting

CABG

MR+or less

MR 4+

?

Mild –Moderate

MR

Concomitant mitral valve repair ?

the available clinical data strongly suggest that the surgical treatment of IMR results in little, if any, survival benefit or reverse remodeling. It may be explained by the fact that slowly progressive MR due to any etiology represents a mild stimulus for remodeling that takes place to impact the ventricle, while a moderate sized MI is an intense and immediate stimulus for remodeling that is orders of magnitude more severe.

CONTRO

PRO

MR, caused by altered geometry and function after acute MI, can itself initiate remodeling. MR alters LV loading; it increases diastolic wall stress, which can induce LV dilation and failure, and end systolic wall stress, with decreased contractility and increased end-systolic volume. Because of this vicious circle, MR begets more MR.

Concomitant mitral valve repair

pro

- *Decrease funtional ischemic MR*
- *CABG alone does not predictably improve postop MR*

contro

- *CABG alone,by decreasing ischemia and improving LV function,often decrease functional ischemic MR*
- *Increase operative complexity and risk*

No randomized study - Very few direct date - Non standardised mitral valve procedure - Lack of long term follow -up - Lack of date on the post- op medical management

Circulation
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American Heart Association®

Editorial

Functional, Ischemic Mitral Regurgitation

To Repair or Not to Repair?

Michael H. Kwon, MD; Marisa Cevasco, MD, MPH; Frederick Y. Chen, MD, PhD

Randomized surgical clinical trial study

To repair or not to repair?

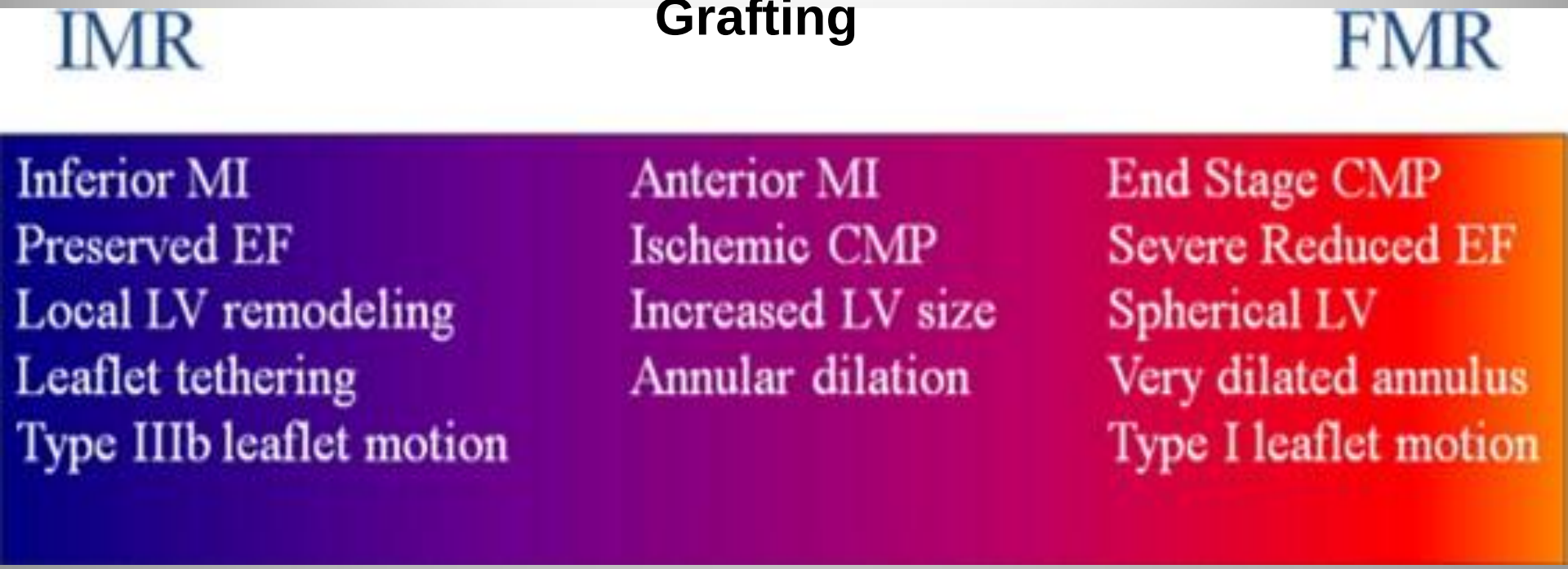
Time will tell

Durability of repair
Reverse remodelling
Survival- symptoms

Ischemic Mitral Regurgitation and Coronary Artery Bypass Grafting

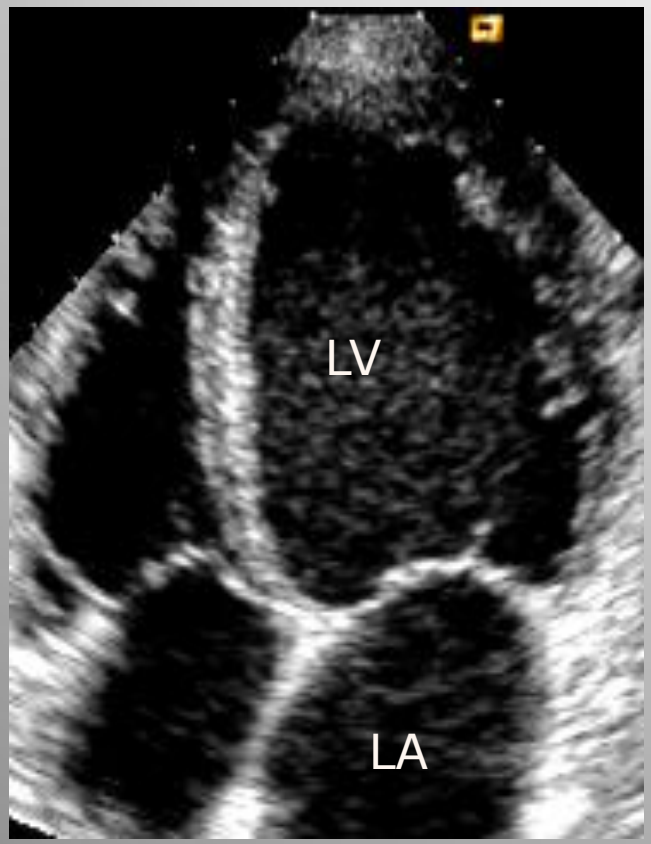
definition of chronic IMR *: "Chronic IMR should be defined as mitral regurgitation occurring more than one week after MI with (1) one or more left ventricular segmental wall motion abnormalities; (2) significant coronary artery disease in the territory supplying the wall motion abnormality; and (3) structurally normal mitral valve leaflets and chordae tendineae*."

Ischemic Mitral Regurgitation and Coronary Artery Bypass Grafting



these entities lie on a clinical continuum and cannot be precisely specified because of the heterogeneity of ischemic heart disease. It is therefore important to recognize the clinical continuum between IMR and FMR when considering the pathophysiology causing the MR

Ischemic Mitral Regurgitation and Coronary Artery Bypass Grafting



- In the chronic IMR the valve is characterized by structurally normal leaflets and normal subvalvular apparatus.

- LV dysfunction is the cause and not the consequence of regurgitation.

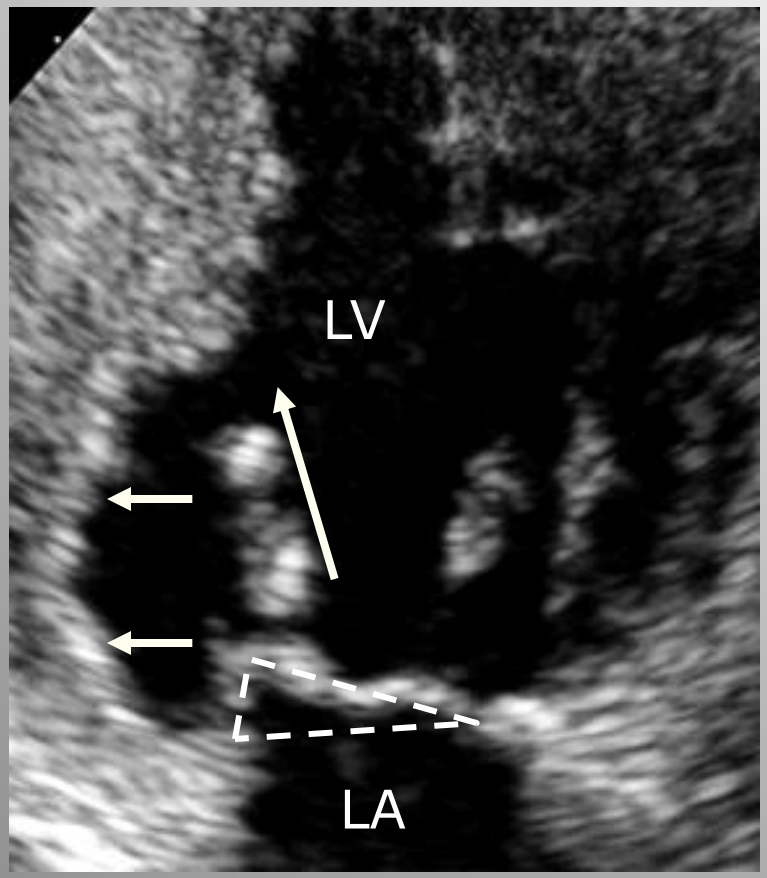
Ischemic Mitral Regurgitation and Coronary Artery Bypass Grafting

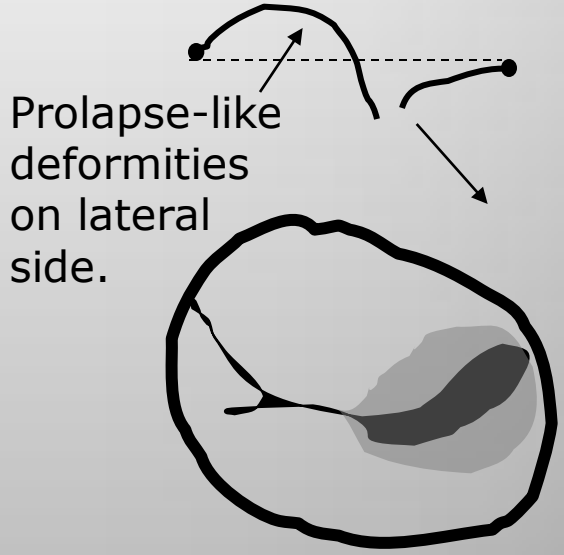
Ischemic MR caused by regional systolic dysfunction

Funtional MR caused by global systolic dysfunction

Ischemic Mitral Regurgitation and Coronary Artery Bypass Grafting

Ischemic MR caused by regional systolic dysfunction





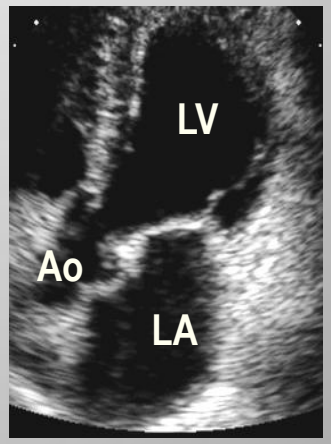
Asymmetrical PM displacement and
restriction in the motion of the medial portion of posterior leaflet.

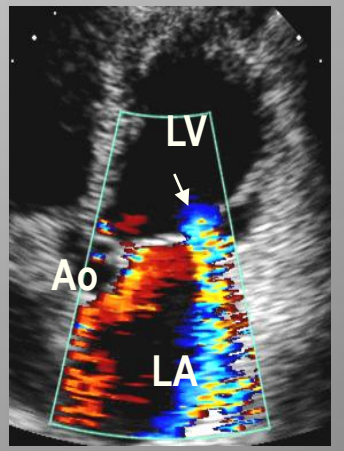
Modified by He S. et al. J Heart Valve Dis 2003

Ischemic Mitral Regurgitation and Coronary Artery Bypass Grafting

Ischemic MR caused by regional systolic dysfunction

- MR usually mild to moderate (RV $\leq$ 30ml; RF $\leq$ 25%; ERO $\leq$ 20mm^2)
- Clinically silent and diagnosed by echo during an evaluation of the underlying ischemic process
- LV function $\geq$ 40% (compensatory anterior wall motion)
- Evolution depends on extent of dysfunctioning tissue





Ischemic Mitral Regurgitation and Coronary Artery Bypass Grafting

Funtional MR caused by global systolic dysfunction

Mitral Valve Tenting area is the strongest determinant of ischemic MR severity

Ischemic Mitral Regurgitation and Coronary Artery Bypass Grafting

European Heart Journal (2005) 26, 1816–1817
doi:10.1093/eurheartj/ehi418

EUROPEAN SOCIETY OF CARDIOLOGY®

Editorial

Chronic ischaemic mitral regurgitation: exercise testing reveals its dynamic component

Patrizio Lancellotti* and Luc A. Piérard

Department of Cardiology, University Hospital of Sart Tilman, B-4000 Liège, Belgium

Online publish-ahead-of-print 29 July 2005

Ischemic Mitral Regurgitation and Coronary Artery Bypass Grafting

The effective regurgitant orifice (ERO) area of IMR is the most robust measurement. In the setting of ischaemic heart disease, an ERO ≥20 mm2 is considered severe and associated with excess mortality.

Exercise Doppler echocardiography has recently emerged as a well-suited method to quantitate the dynamic component of IMR.

Before by-pass grafting in patients with moderate IMR. I**. If a significant increase in ERO (≥13 mm**2) develops with exercise, a combined treatment, by-pass, and mitral valve surgeries might be proposed

Ischemic Mitral Regurgitation and Coronary Artery Bypass Grafting

Circulation
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Predictors of Improvement of Unrepaired Moderate Ischemic Mitral Regurgitation in Patients Undergoing Elective Isolated Coronary Artery Bypass Graft Surgery

Martin Penicka, Hana Linkova, Otto Lang, Richard Fojt, Viktor Kocka, Marc Vanderheyden and Jozef Bartunek

Circulation. 2009;120:1474-1481; originally published online September 28, 2009;
doi: 10.1161/CIRCULATIONAHA.108.842104
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Ischemic Mitral Regurgitation and Coronary Artery Bypass Grafting

An additional important contribution of the study by Penicka and colleagues is that it shifts **the focus from the mitral valve to myocardial viability and function** as the primary determinants of recovery from moderate functional ischemic MR after isolated CABG

causal therapy to manage IMR should primarily address the underlying mechanism leading to the disease of the left ventricle as opposed to systemic placement of a mitral annular ring in the dilated left ventricle

Ischemic Mitral Regurgitation and Coronary Artery Bypass Grafting

. This finding suggests that recovery of LV function by revascularization of viable myocardium or resynchronization of contractions between the papillary muscles through biventricular pacing may be the optimal therapy for addresing the mechanism underlying IMR r (ie, disease of the left ventricle).

Thus, pre-CABG assessment of myocardial viability and dyssynchrony may be useful in identifying patients who stand to benefit from isolated CABG in terms of both improved IMR and long-term outcome.

Ischemic Mitral Regurgitation and Coronary Artery Bypass Grafting

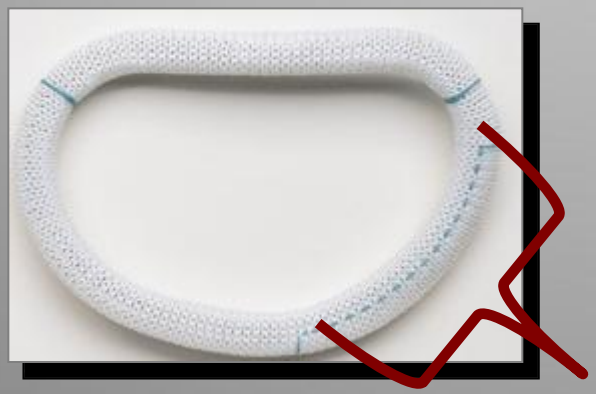
Surgical treatment

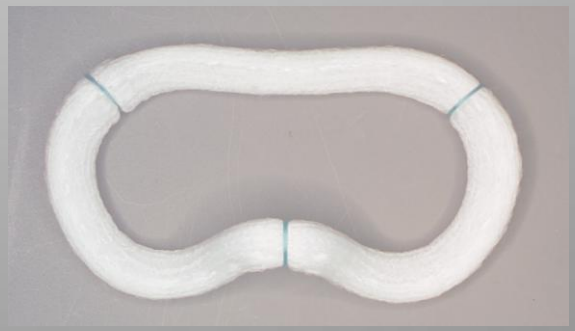
Undersized Mitral Anuloplasty

Principles of restrictive annuloplasty:

a) **Presence of annular dilatation and asymmetrical tethering of the anterior and posterior leaflet resulting in loss of coaptation surface and central IMR**

b) **Implantation of a down-sized rigid annuloplasty ring reduces the septo-lateral distance, thus allowing the valve to close correctly again**





Ischemic Mitral Regurgitation and Coronary Artery Bypass Grafting

Alternative surgical procedure

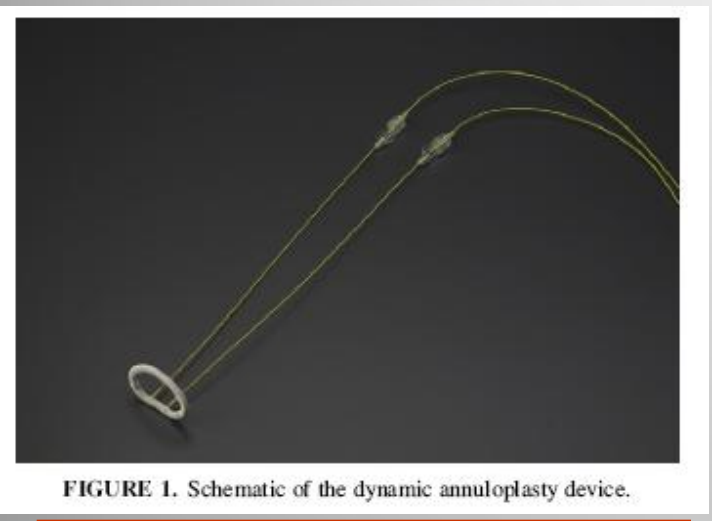
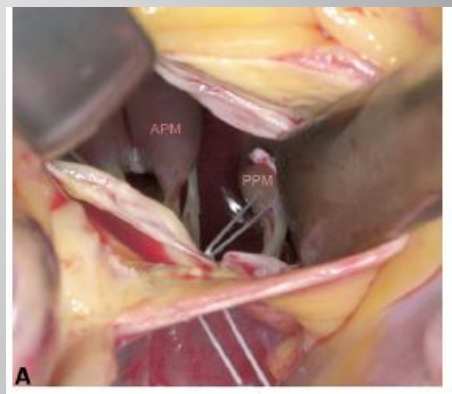


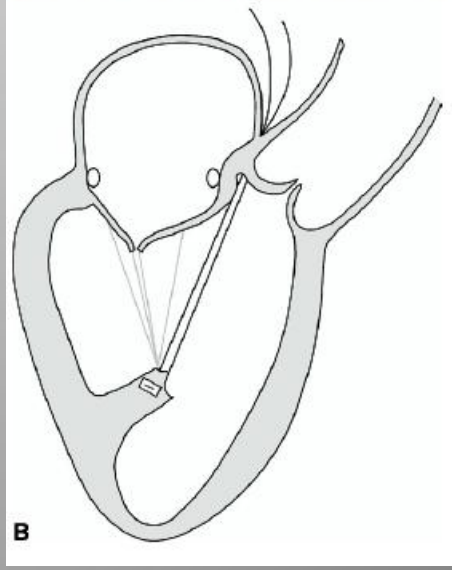
FIGURE 1. Schematic of the dynamic annuloplasty device.

Dynamic anuloplasty

Second- order chordal cutting

Surgical relocation of the posterior papillary muscle





Ischemic mitral regurgitation redux—To repair or to replace?

D. Craig Miller, MD

*Without a doubt, a role still remains for **MVR**, especially if all **anterior and posterior leaflet chordae are preserved**.*

.

very sickest patients, those with a complex MR leak or a lateral LV wall motion abnormality, and patients with considerable apical leaflet tenting

… tissue valve is indicated because very few of these patients will actually live long enough to sustain structural deterioration of their bioprosthesis

Moderate-severe IMR- CABG

Leak is centrally directed
Retraction posterior leaflet
Anular dilatation

→ Ring anuloplasty

↓ ↑

Leak is complex – laterl wall infarct- tenting area >1 cm

→ Mitral valve replacement

Mild –moderate IMR

↓

Exercise doppler echocardiography

Vitality'(MR)-papillary muscle dissynchrony

↓

Mitral treatment+CABG

CABG alone