

The background of the slide is a photograph of a large, ornate historic building, likely a cathedral or church, illuminated at night. The building features a prominent dome with a lantern on top, and its facade is adorned with intricate carvings and statues. The lighting is warm, highlighting the architectural details against a dark blue night sky. The text is overlaid on the right side of the image.

How to manage severe heart failure complicated by mitral and tricuspid regurgitation

Advances in Cardiac Arrhythmias and Great Innovations in Cardiology

Turin, October 24th 2014

Barry A. Boilson MD

Mayo Clinic

Presenter Disclosure Information

Relevant Financial Relationship(s)

None

Off Label Usage

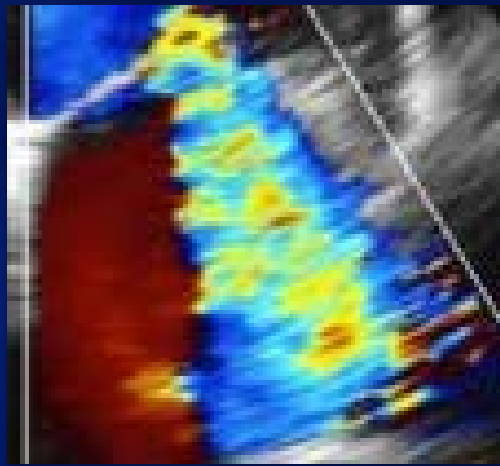
None

Which patients are we referring to?

- Patient presents with symptoms and signs of CHF
- MR and or TR noted on echocardiography/ clinically
- What to do?

Valve disease in CHF

- MR and TR are common in patients with CHF



- Traditionally, much is made of primary vs. secondary
- In the setting of CHF, not so simple

Objectives

- To discuss mechanisms of MR and TR in CHF
- To review the instances where percutaneous or surgical intervention are helpful
- To appreciate the importance of remodeling

Remodeling



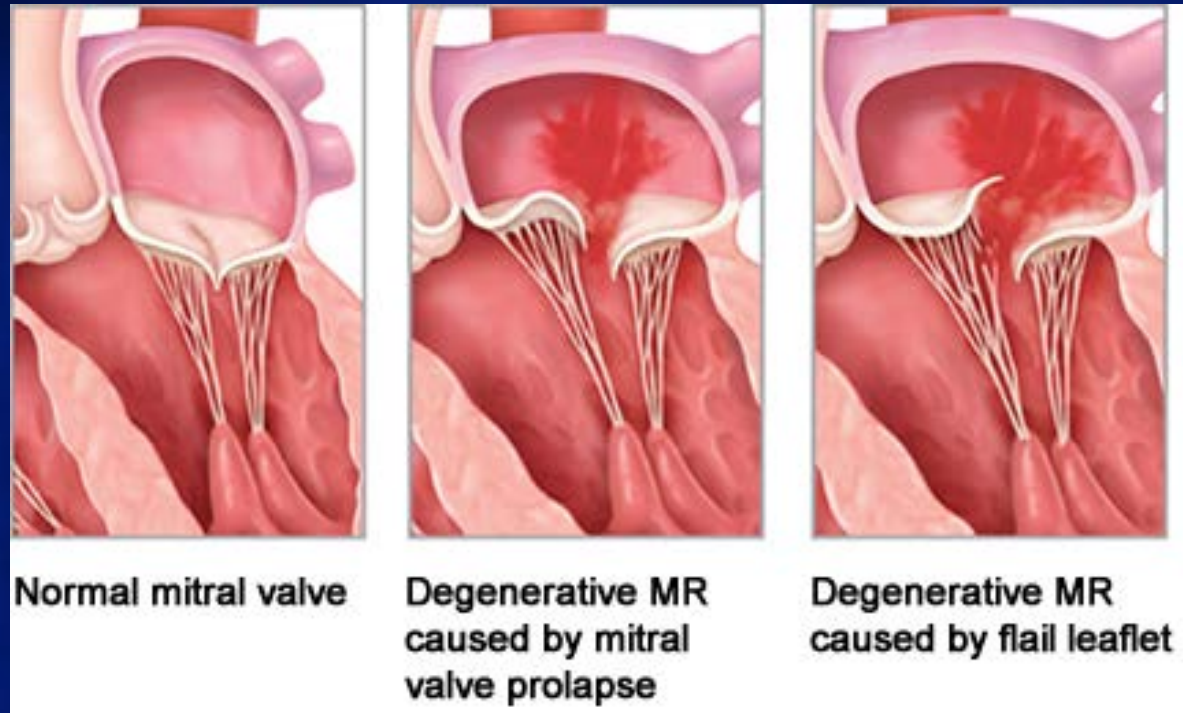
Primary disease

- The valve is structurally abnormal
- Valve repair or replacement can be curative
- Need to intervene before the “point of no return”

Primary MR

- **Primary valve lesions**

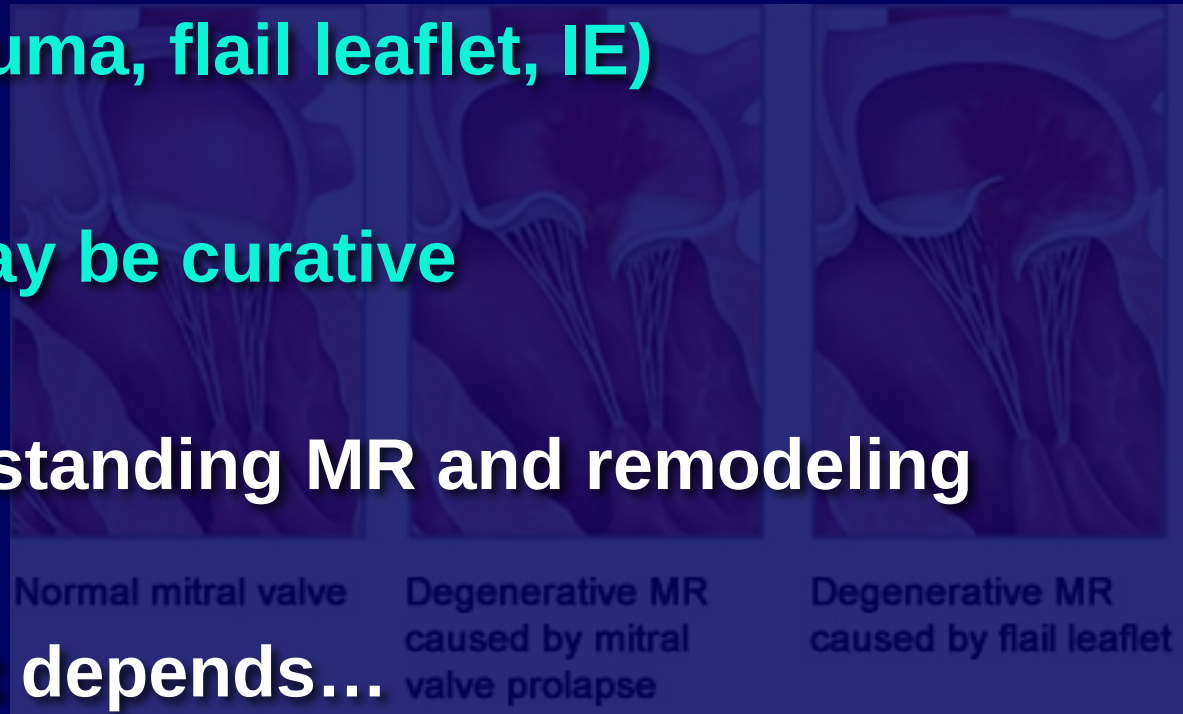
- Mitral valve prolapse
- Infective endocarditis
- Rheumatic heart disease
- Trauma
- Congenital



Primary MR

Patients with primary MR may present in HF

- **Acute injury (trauma, flail leaflet, IE)**
 - Infective endocarditis
 - **Surgery may be curative**
 - Rheumatic heart disease
- **Often more longstanding MR and remodeling**
 - Trauma
 - Congenital
 - **Surgery? It depends...**



Remodeling

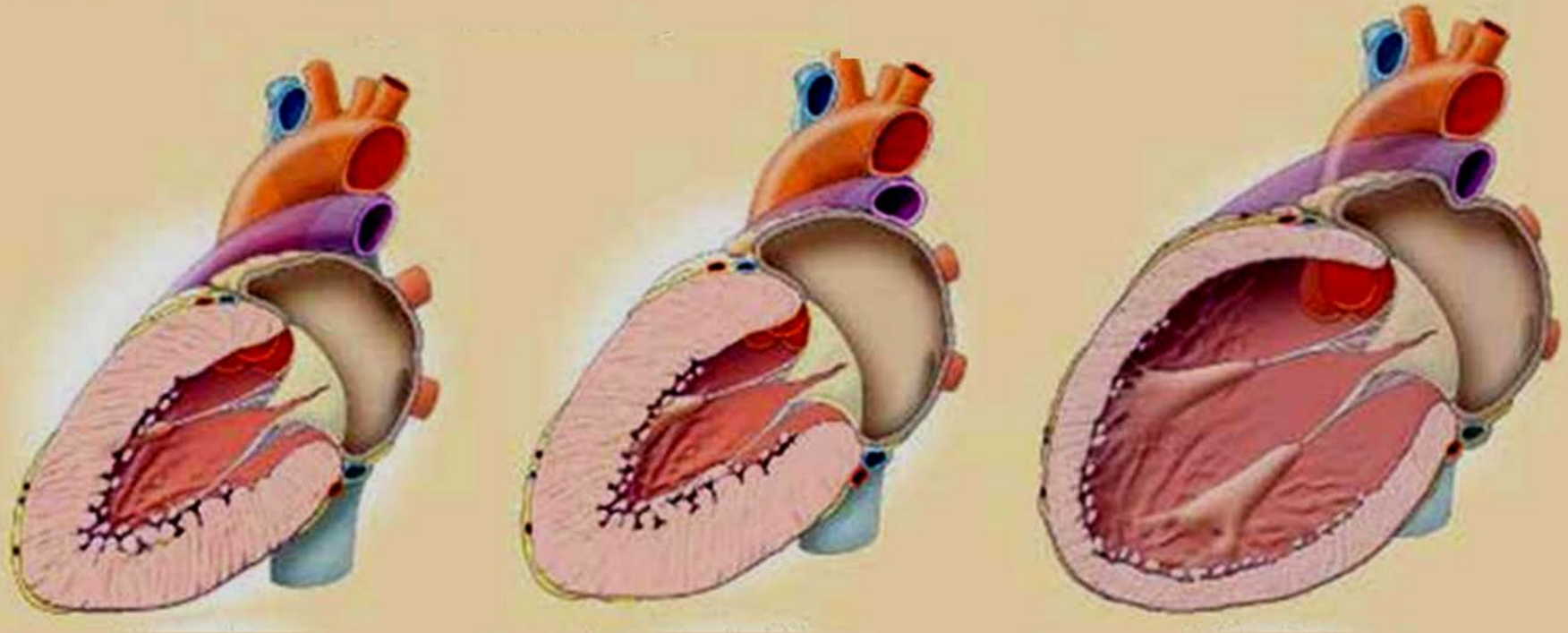


**Constructive
Adaptive**



**Destructive
Maladaptive**

Pathophysiology of Volume Overload



Normal

**Eccentric
Hypertrophy**

Dilated phase

“The point of no return”?

3 stages of remodeling in regurgitant valve disease:

Compensated minimal or none

Transitional eccentric/early dilated
reversible

Decompensated advanced dilated
irreversible

“The point of no return”?

3 stages of remodeling in regurgitant valve disease:

Compensated minimal or none

Transitional eccentric/early dilated
***** *reversible*

Decompensated advanced dilated
 irreversible



BEST PAYOFF FOR INTERVENTION

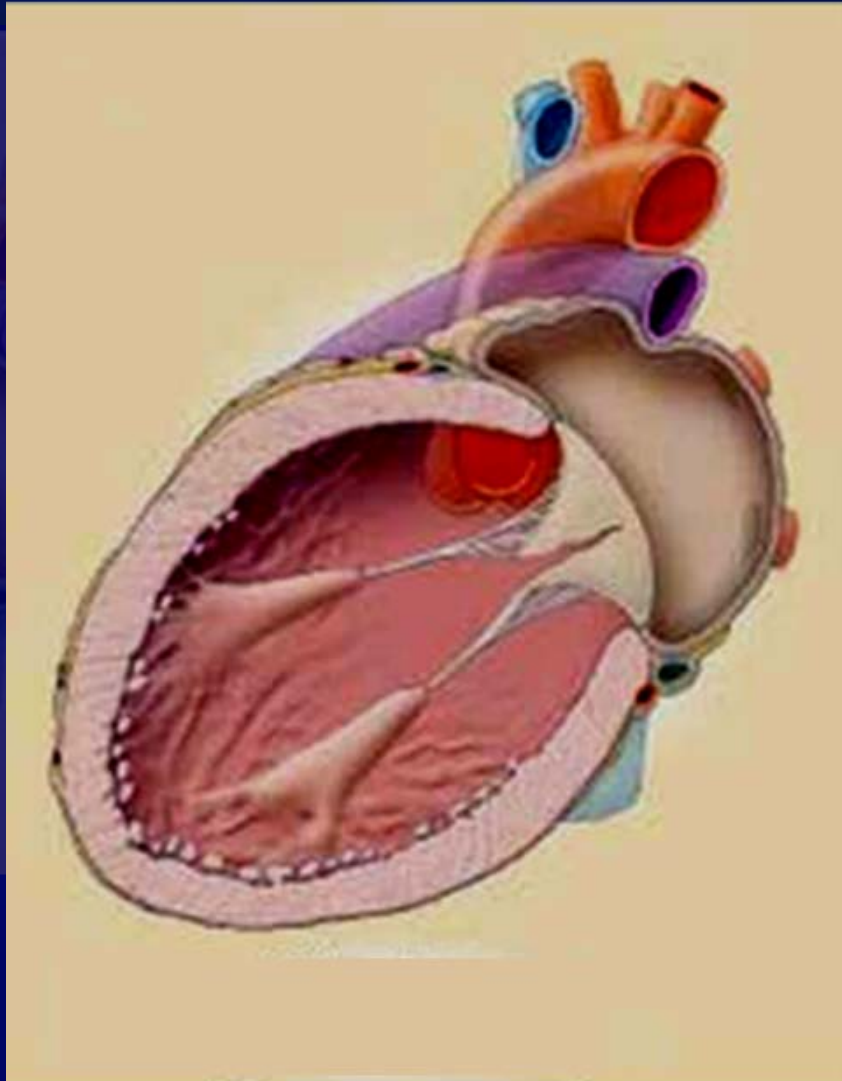
Echo criteria

- **Compensated stage**
LVEDD < 60 mm
LVESD < 40 mm
Normal LVEF
- **Decompensated stage**
LVEDD > 70 mm
LVESD > 45 mm
LVEF < 50 to 55 %
- **Transitional** – not clearly defined,
(somewhere in between)

Remodeling – Dilated phase

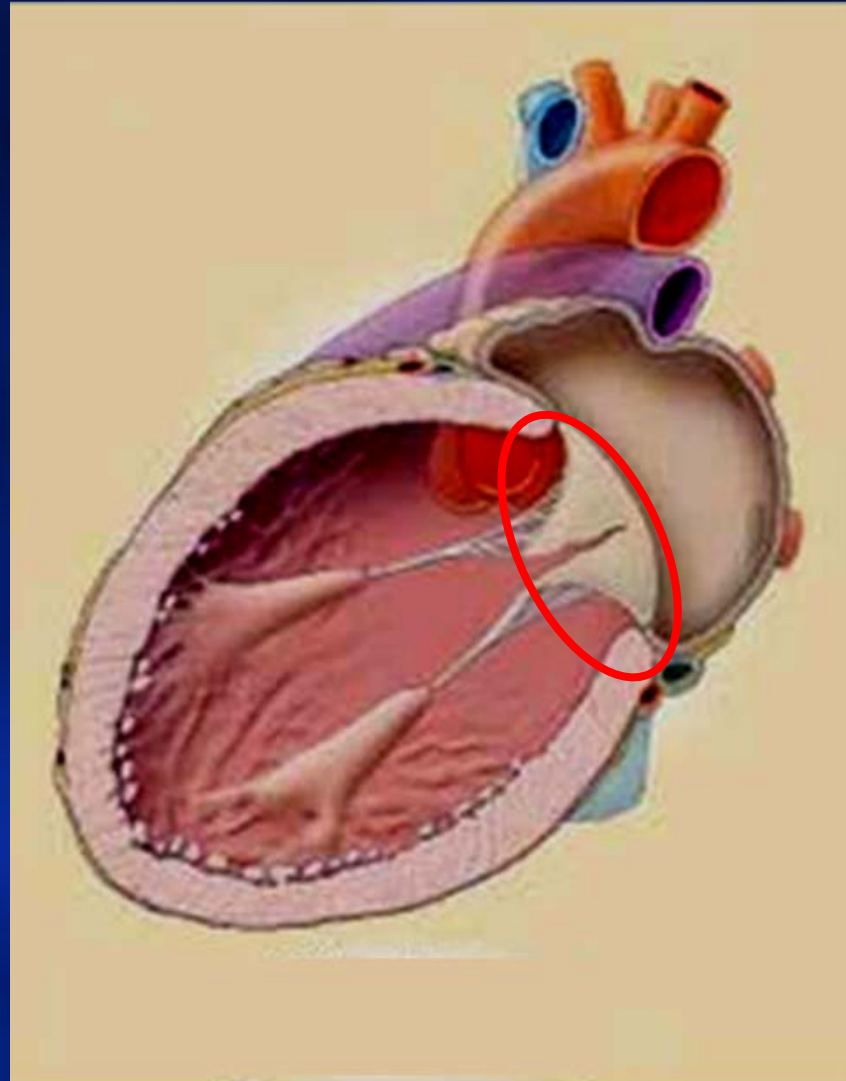


Normal



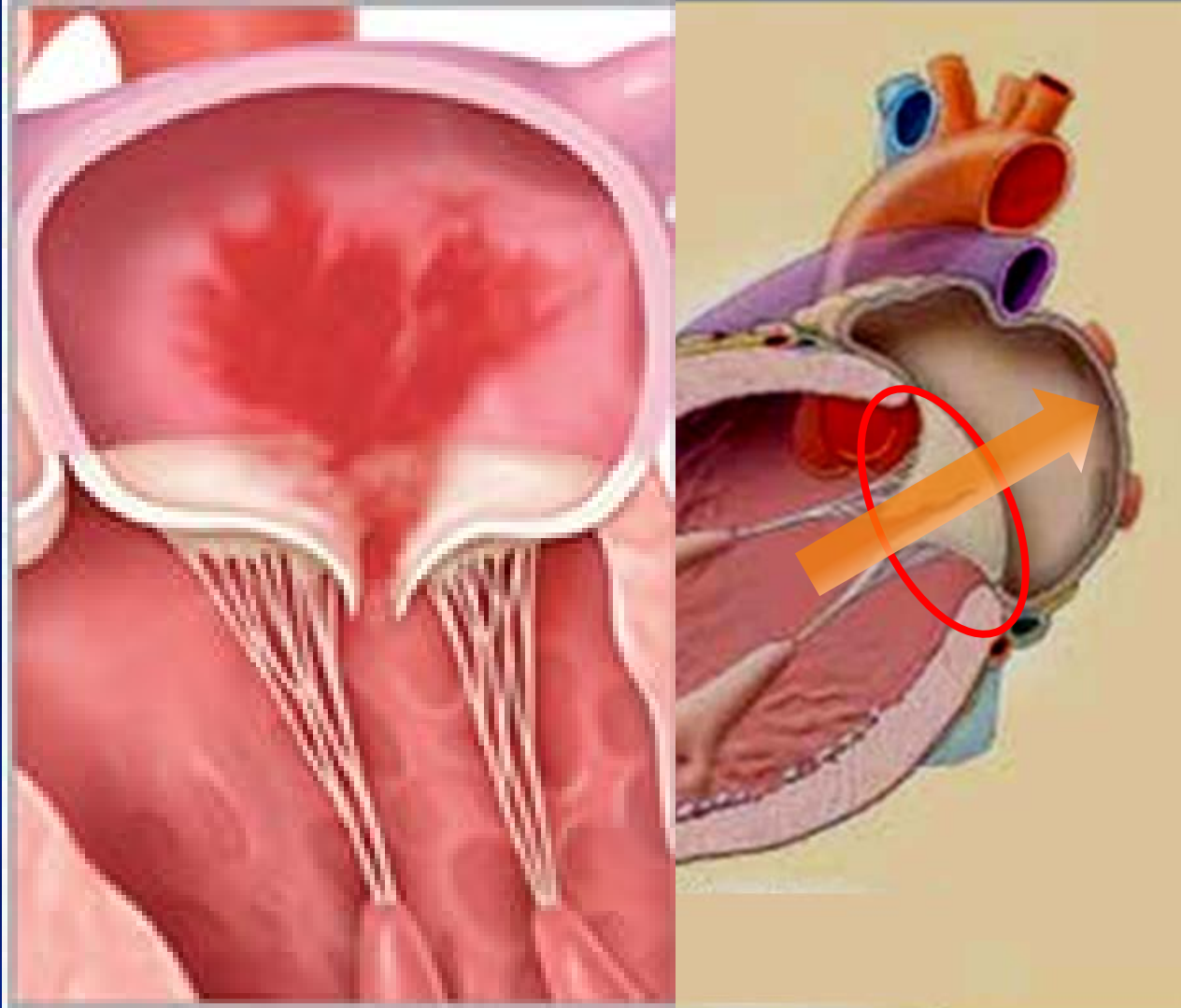
Dilated phase

Remodeling – Dilated phase



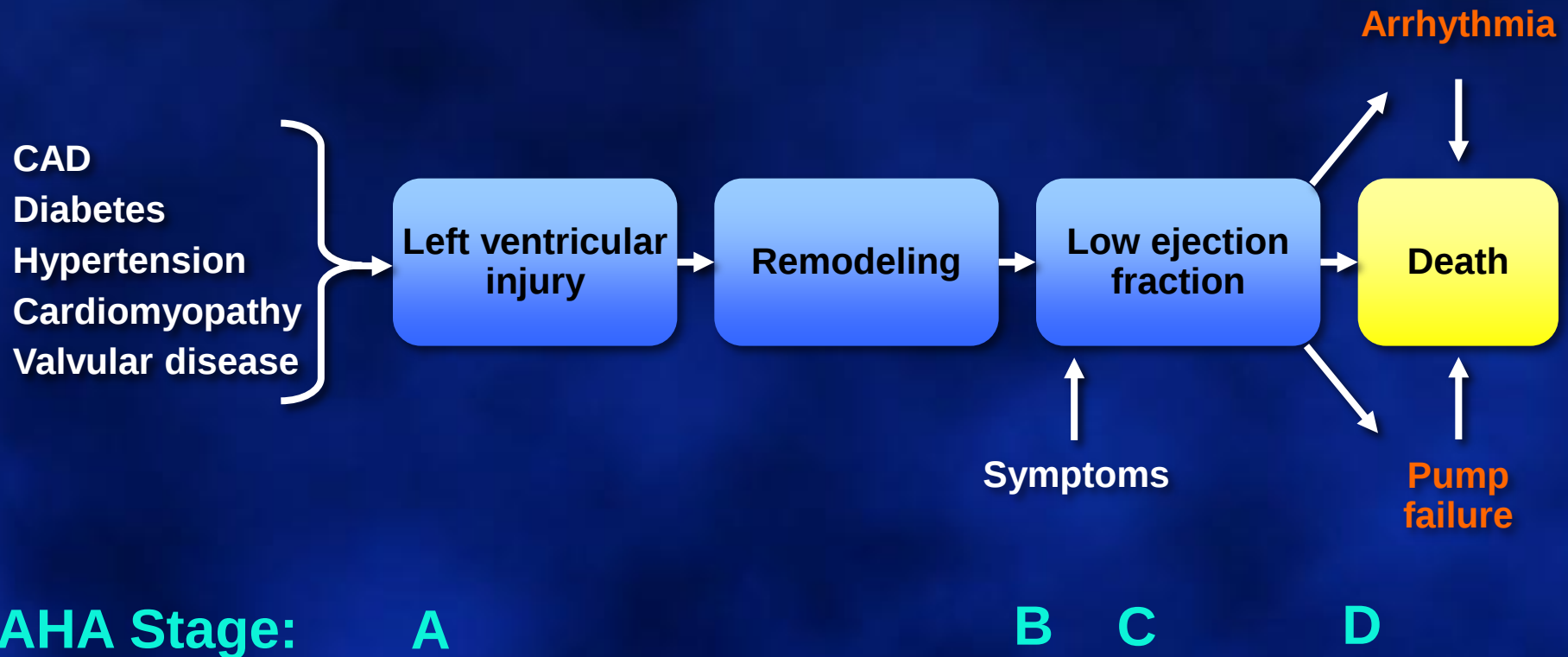
**annular
dilatation**

Remodeling – dilated phase



**Functional
(secondary)
MR**

Secondary MR/TR - Remodeling



Secondary MR - Treatment

- Treat remodeling

ACEI/ARB

Beta blocker

Spironolactone/ diuretics

Secondary MR – Surgery?

- Mitral valve repair

Anecdotal reports of ↑EF, ↓LVEDD
(chordal sparing)

Bach et al. Am Heart J. 1995;129(6):1165

Bolling et al. J Thorac Cardiovasc Surg. 1998;115(2):381

No proven long term benefit

Wu et al. J Am Coll Cardiol. 2005;45(3):381

Not generally recommended in major
society guidelines

ACC/ESC/HFSA/ISHLT

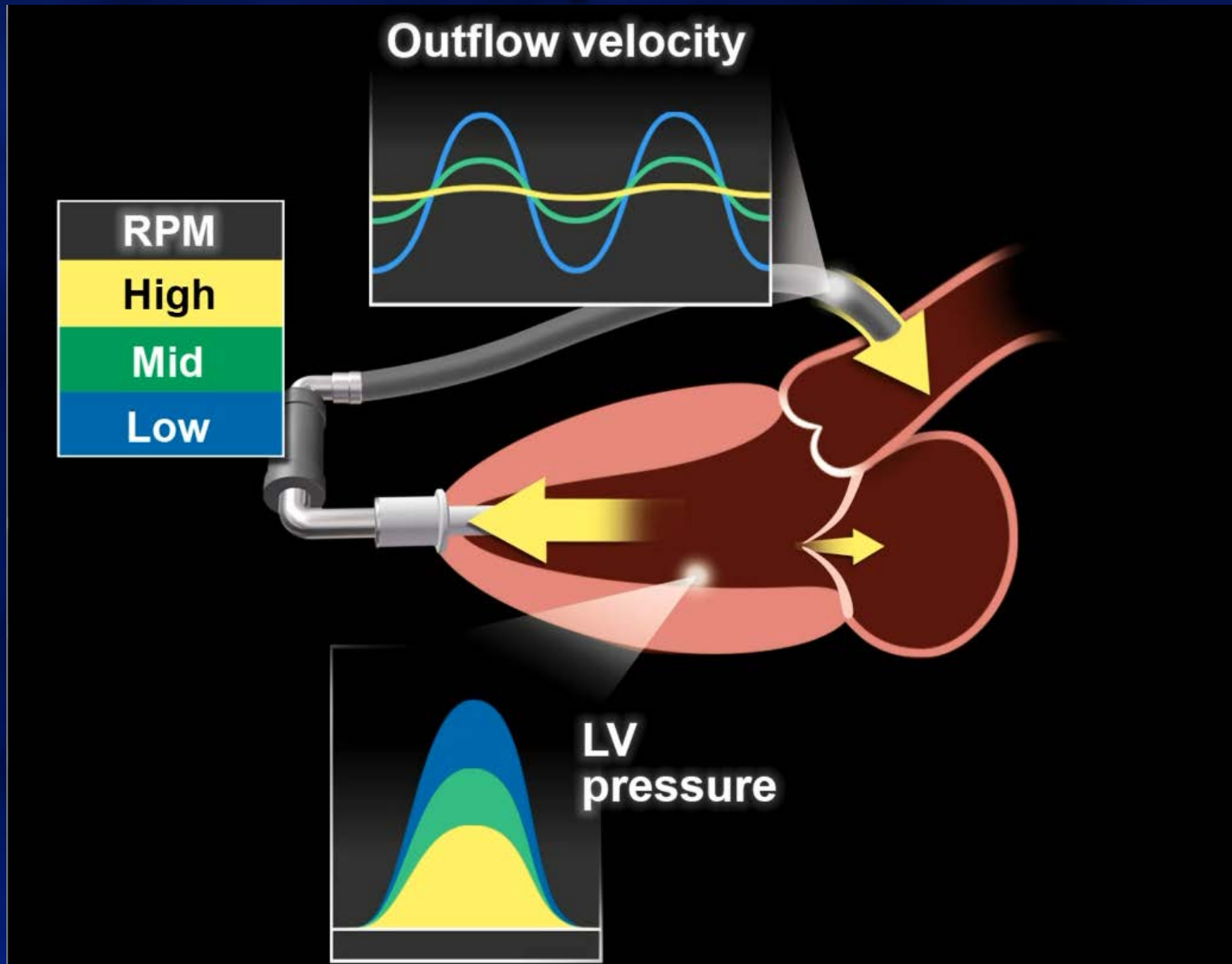
Secondary MR – CRT

- **Cardiac resynchronization therapy**

- CRT promotes favorable remodeling in responders
- CARE-HF/ MIRACLE - LVEDD and regurgitant jet in area in pts with mild-mod MR
[Cleland et al. N Engl J Med. 2005;352\(15\):1539](#)
[Abraham et al N Engl J Med. 2002;346\(24\):1845](#)
- May improve severe MR in up to 50% - less likely in ischemic MR

[Circulation. Van Bommel et al. 2011;124\(8\):912](#)

Secondary MR – LVAD



Secondary MR

- In most cases is due to progressive LV remodeling
- Other causes:
 - Ischemia
 - Chronic RV pacing/ LBBB

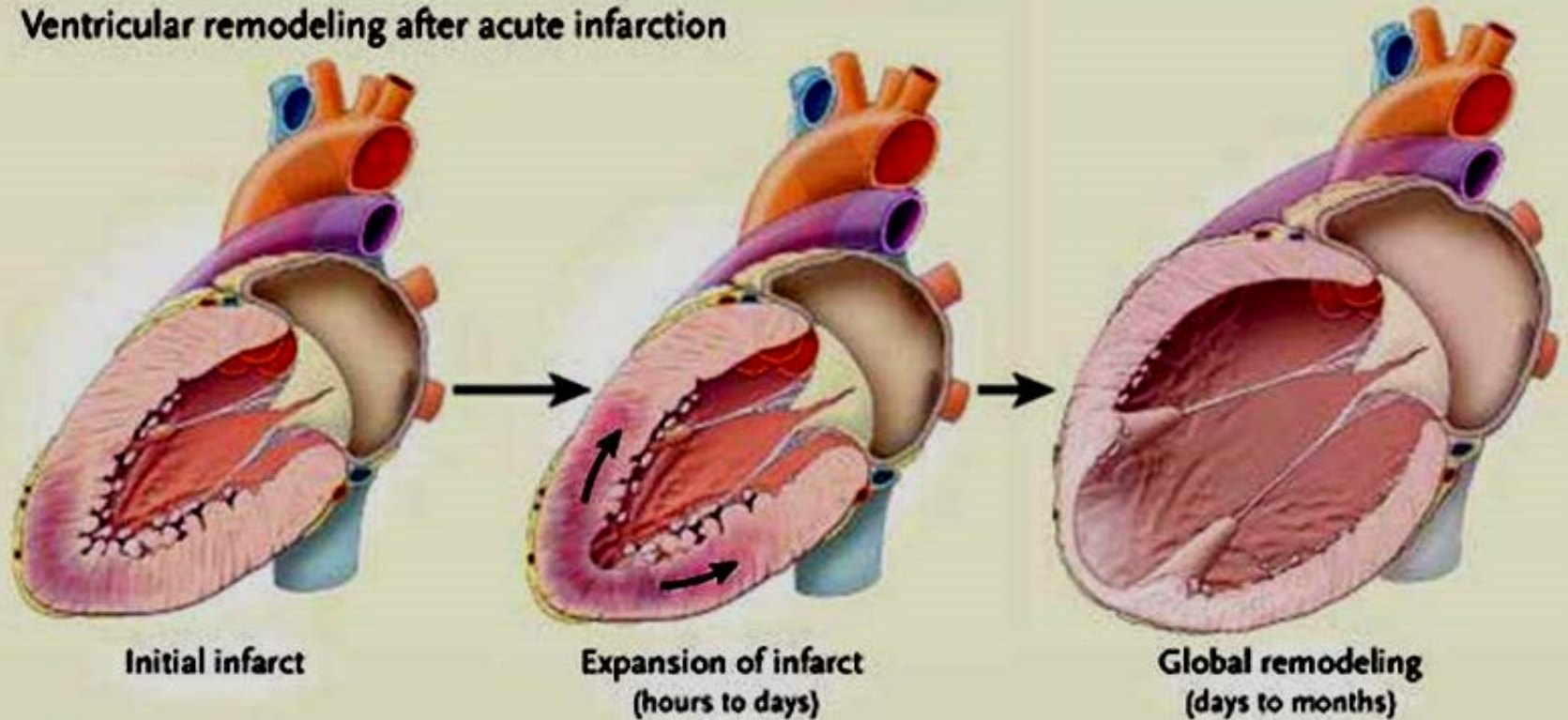


Ischemic MR

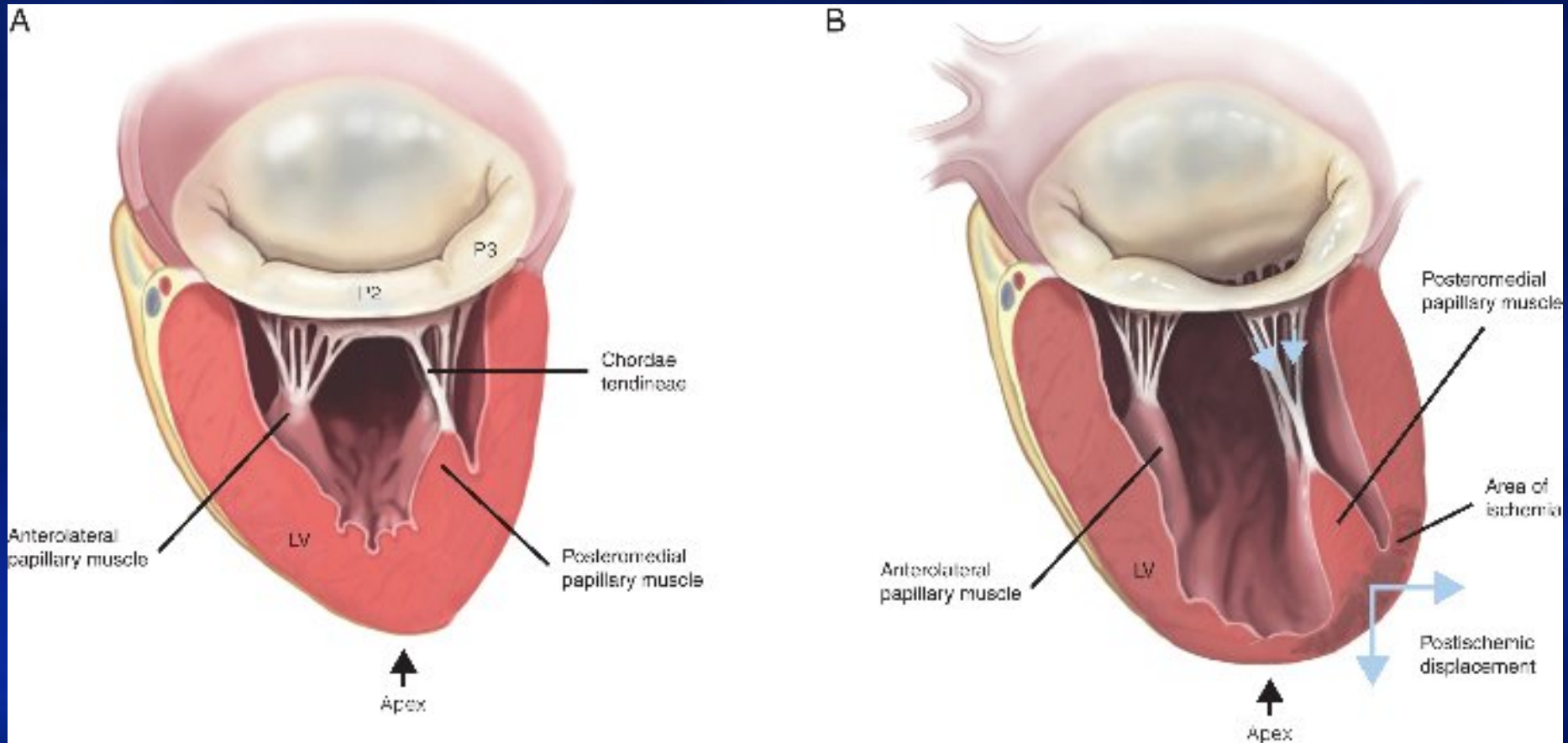
- “post infarction MR”
- Papillary muscle injury – localized remodeling
- Papillary muscle *displacement* rather than dysfunction
- Shortening of MV apparatus (tethering)

Remodeling after MI

A Ventricular remodeling after acute infarction



Papillary muscle remodeling



Ischemic MR - revascularization

- MR in the setting of acute MI may benefit from revascularization

Leor et al. J Am Coll Cardiol. 1993;21(7):1661

- Late revascularization
 - Less benefit post CABG

Penicka et al. Circulation. 2009;120(15):1474

- Viability at PET may identify potential responders

Diodato et al. Ann Thorac Surg. 2004;78(3):794

Ischemic MR – MV repair/replace

- **If candidate for CABG, moderate to severe MR**
 - MV surgery reasonable (repair preferable)

ESC/ ACC/AHA guidelines

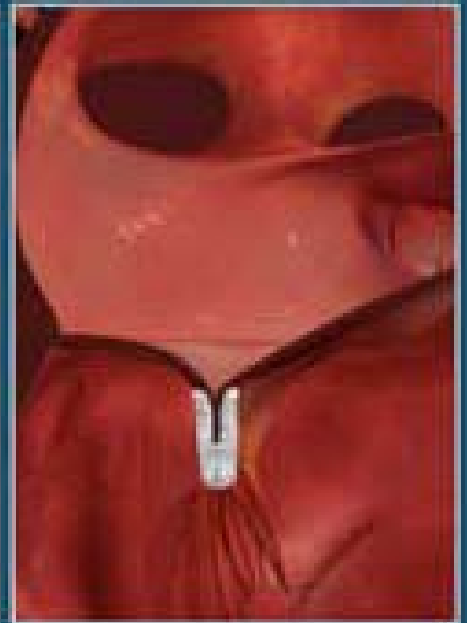
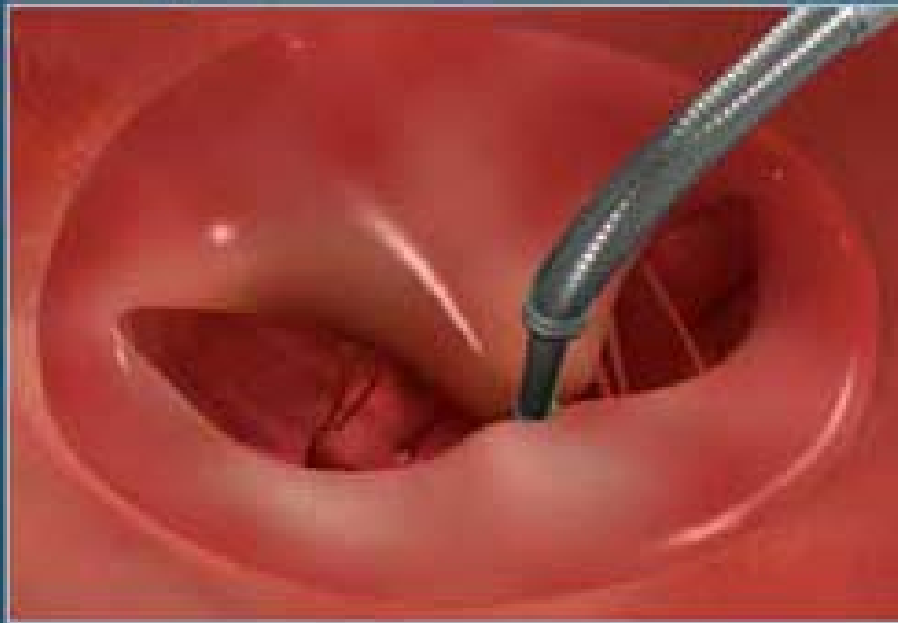
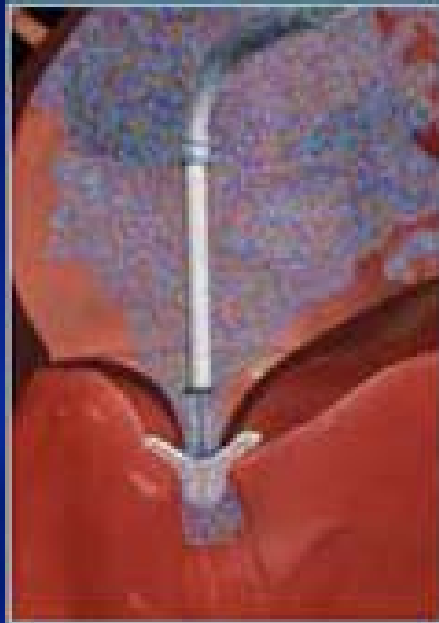
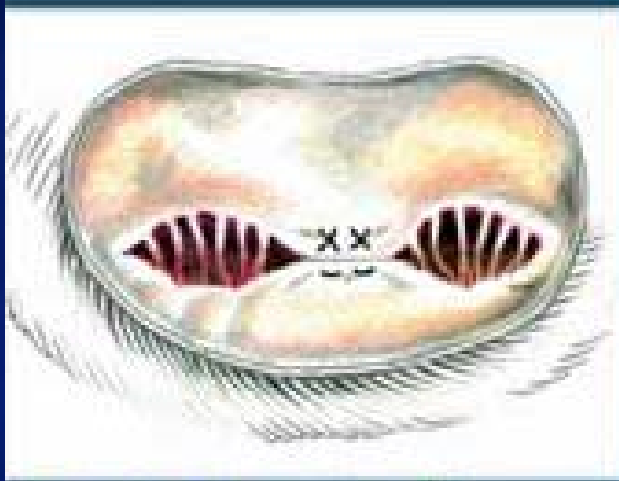
- Symptomatic benefit, no survival advantage

Kang et al. Circulation. 2011;124(11 Suppl):S156

Fattouch et al. J Thorac Cardiovasc Surg. 2009;138(2):278

- **Acute MR in the setting of MI**
 - Papillary muscle rupture
 - Surgery recommended (mortality 20-25%)
 - Survival with medical therapy alone very poor

MitraClip – *will it change practice?*



MitraClip – *will it change practice?*

- **EVEREST II trial**

Lower composite efficacy rate for MitraClip but significantly lower MACE

Feldman et al. N Engl J Med. 2011;364(15):1395

Glomer et al. J Am Coll Cardiol. 2014 Jul 15;64(2):172-81

- **May have a role for high risk patients who would otherwise be considered for MVR**
- **Recent data favorable for pts with HF and functional MR**

Pleger et al. Eur J Heart Fail. 2013 Aug;15(8):919-27

Nickenig et al. JACC 2014 Sep 2;64(9):875-84

Tricuspid Regurgitation

- Most TR is secondary to left heart disease

Secondary pulmonary hypertension
Adverse RV remodeling

- Conventional Rx for LV dysfunction
- Loop diuretics/ spironolactone
- Refractory - ultrafiltration

Tricuspid Regurgitation - *Surgery*

- **Left sided valve surgery**
 - severe TR
 - <severe (annular dilation/RVF)
 - repair preferable

AHA/ACC 2014 ESC 2012 Guidelines

- **LVAD** and at least moderate TR

- **Pacing Leads?**

Lead extraction may not reduce TR if annular dilatation

Nazmul et al. Europace. 2013 Mar;15(3):409-13

Take home messages

- 1.** Once significant remodeling has occurred, MR etiology may be less important
- 2.** Management is primarily medical therapy to promote favorable remodeling and treat CHF
- 3.** CRT may be of benefit
- 4.** In setting of CABG, MV repair/rep reasonable
- 5.** Mitraclip, role as yet unclear in advanced HF
- 6.** TR, treat left heart disease and diurese
- 7.** If left heart surgery planned (CABG-MVR/LVAD) tricuspid valve repair/replacement reasonable.



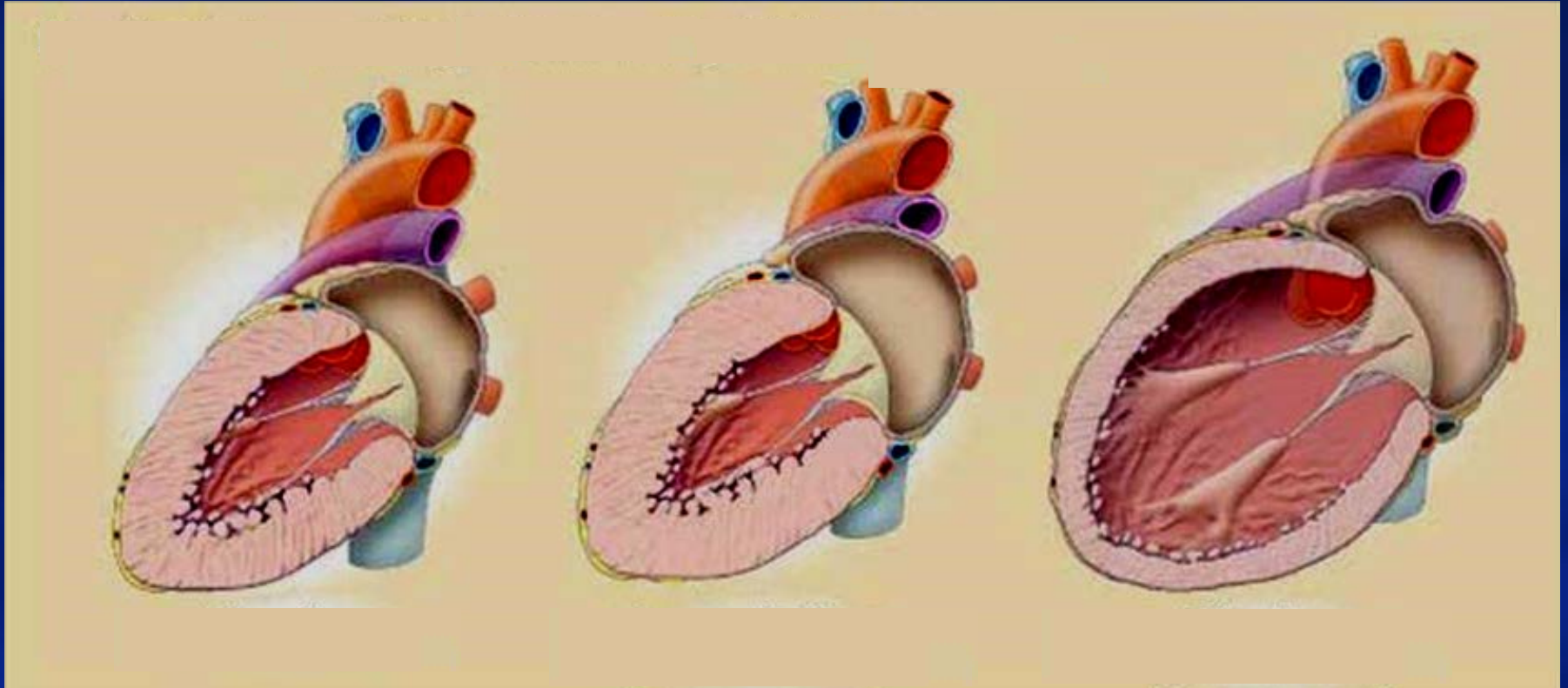
MAYO CLINIC

boilson.barry@mayo.edu

Remodeling



Pathophysiology of Volume Overload



Secondary MR/TR - Remodeling

- Valve leaflets and papillary muscles are normal
- Dilatation, decrease in contractility
- Annular dilatation, displacement of papillary muscles
- Increase in end-diastolic filling pressures
- Regurgitation
- (diagram)