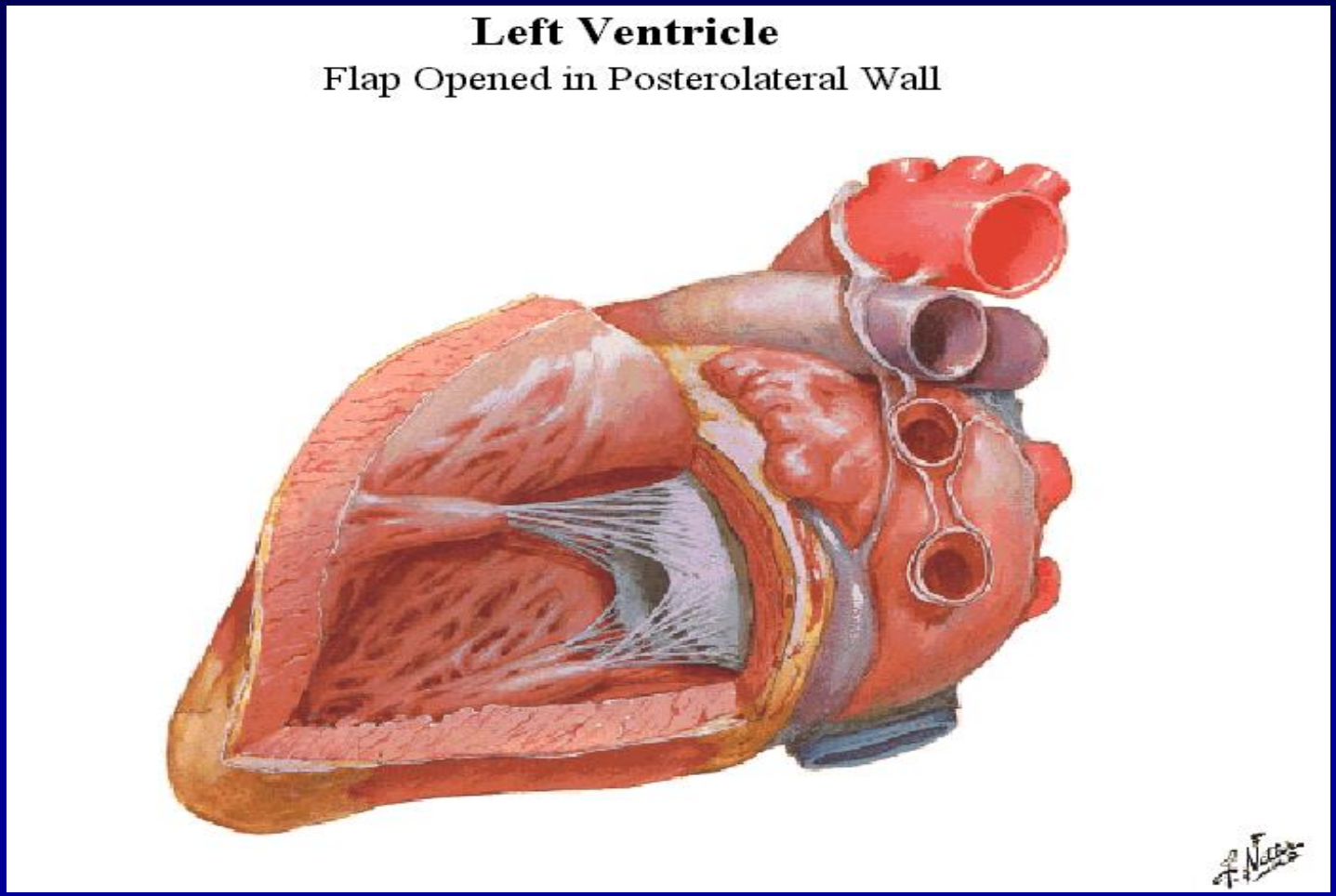
Acute Mitral regurgitation

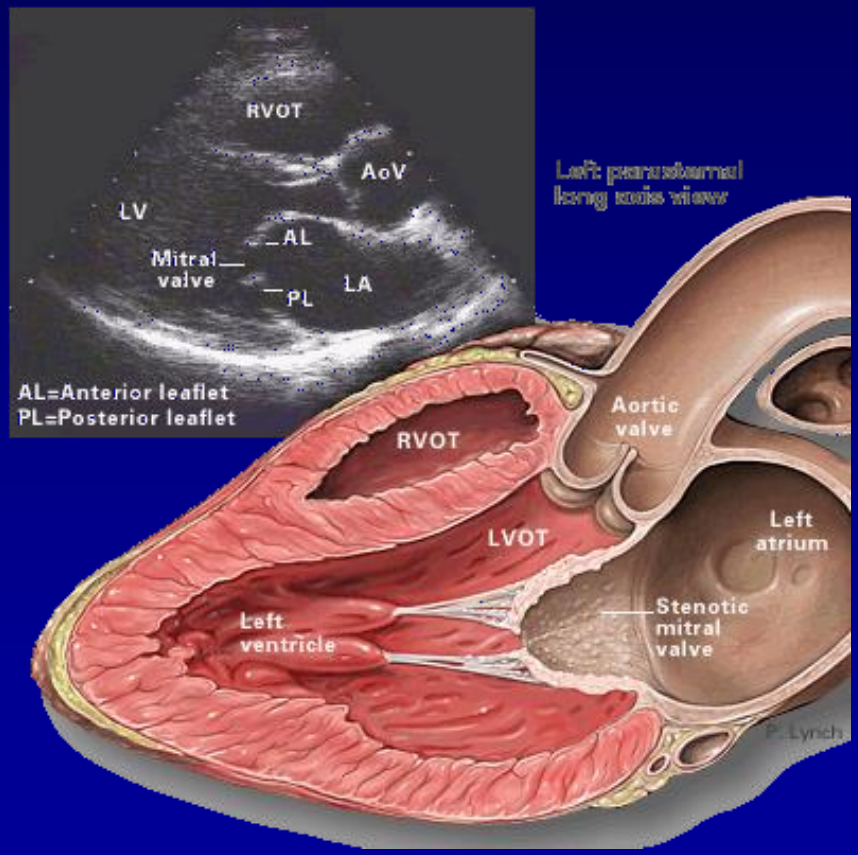
Dan Gilon MD

Heart Institute

Hadassah-Hebrew University Medical Center

Mitral valve anatomy




RVOT
AoV
LV
AL
Mitral valve
PL
LA
AL=Anterior leaflet
PL=Posterior leaflet
Left parasternal long axis view
Aortic valve
RVOT
LVOT
Left atrium
Stenotic mitral valve
Left ventricle

Acute MR

- Mitral Annulus Disorders
- Mitral Leaflet Disorders
- Rupture of Chordae Tendinae
- Papillary Muscle Disorders
- Primary Mitral Valve Prosthetic Disorders

Braunwald & others

Acute MR

- Mitral Annulus Disorders:
  - Infective Endocarditis (Abscess)
  - Trauma (heart surgery
  - Paravalvular leak caused by suture
-

Braunwald & others

Acute MR

- Mitral Leaflet Disorders:
  - Infective endocarditis
  - Trauma
  - Tumors (myxoma)
  - Myxomatous degeneration
  - SLE (Libman-Sacks lesions) Braunwald & others

Acute MR

- Rupture of Chordae Tendinae:
  - Spontaneous
  - Myxomatous degeneration
  - Infective Endocarditis
  - Acute Rheumatic Fever
  - Trauma

Braunwald & others

Acute MR

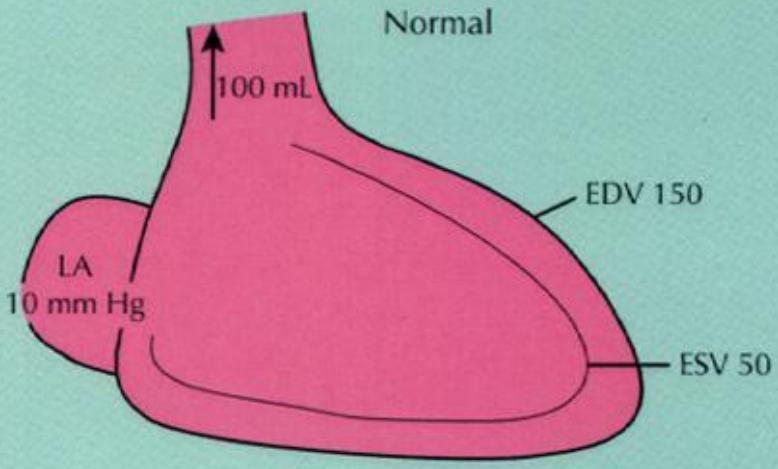
- Papillary Muscle Disorder:
  - CAD
  - Acute global LV dysfunction
  - Infiltrative diseases (amyloidosis, sarcoidosis)
  - Trauma

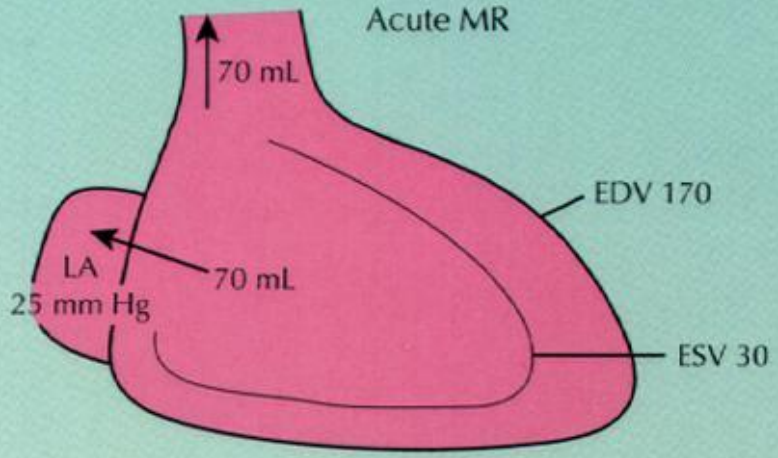
Braunwald & others

Acute MR

- Primary Mitral Valve Prosthetic Disorders

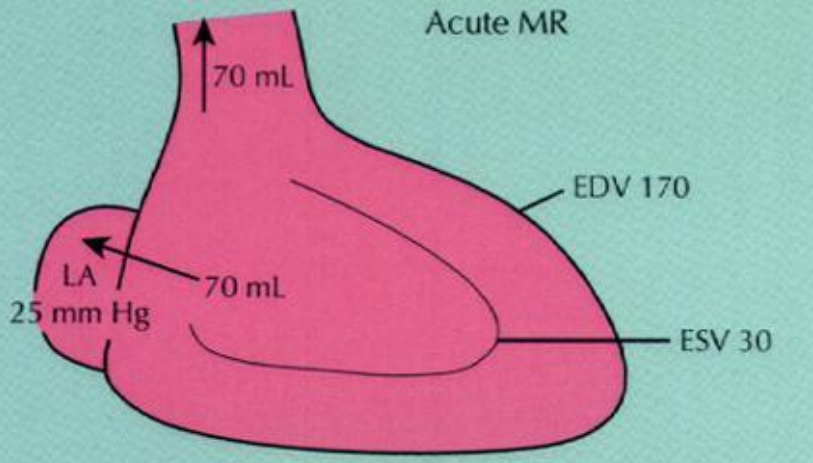
Braunwald & others

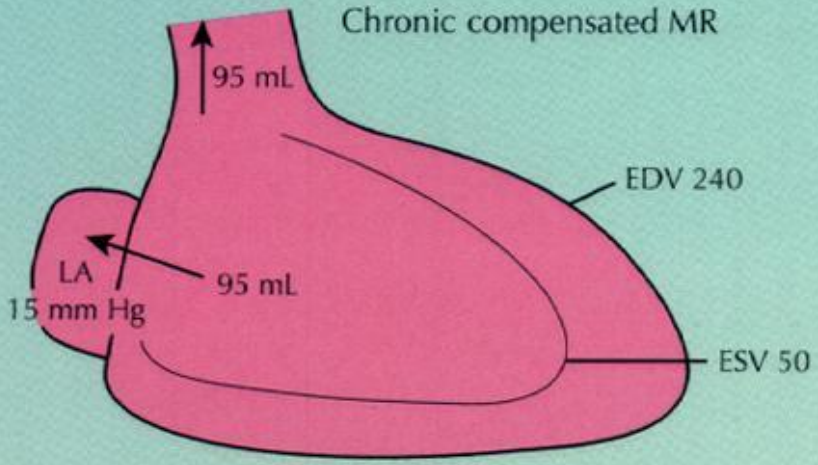




	Preload SL, μ	Afterload ESS, *Kdyne/cm²*	CF	EF	RF	FSV, *mL*
N	2.07	90	N	0.67	0.0	100
AMR	2.25	60	N	0.82	0.50	70

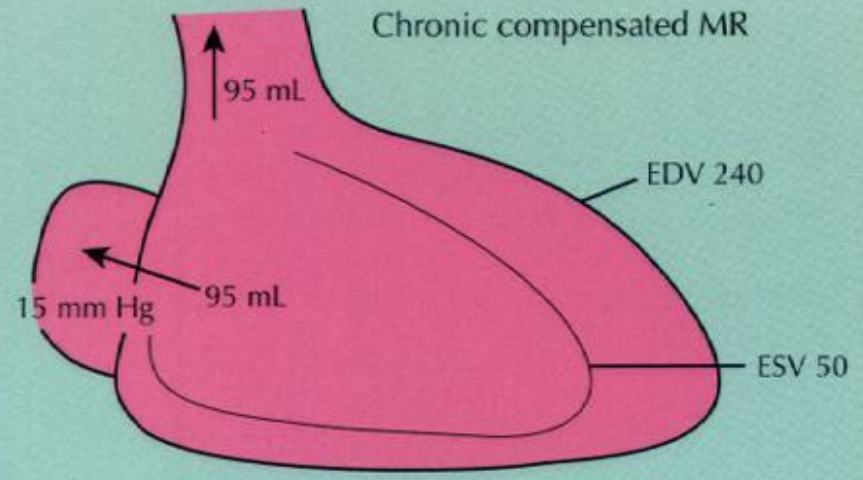
A

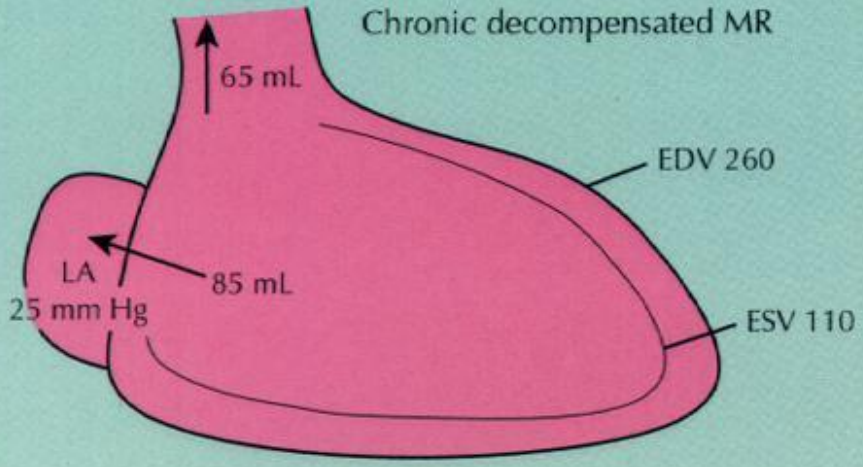




B

	Preload SL, μ	Afterload ESS, *Kdyne/cm²*	CF	EF	RF	FSV, *mL*
AMR	2.25	60	N	0.82	0.5	70
CCMR	2.19	90	N	0.79	0.5	95





C

	Preload SL, μ	Afterload ESS, *Kdyne/cm²*	CF	EF	RF	FSV, *mL*
CCMR	2.19	90	N	0.79	0.50	95
CDMR	2.19	120	↓	0.58	0.57	65

A forgotten devil;

Rupture of mitral valve papillary muscle

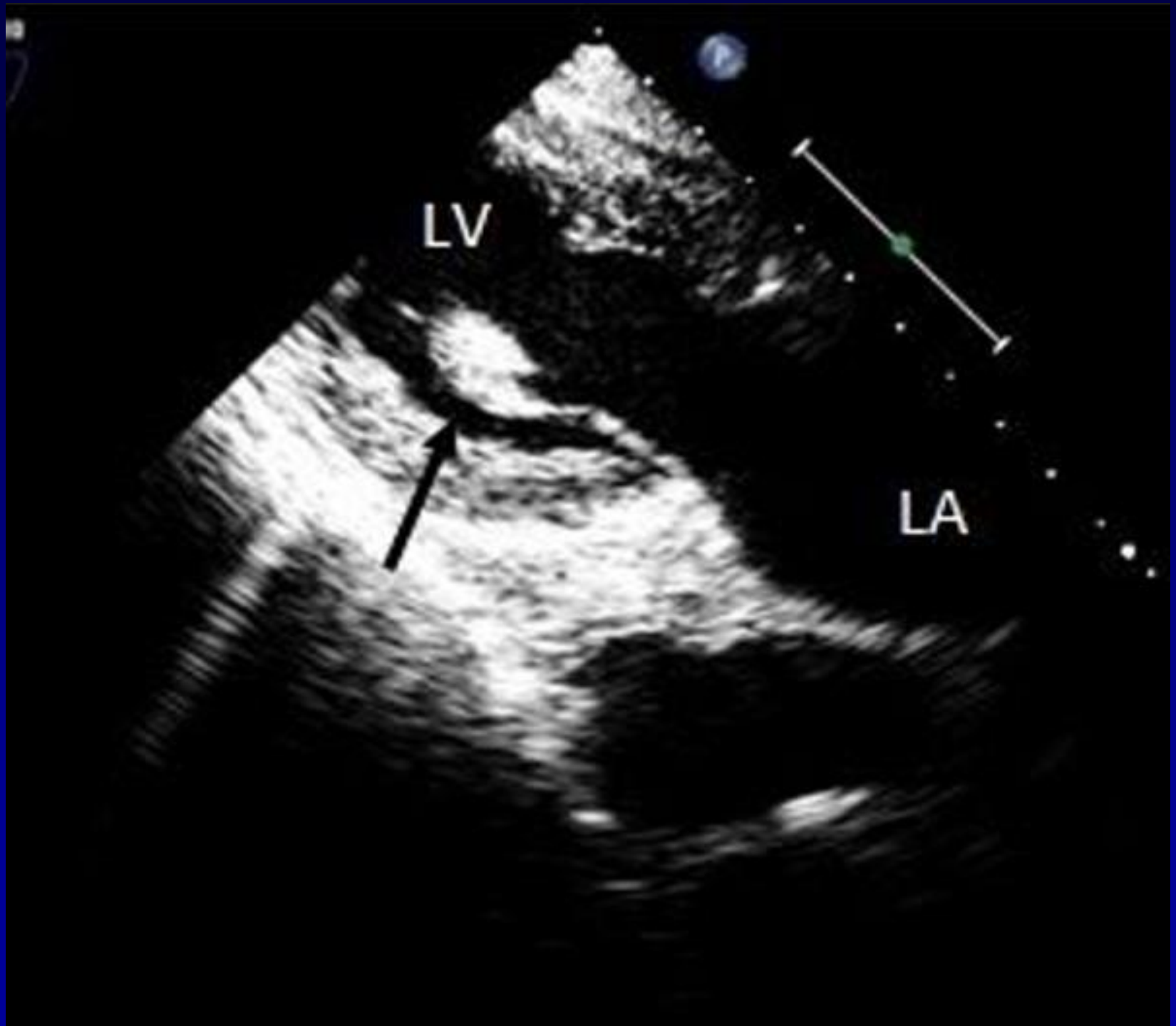
Am J Case Rep. 2013 Jain SK et al

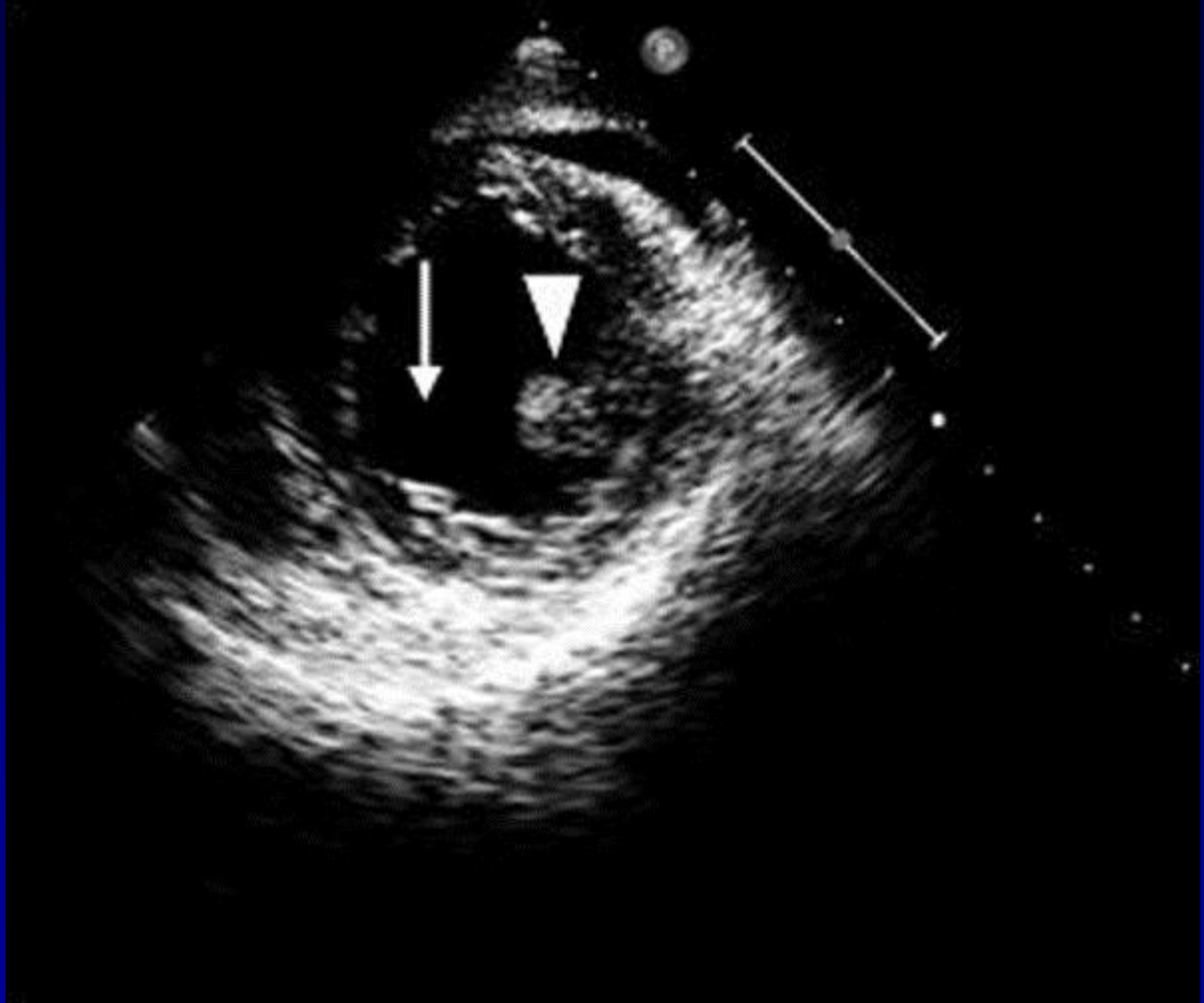
Papillary Muscle Rupture

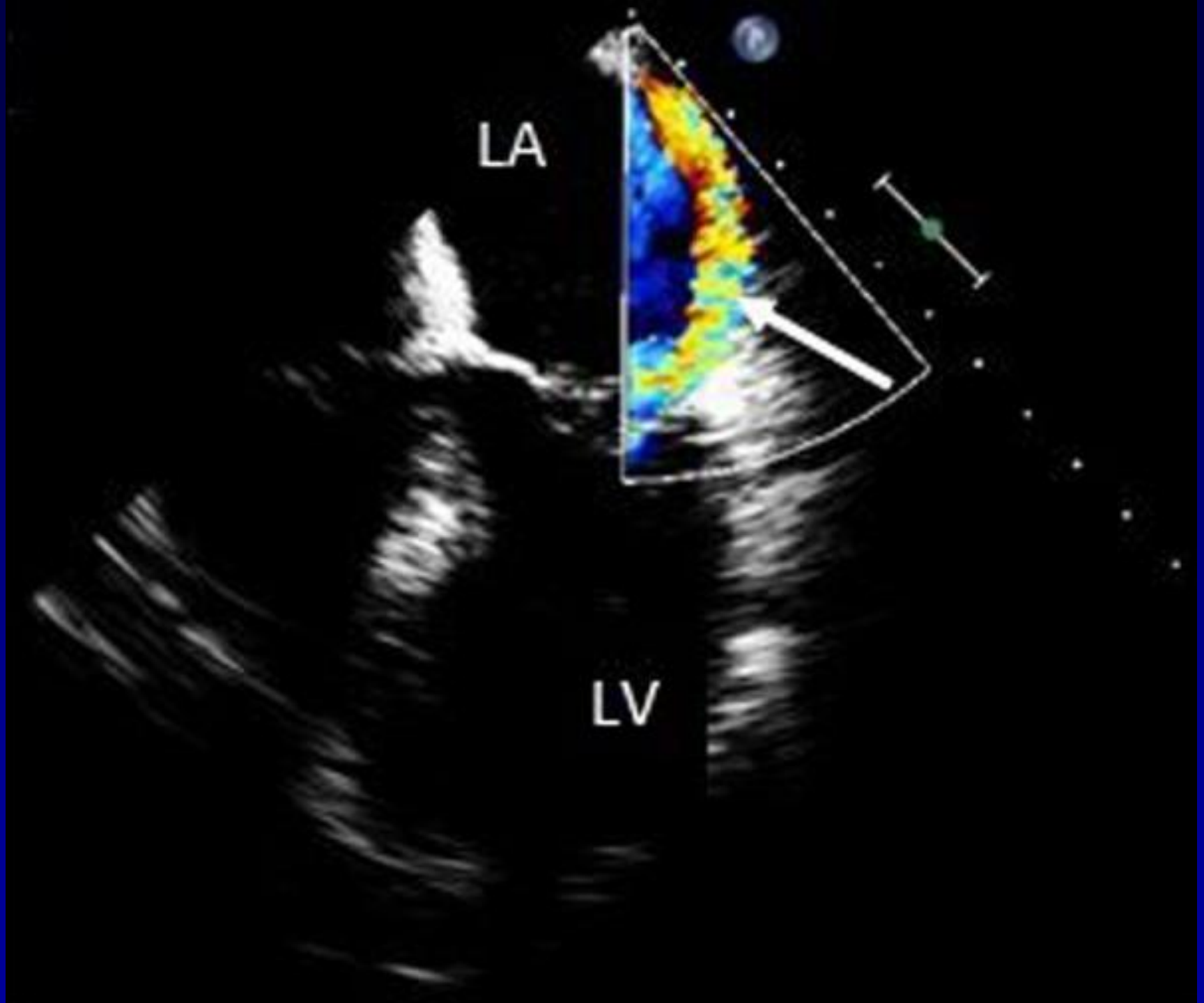
is one of the catastrophic mechanical complications following myocardial infarction.

Rupture leads to acute mitral valve regurgitation, pulmonary edema, and cardiogenic shock. Survival is dependent on prompt

recognition and surgical intervention


LV
LA




LA
LV

Papillary Muscle Rupture

- Complete transection:
  - Incompatible with life, Sudden massive MR that cannot be tolerated
- Rupture of a PORTION of PM (tip or head)
  - Severe MR
  - More frequent
  - Not immediately fatal
- Occurs in small MIs (in 50% of cases)

Papillary Muscle Rupture

~ 1%

- Posteromedial >> anterolateral PM

- Bimodal peak: - 24 hours, 3-5 days

  range: 1-14 days

- Abrupt onset of SOB and P. Edema,

  cardiogenic shock

Braunwald 2012. P 1148

Papillary Muscle Rupture

Echo:

- Hypercontractile LV

- Torn papillary muscle or chordae(suspect)

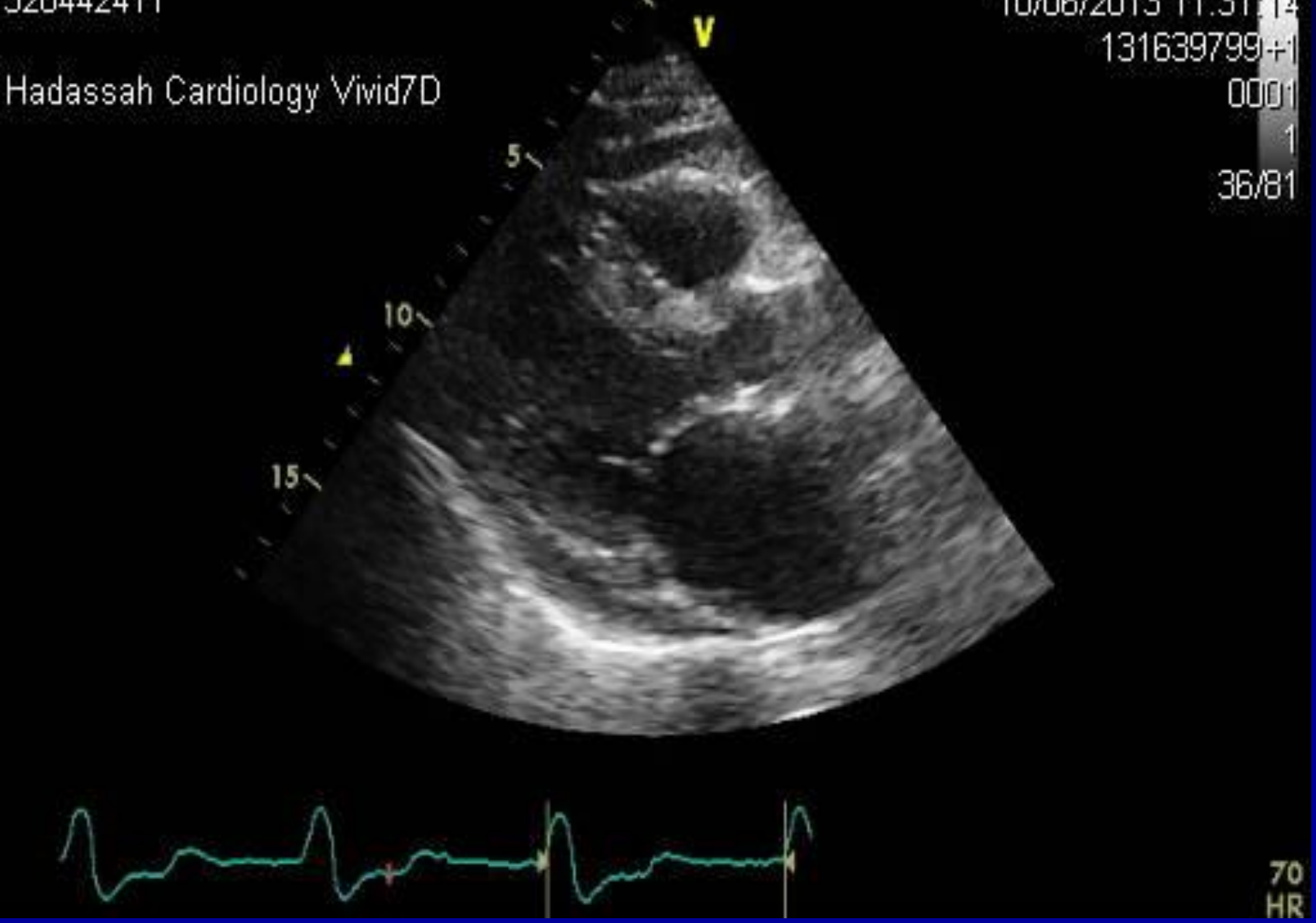
- Flail leaflet

- Severe MR on Color Doppler

Braunwald: 1148. 2012

Papillary Muscle Rupture

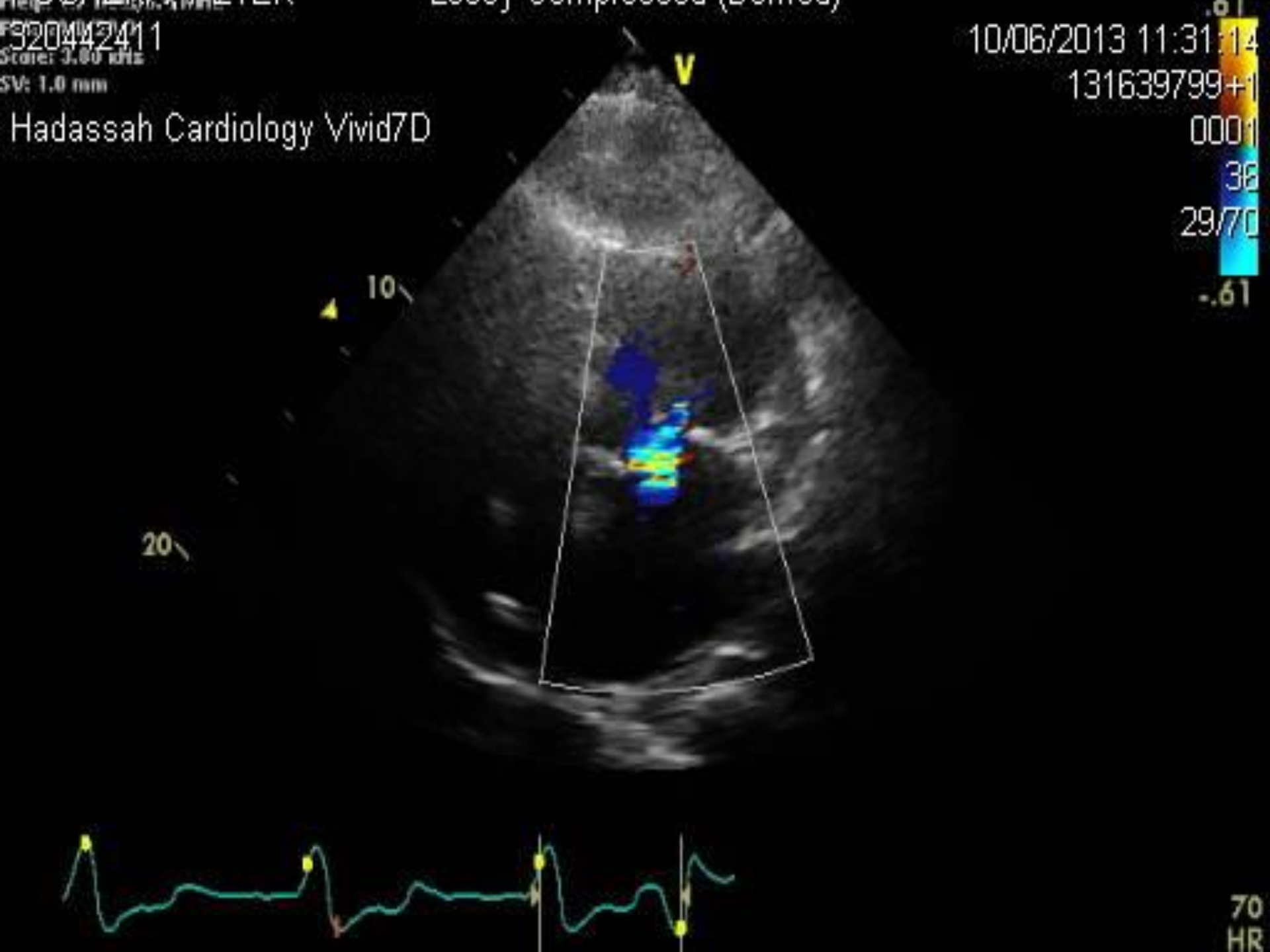
- Treatment Approach:
  - Nitroglycerin or Nitroprusside (unless BP<90)
  - IABP (especially if vasodilator Rx is not tolerated)


Hadassah Cardiology Vivid7D
5
10
15
70
HR

Papillary Muscle Rupture

- Surgical survival: predictors
  - Early operation
  - Short duration of shock
  - Mild degree of right & left impairment

- **Mitral Regurgitation After Anteroapical Myocardial Infarction**
- **New Mechanistic Insights**
- **Chaim Yosefy, Ronen Beeri, Mordehay Vaturi, et al**
- **Circ. 2012**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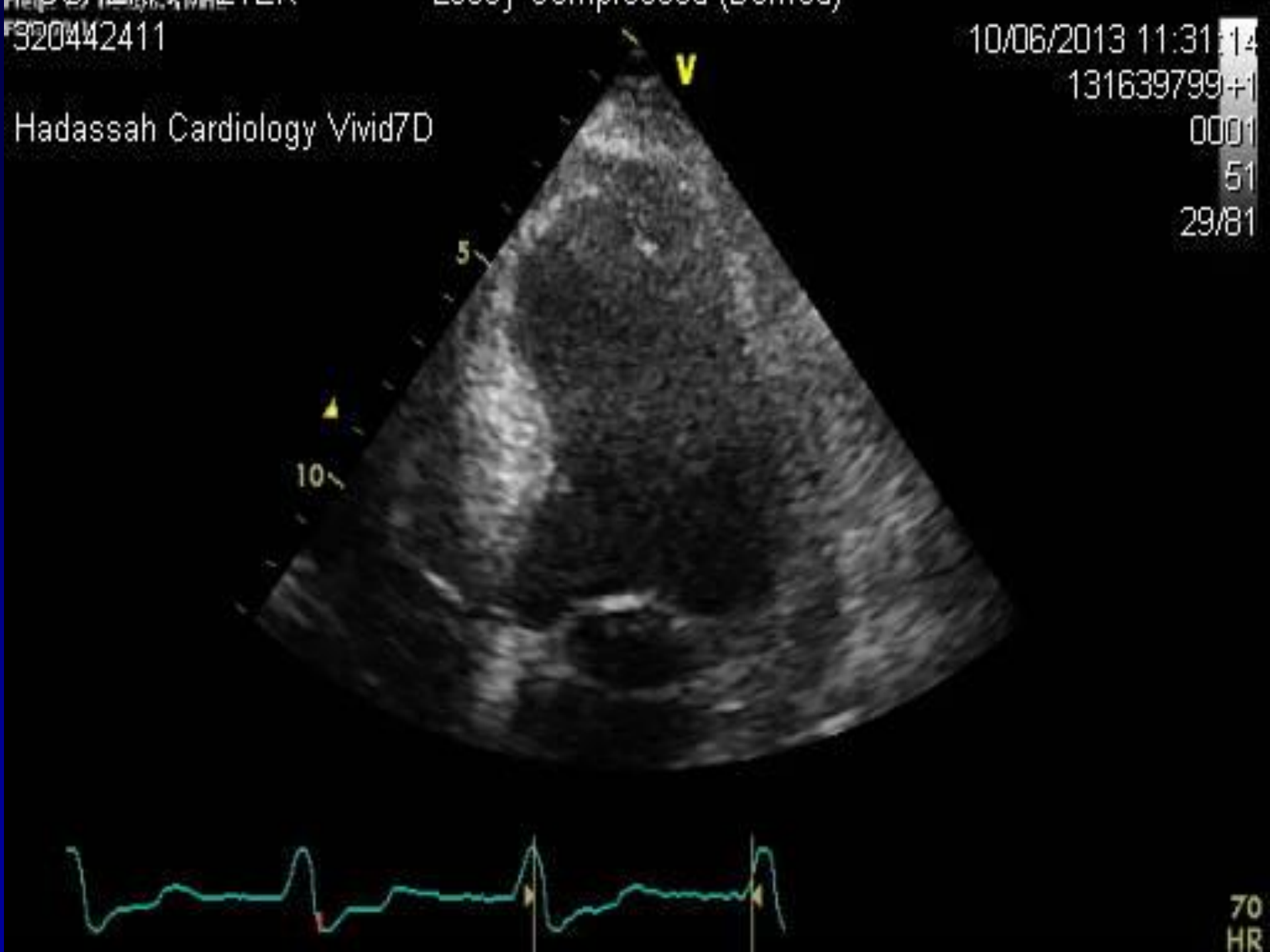
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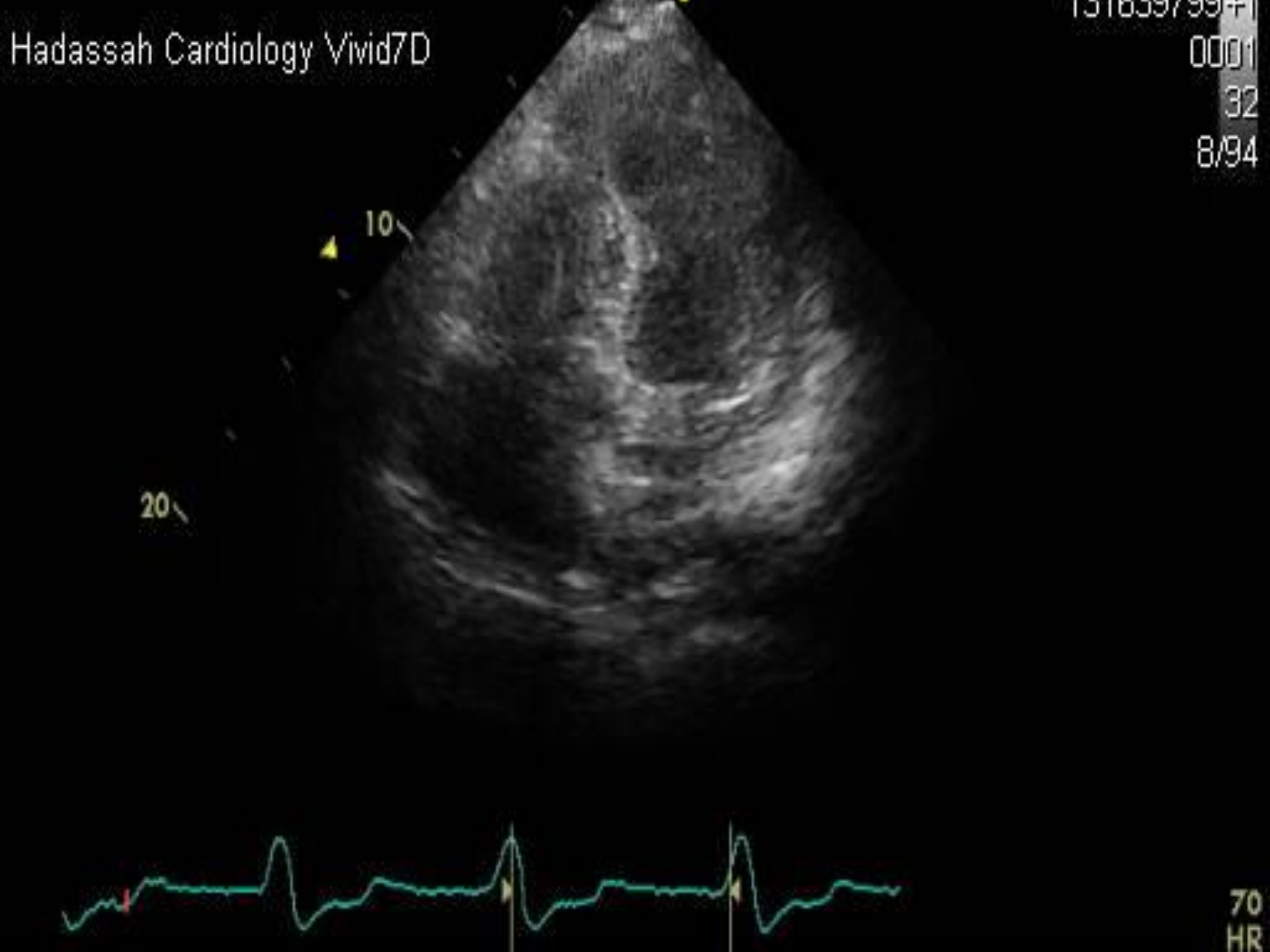
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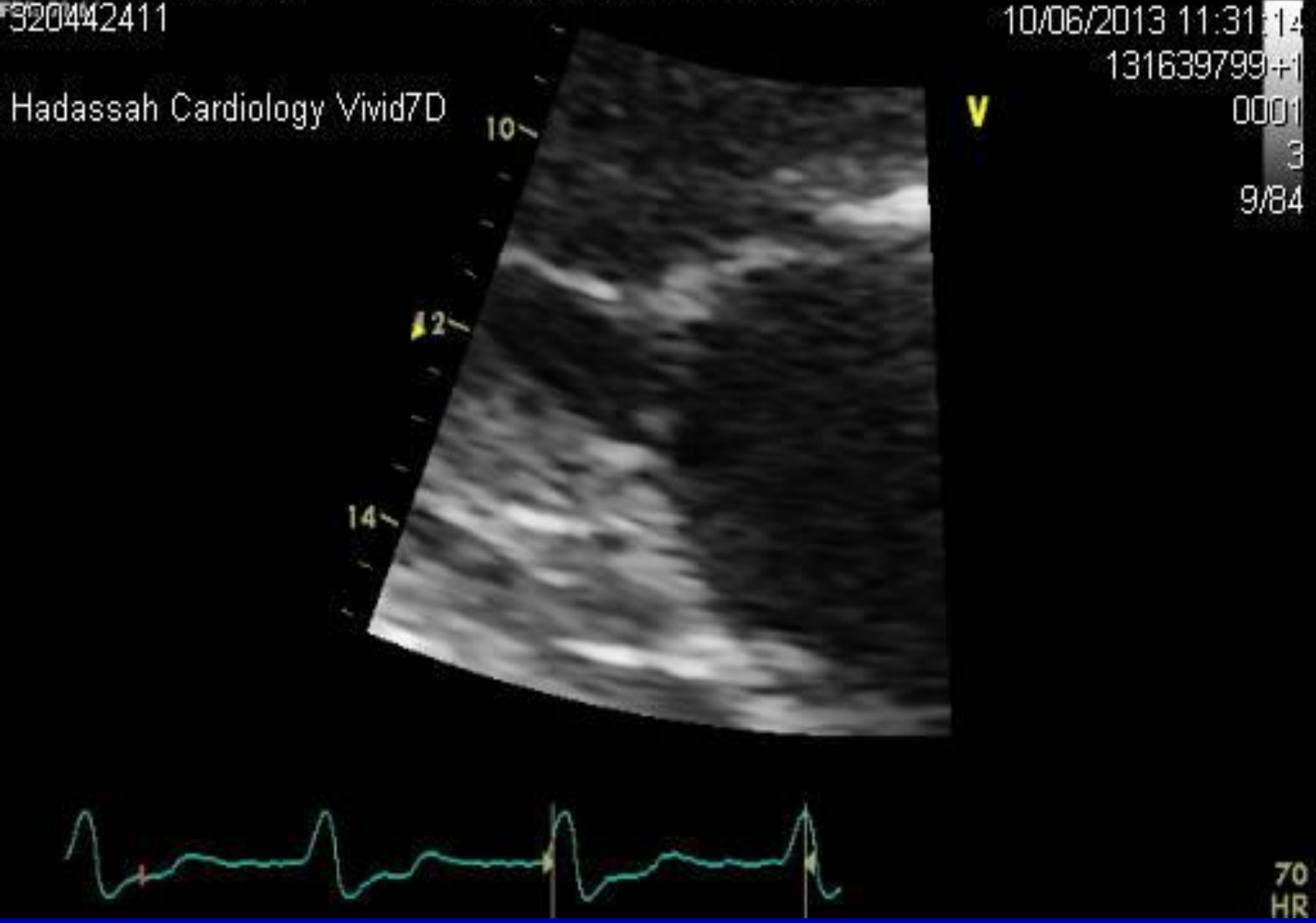
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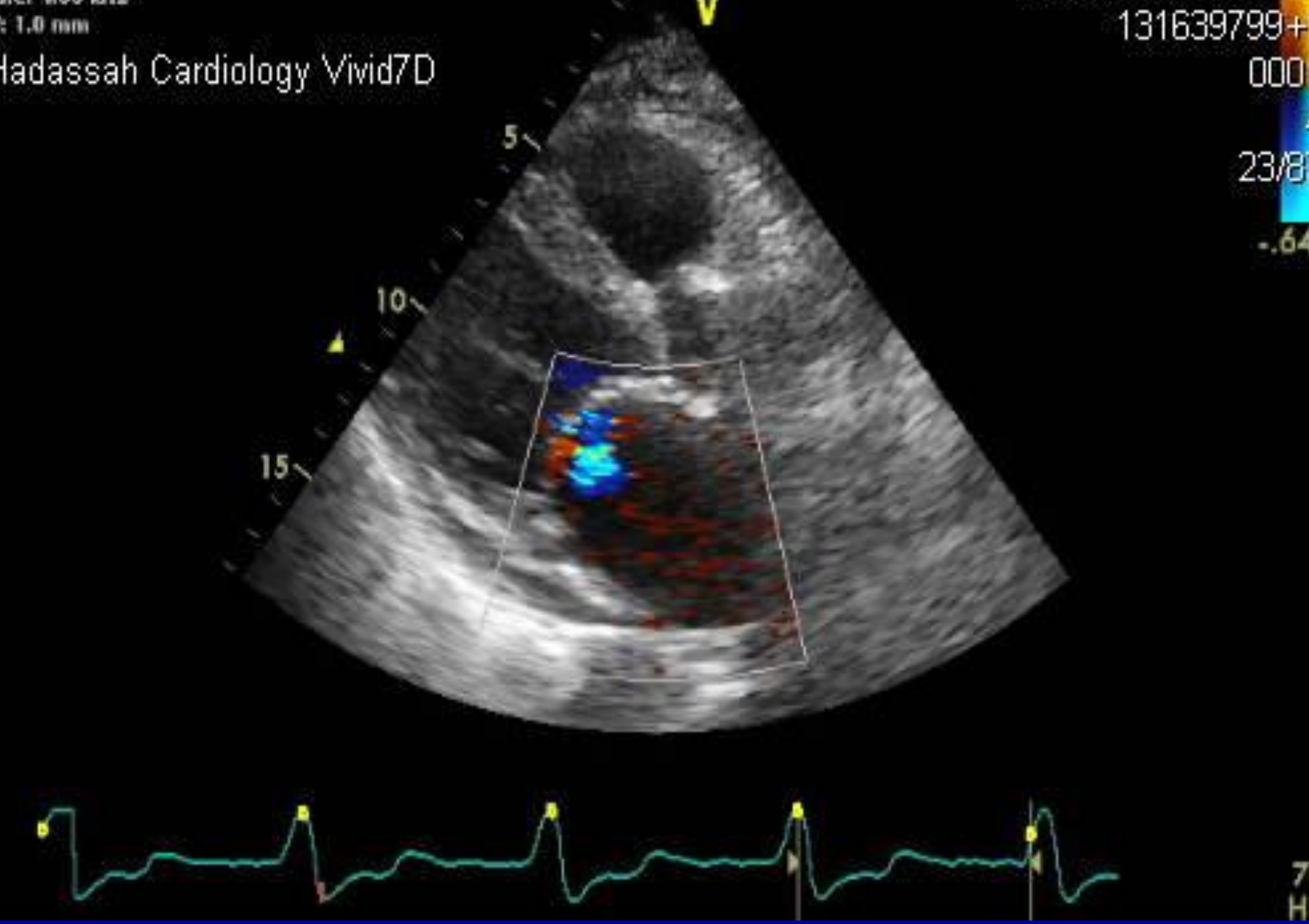
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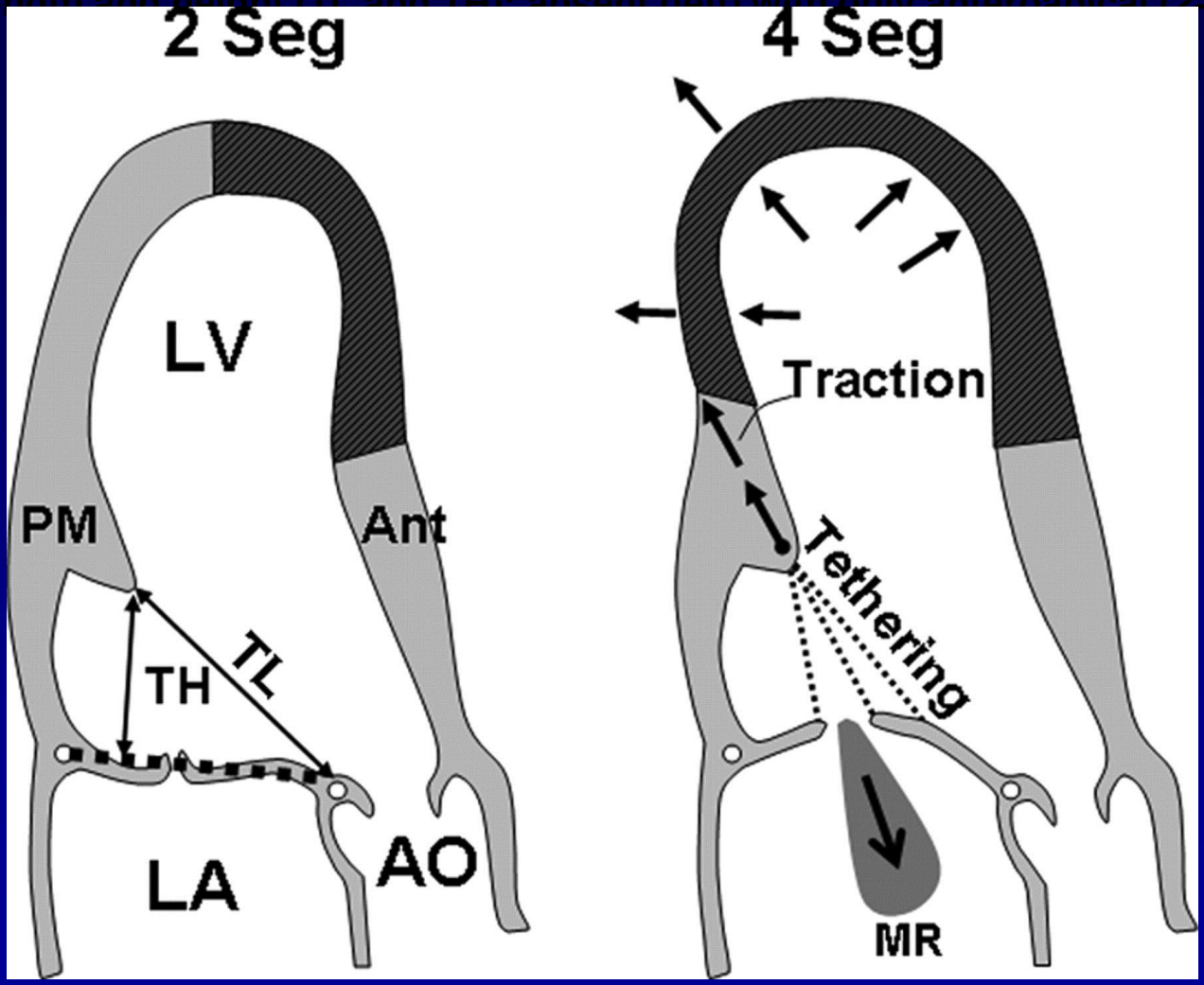
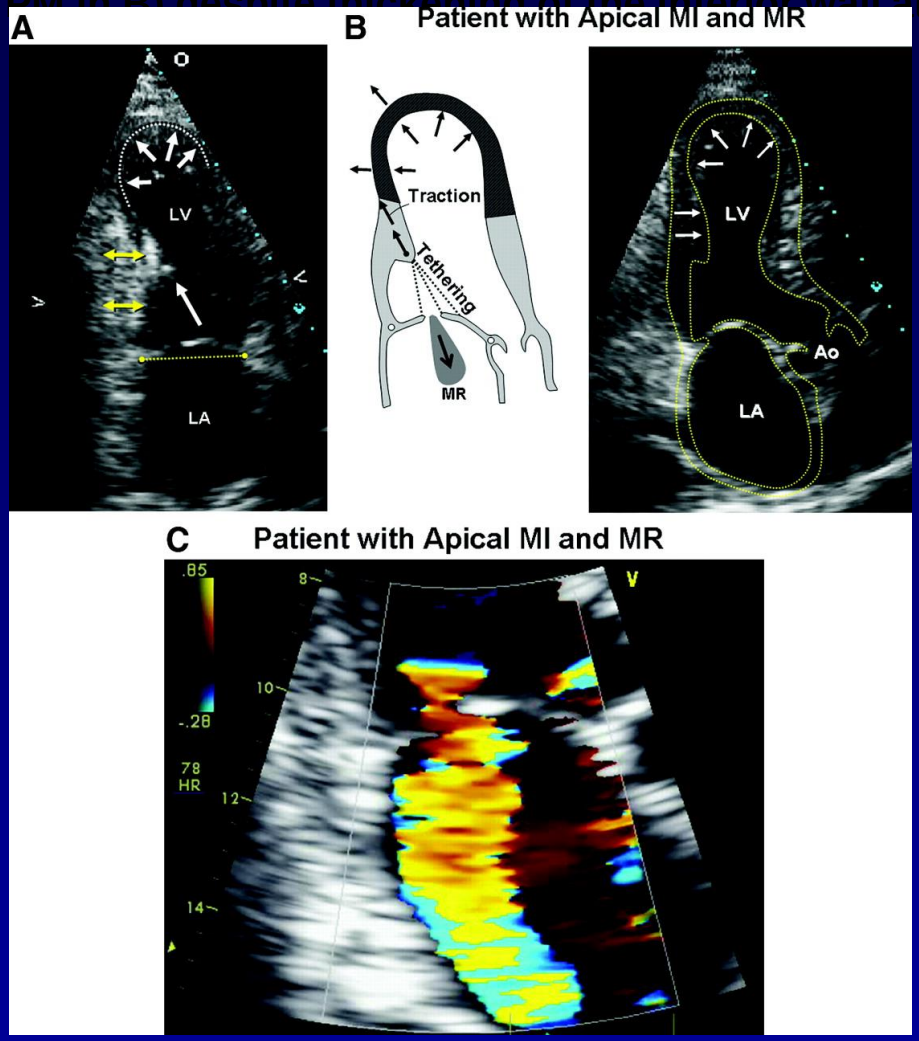
Proposed mechanism of ischemic mitral regurgitation (MR) induced by inferoapical dyskinesis (right) exerting traction on the adjacent papillary muscle (PM), increasing tethering length and height (TL and TH); absent (left) with only anteroapical (2-segment)...



Yosefy C et al. Circulation 2011;123:1529-1536

A and B, Patient with 4-segment apical infarction, inferoapical dyskinesis and anteroapical bulging (outward arrows) and mitral leaflet tenting toward the apex (diagonal arrow to PM in A and within PM in B) despite thickening of the inferior wall at the bas...



Yosefy C et al. Circulation 2011;123:1529-1536

MR post myocardial Infarction

- Mitral regurgitation (MR) doubles

  postmyocardial infarction (MI) mortality

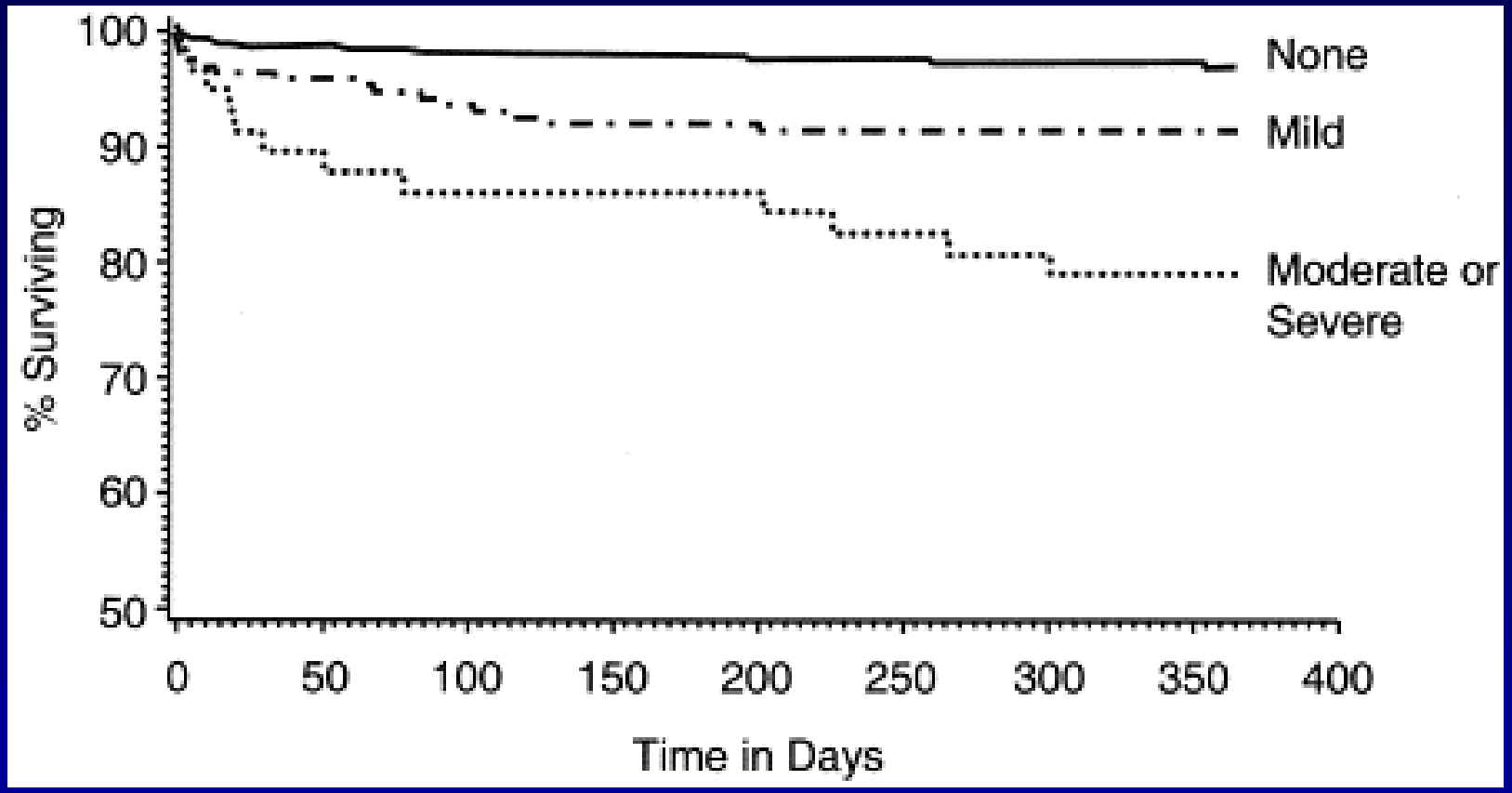
-

-

Heart failure and death after MI in the community – The role of MR

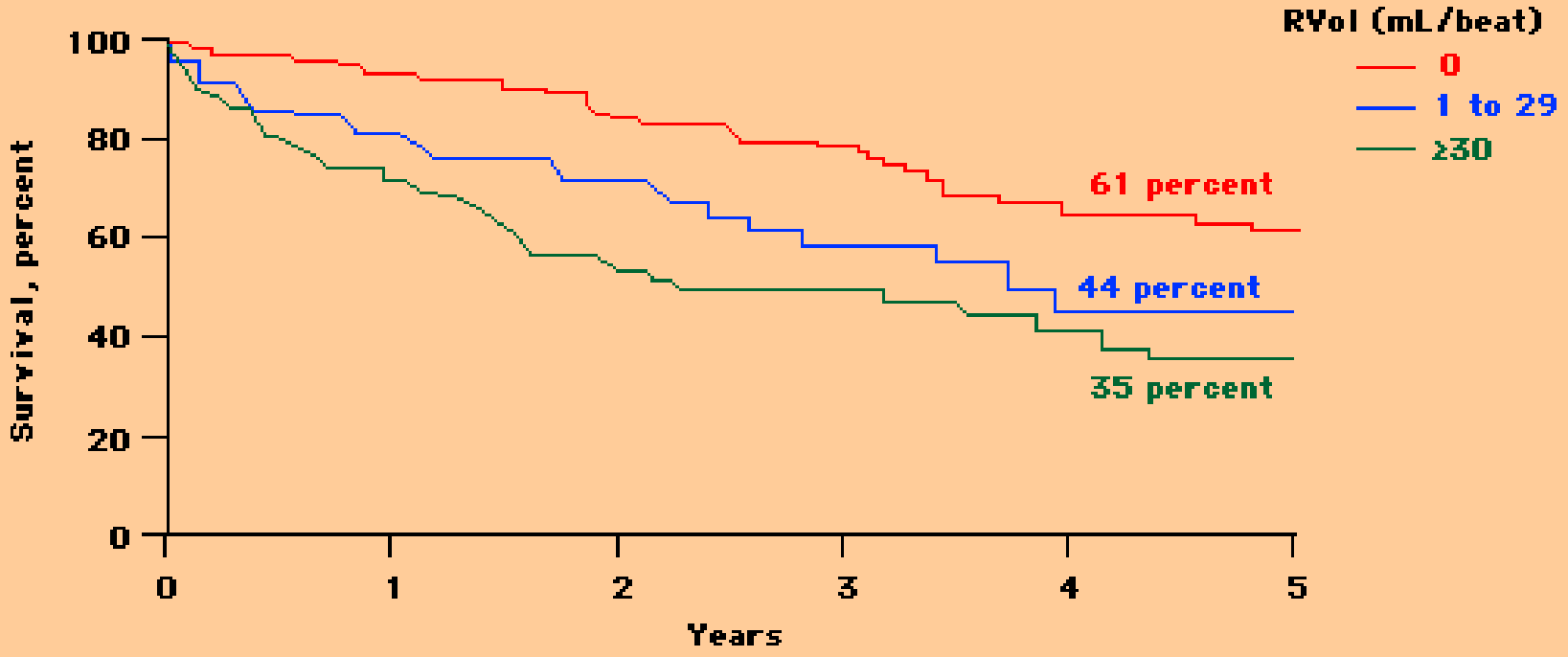
- Population based study (Olmsted county)
- Of 1331 patient 773 had post MI Echo of which
  - 50% no MR
  - 38% mild MR
  - 12% moderate to severe

One-year survival stratified by the severity of MR



Pellizzon et al. JACC 2004

Survival is related to the degree of regurgitation



Survival in ischemic mitral regurgitation is related to the degree of mitral regurgitation In a study of 303 patients with ischemic mitral regurgitation after a

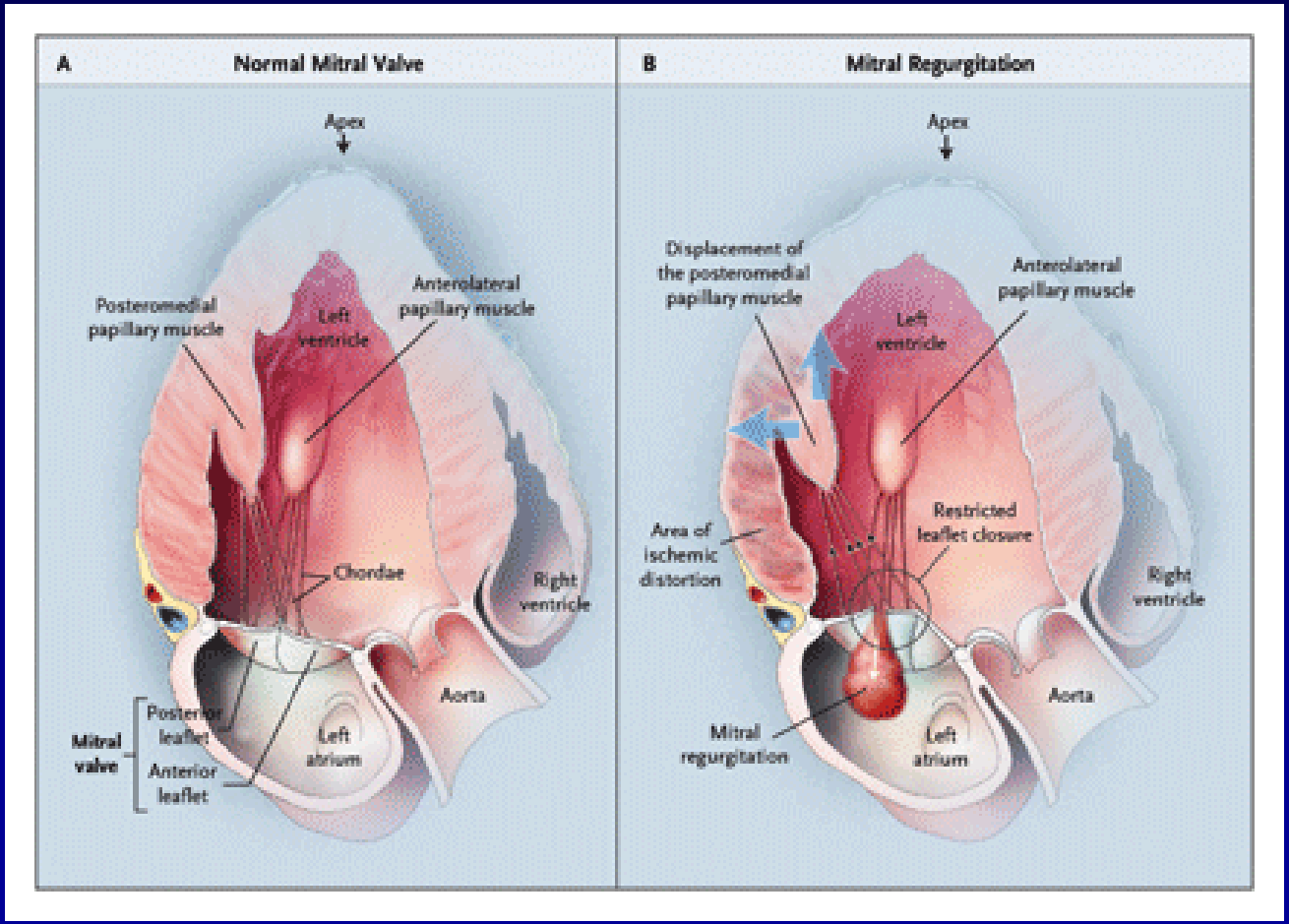
Grigioni et al. Circulation 2001

Conclusion

- Chronic MR after MI is an independent risk factor for morbidity and mortality
- The mortality risk is associated with the severity of MR

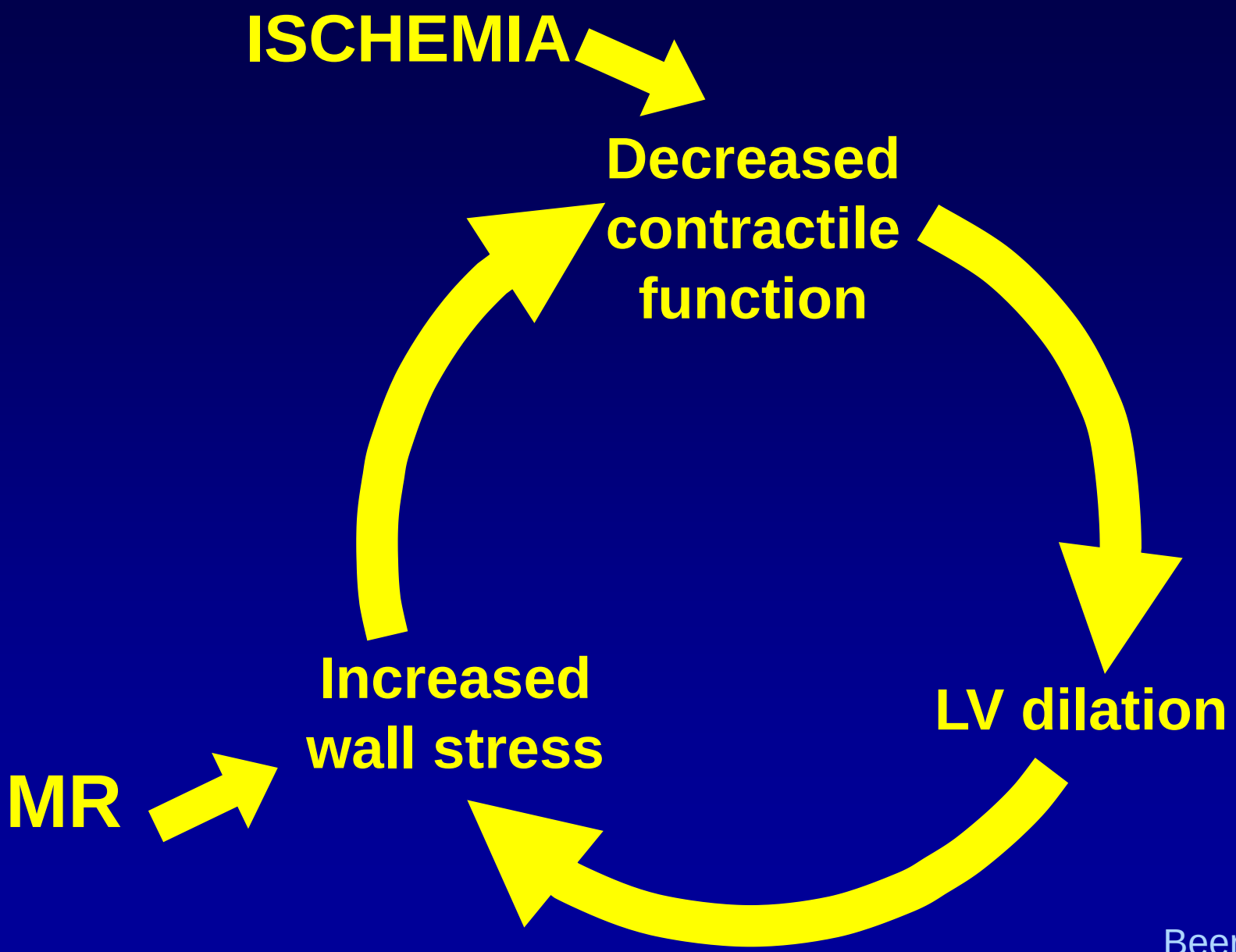
Grigioni et al. Circulation 2001

Mechanism of ischemic MR



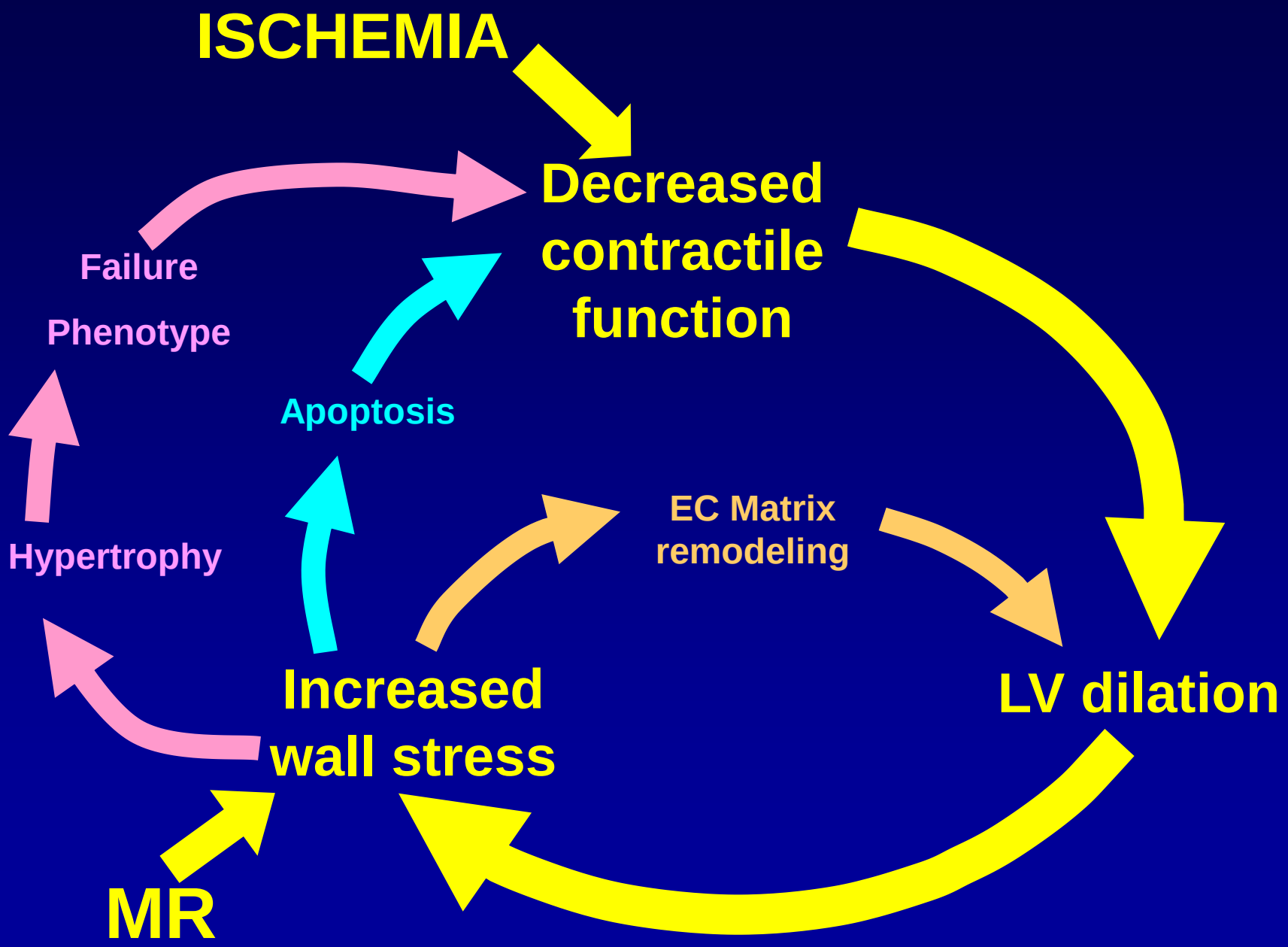
Levine NEJM 2004

REMODELING: A VICIOUS CYCLE

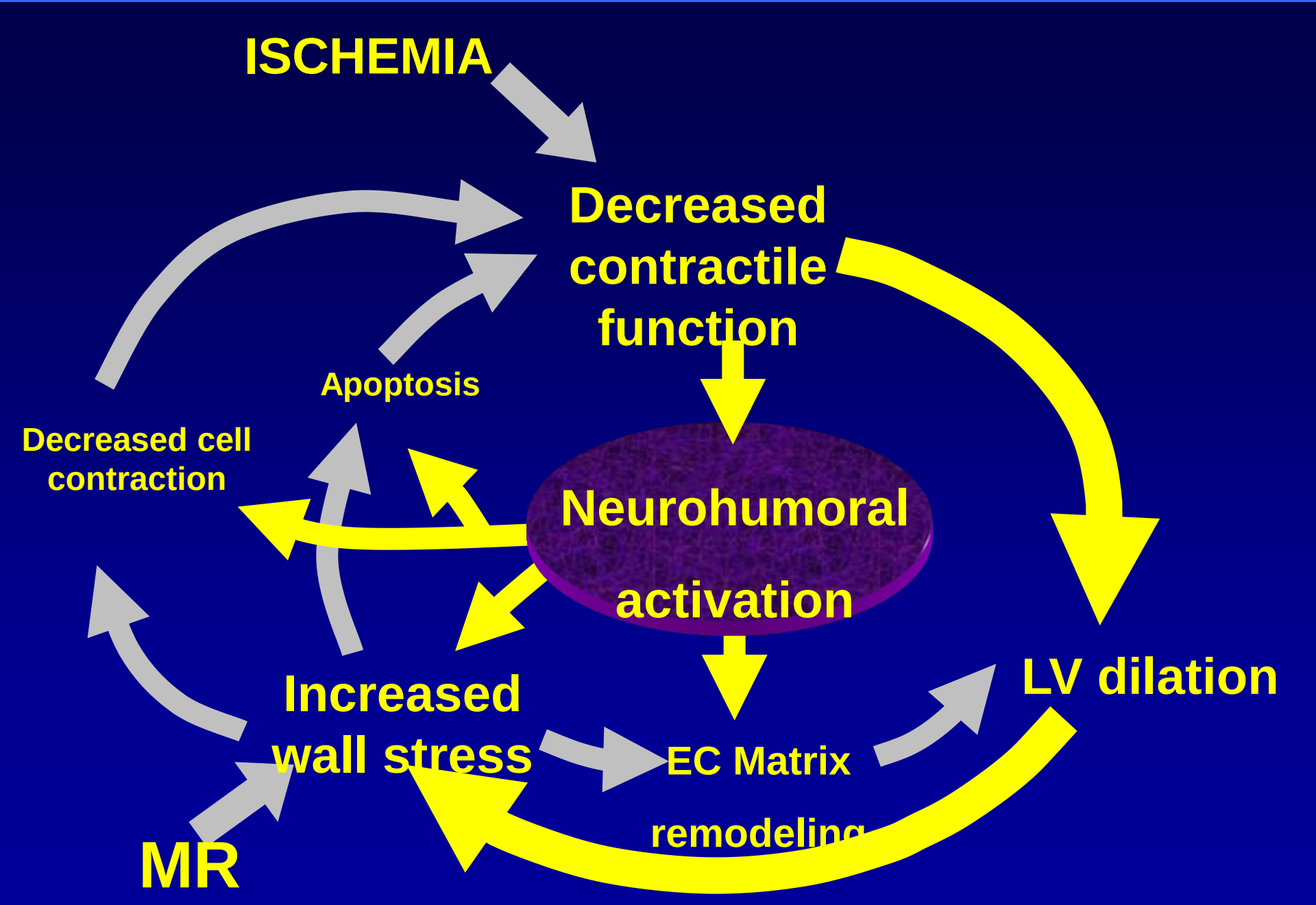


Beeri & others

REMODELING: FAILED COMPENSATION



REMODELING: FAILED COMPENSATION



Acute MR

-
-

Acute MR – CONCLUSION (I)
Take home message

- High Degree of Suspicion
- Understanding Meachnism
- Clinical context
- Echo

Acute MR – CONCLUSION (II)
Take home message

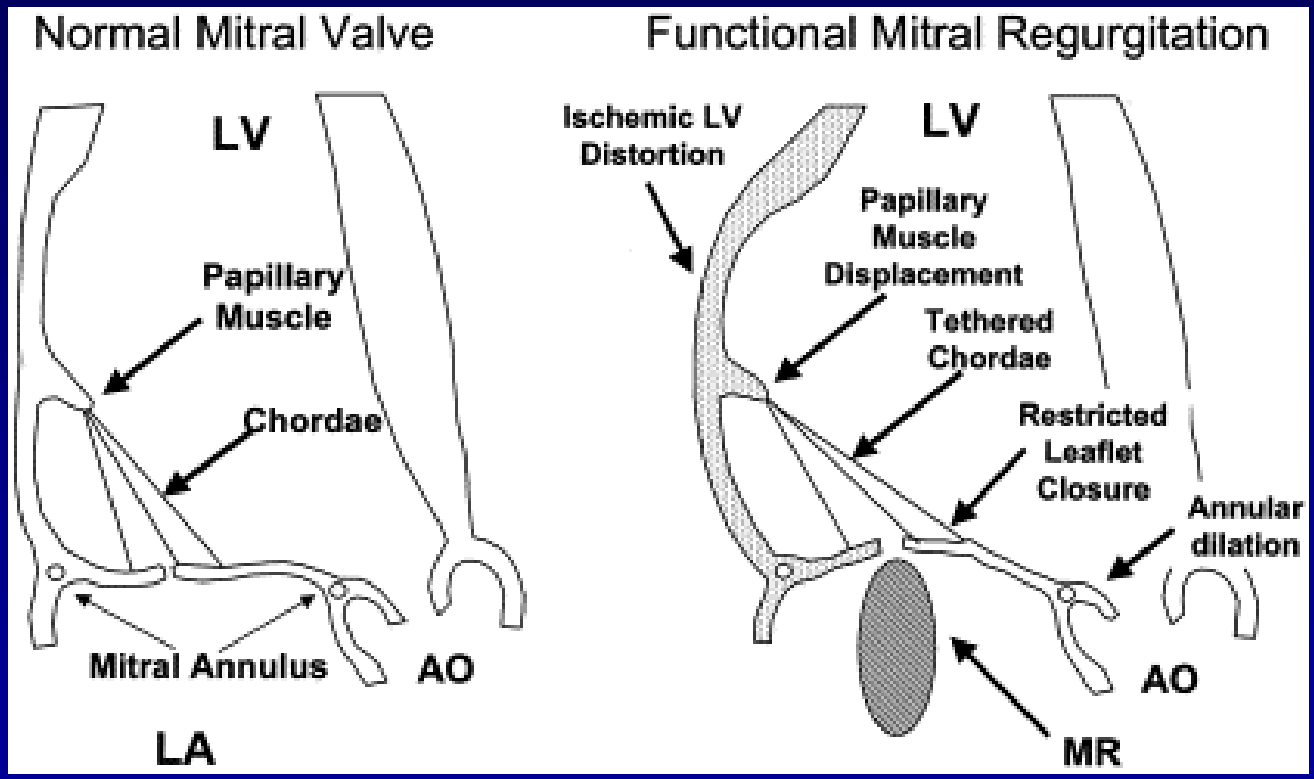
- Early Intervention
- Understanding Prognosis
- Accordingly: further F/O and Intervention

Acute MR

- ***TODA***

GILON et al

Apical Tethering Causes Incomplete Mitral Leaflets Closure



Only Apical Tethering of the Papillary Muscle Causes MR in Inferoposterior MI