

Diastolic Function Cases 2016

Susan Wilansky MD,
FRCP(C), FACC, FASE



DISCLOSURE

Relevant Financial Relationship(s)

None

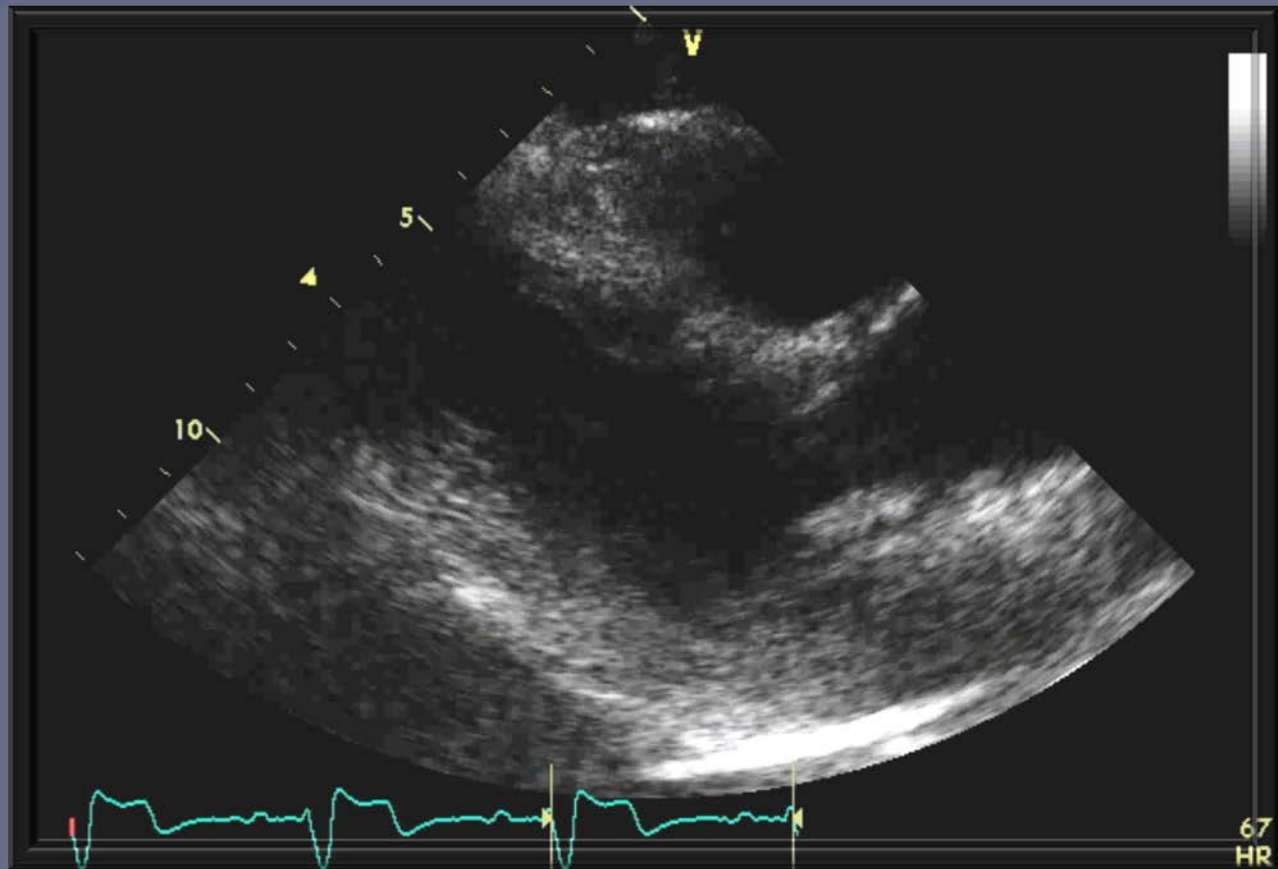
Off Label Usage

None

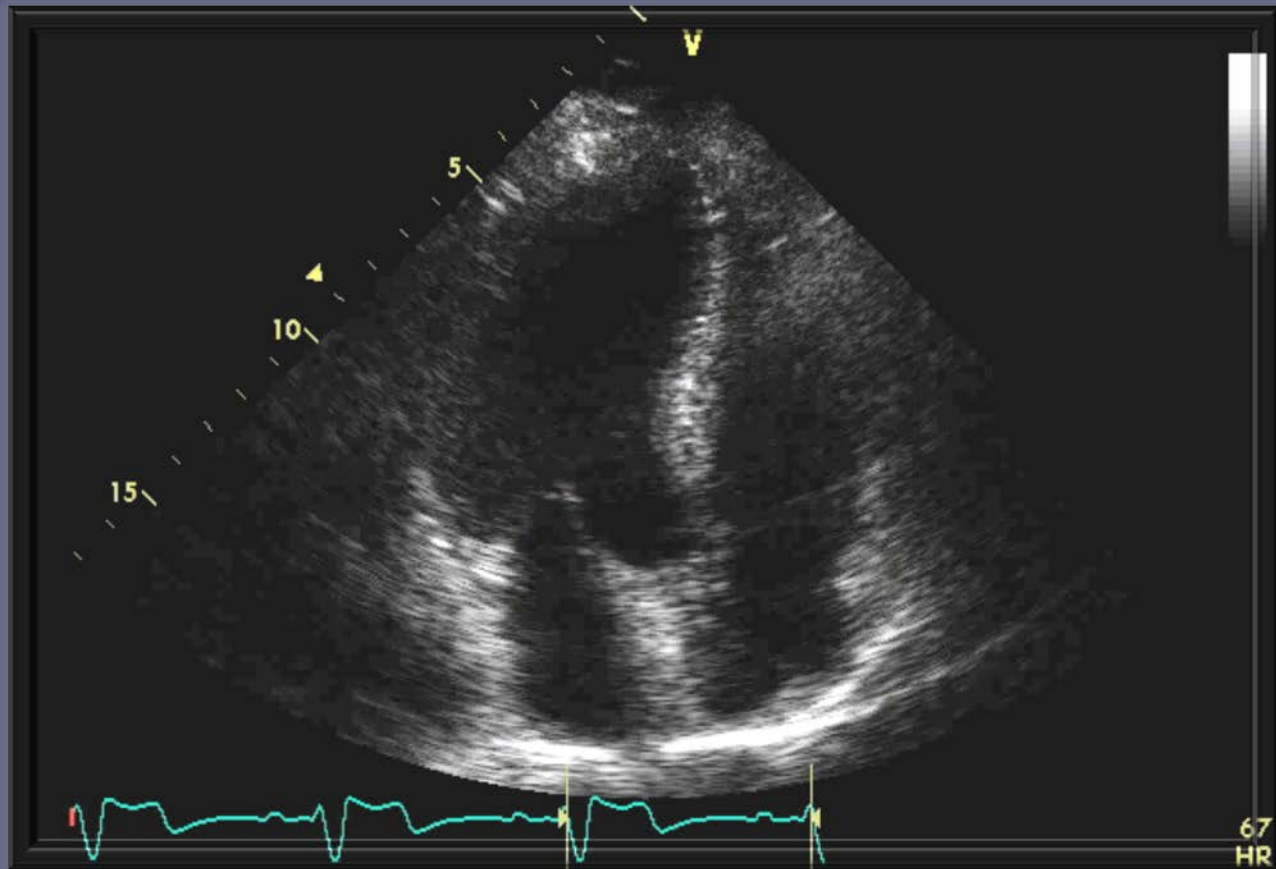
Case

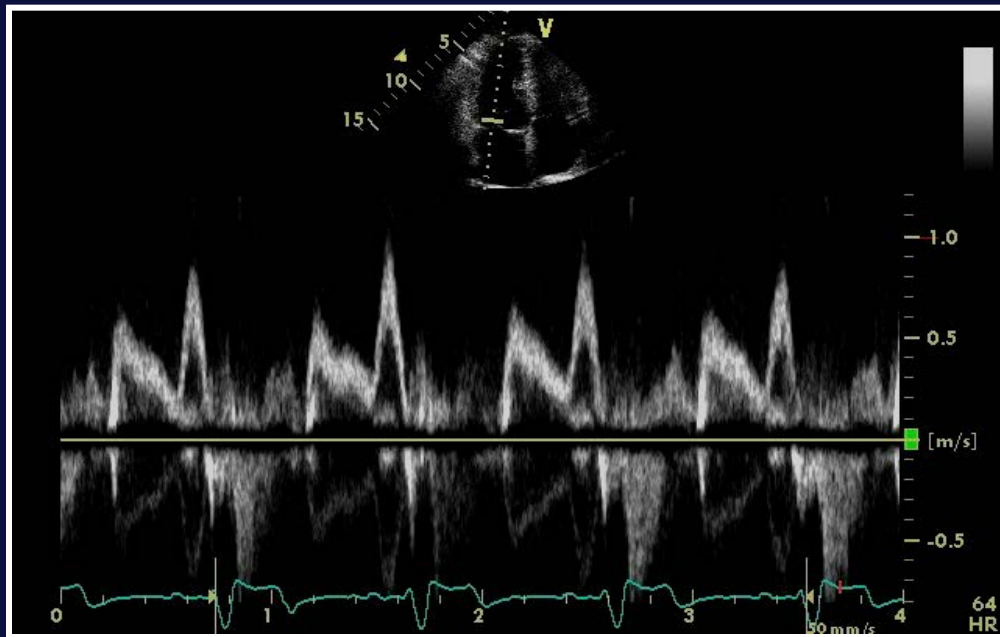
- **67 year old male**
- **NYHA class II**
- **2005: renal failure**

Septum 17 mm Posterior wall 16 mm



EF 69% LAVI 24 cc/m²

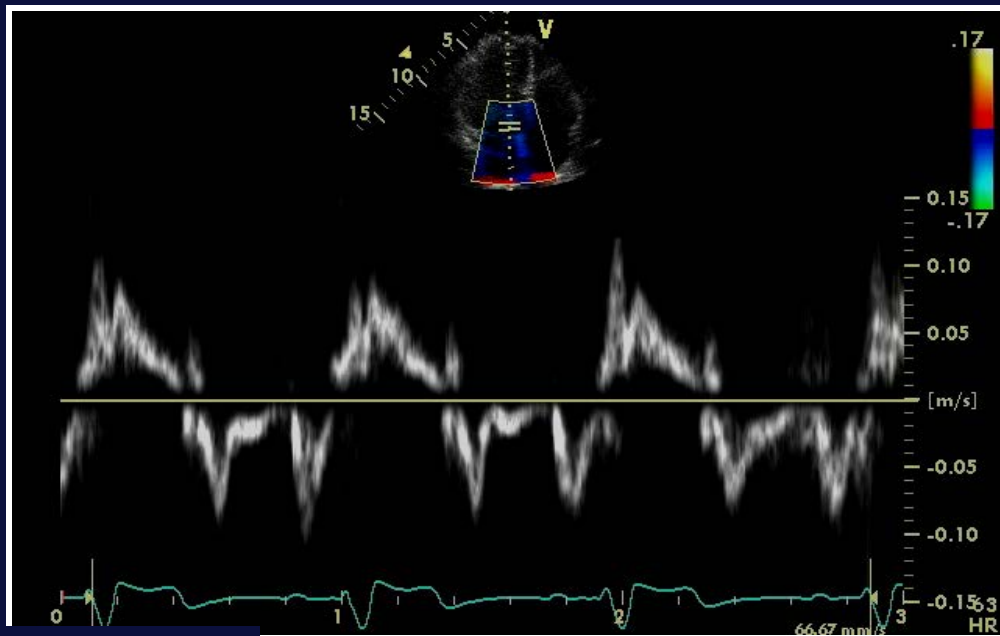




E: 0.6 cm/s

E/A: 0.67

DT: 214 ms



E/e': 7.5

Diastolic function

Grade I = abnormal relaxation

1. $E/A < 0.8$

E: 0.6 cm/s

2. $DT > 200$ ms

E/A: 0.67

3. Average $E/e' \leq 8$

DT: 214 ms

E/e': 7.5

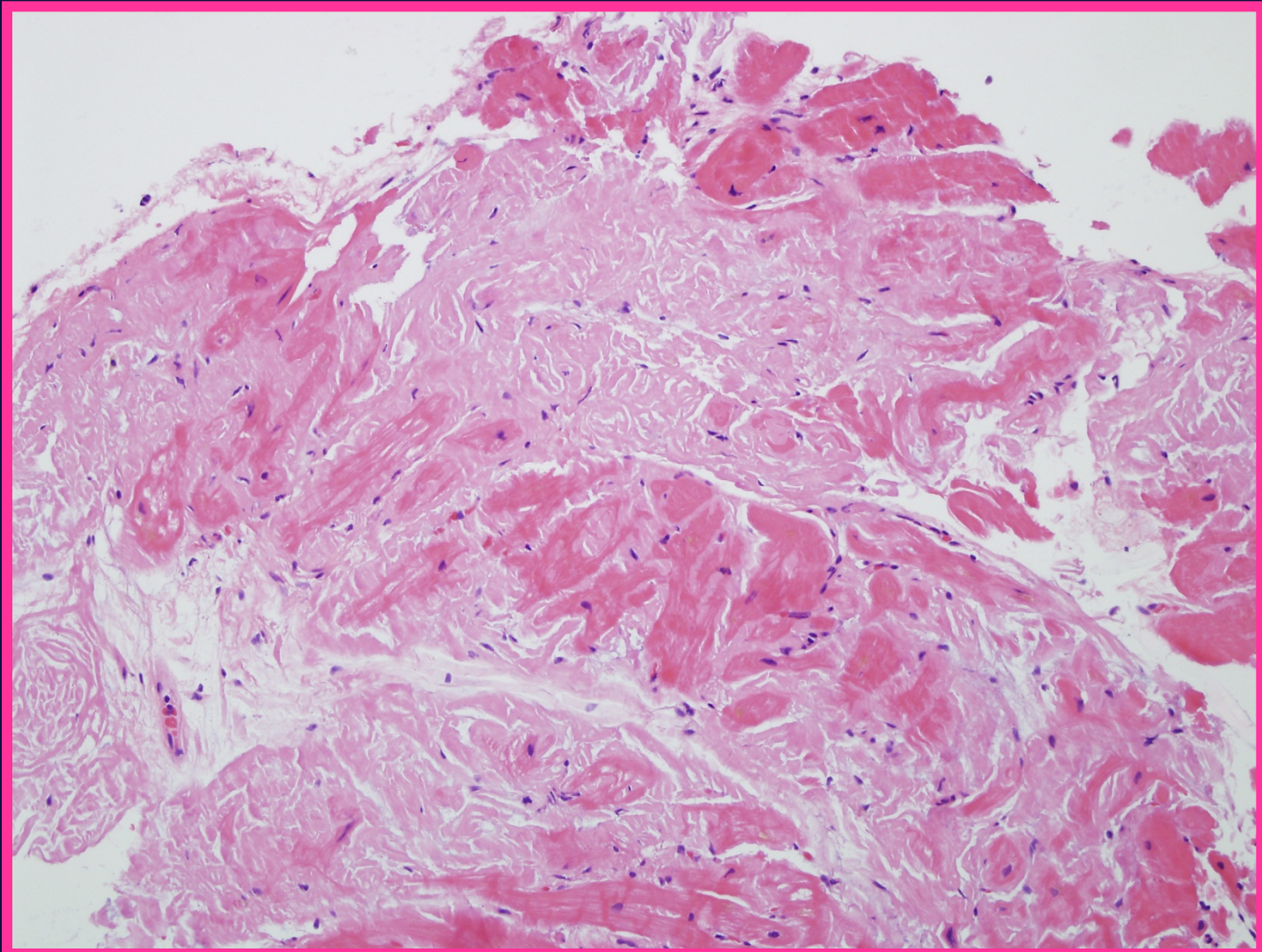
4. $Ar - A < 30$ ms

5. $Val \triangle E/A < 0.5$

Right heart cath

- RAP: 6 mmHg
- PAP: 28/11
- PCW: 9 mmHg
- CI: 1.7 L/min

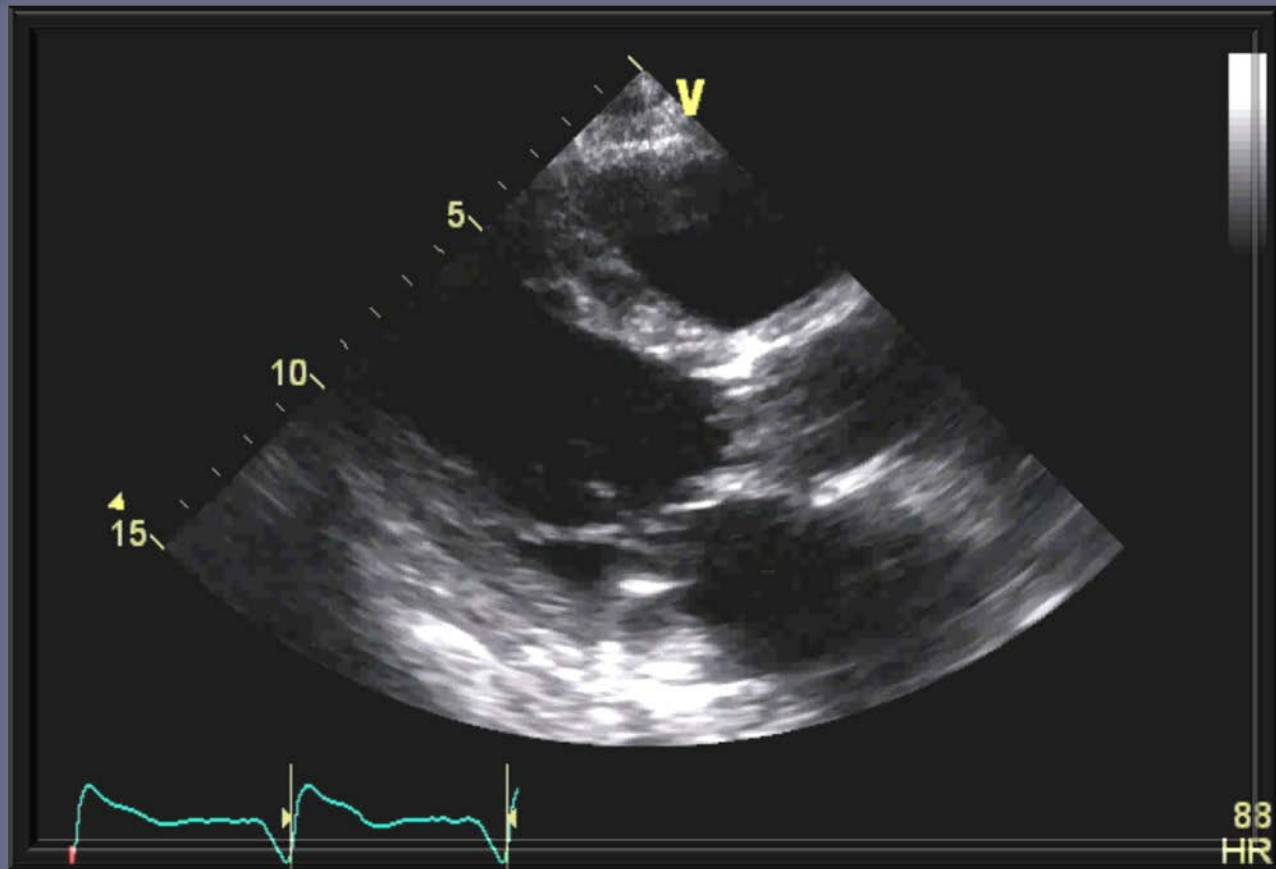
Amyloidosis



The story continues

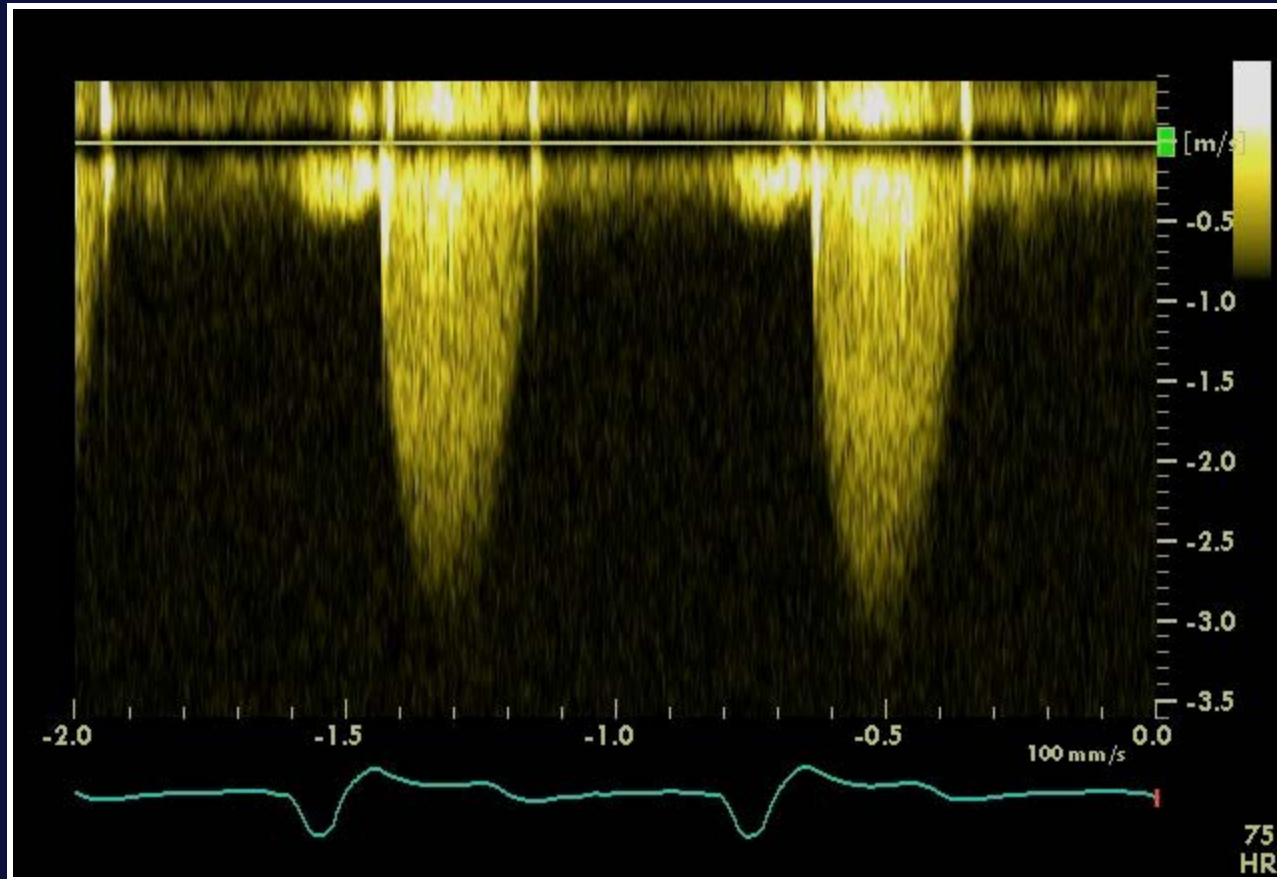
- Regular hematology follow up
- Chemotherapy for rising light chains
- “Outside” cardiology follow up
- Presents to ER (1/2013) now NYHA class IV
- New systolic murmur

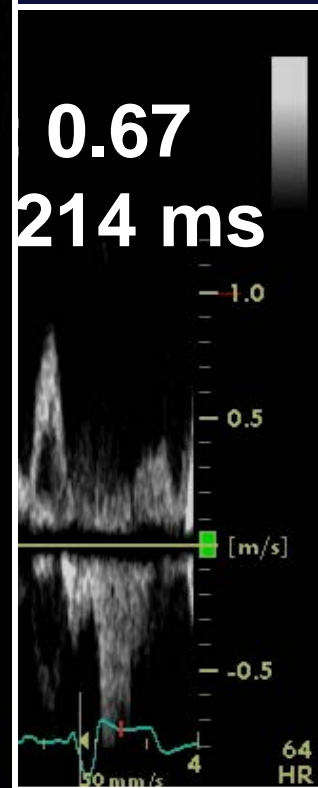
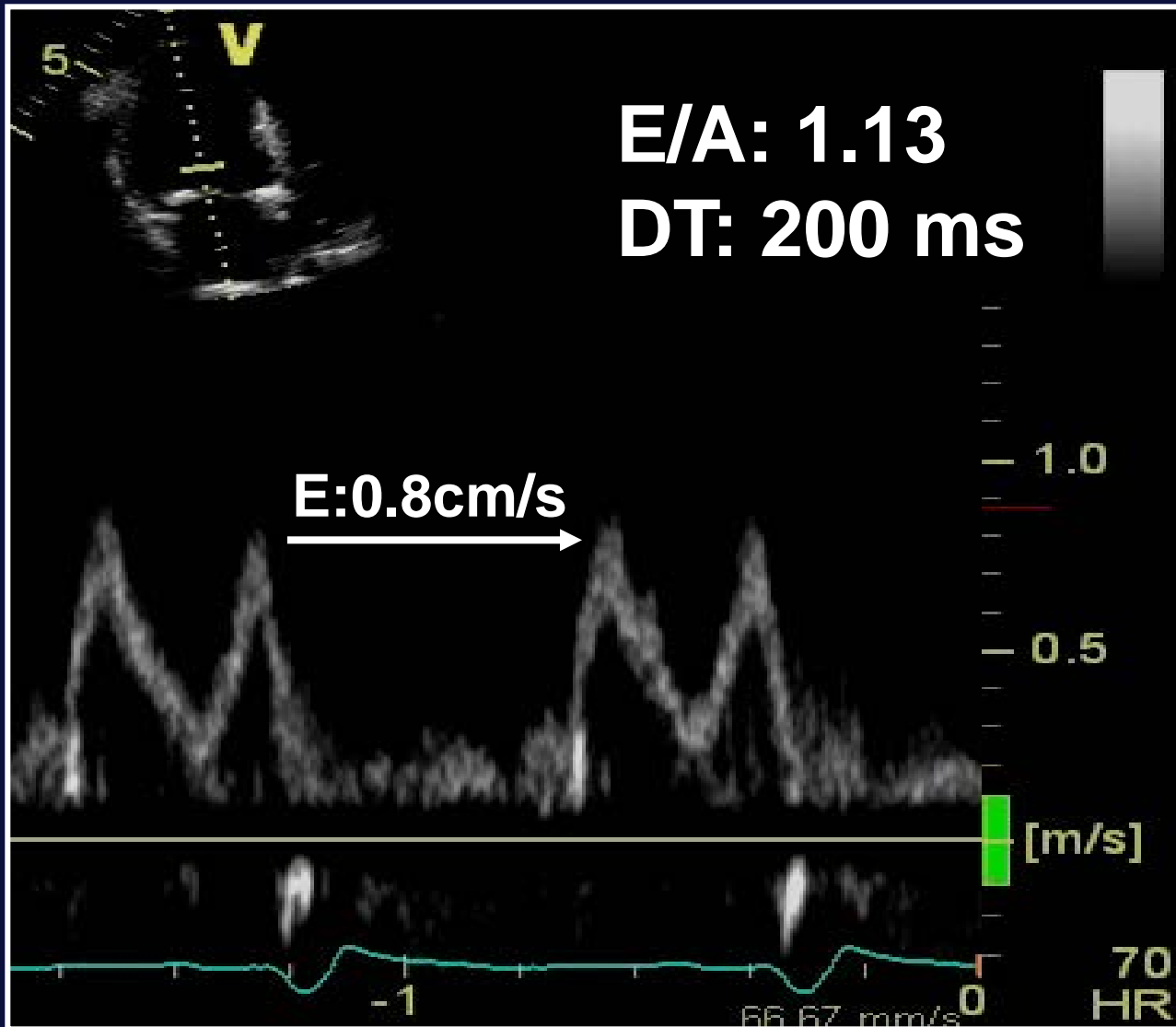
EF 54% LAVI 49 cc/m²

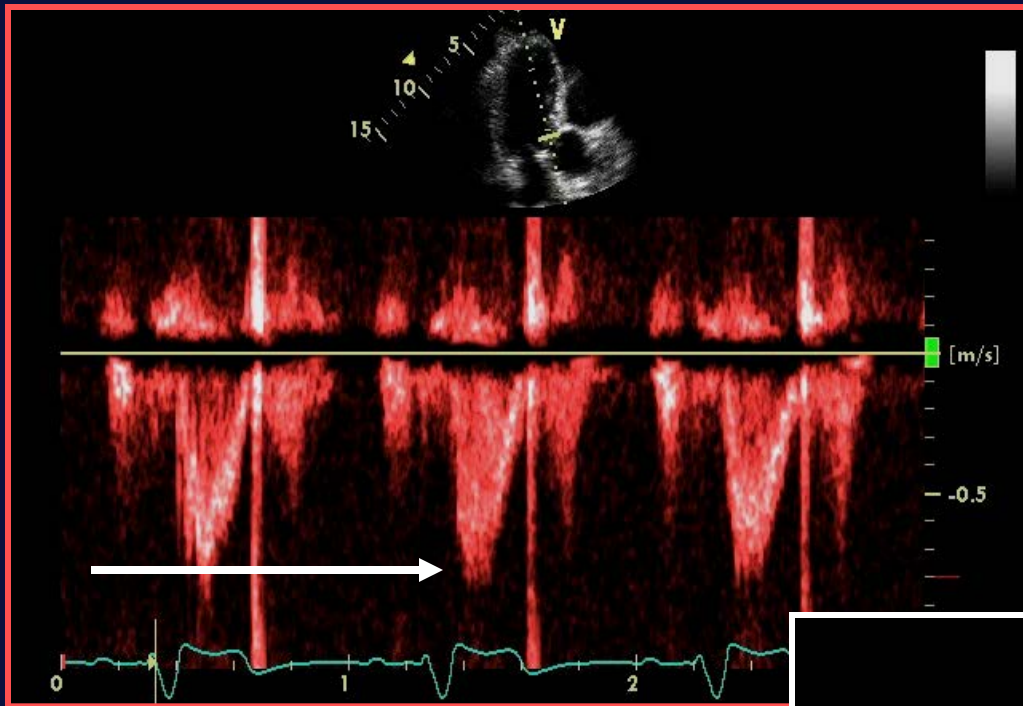


Mean gradient: 23 mmHg

AVA: 1.3 cm²

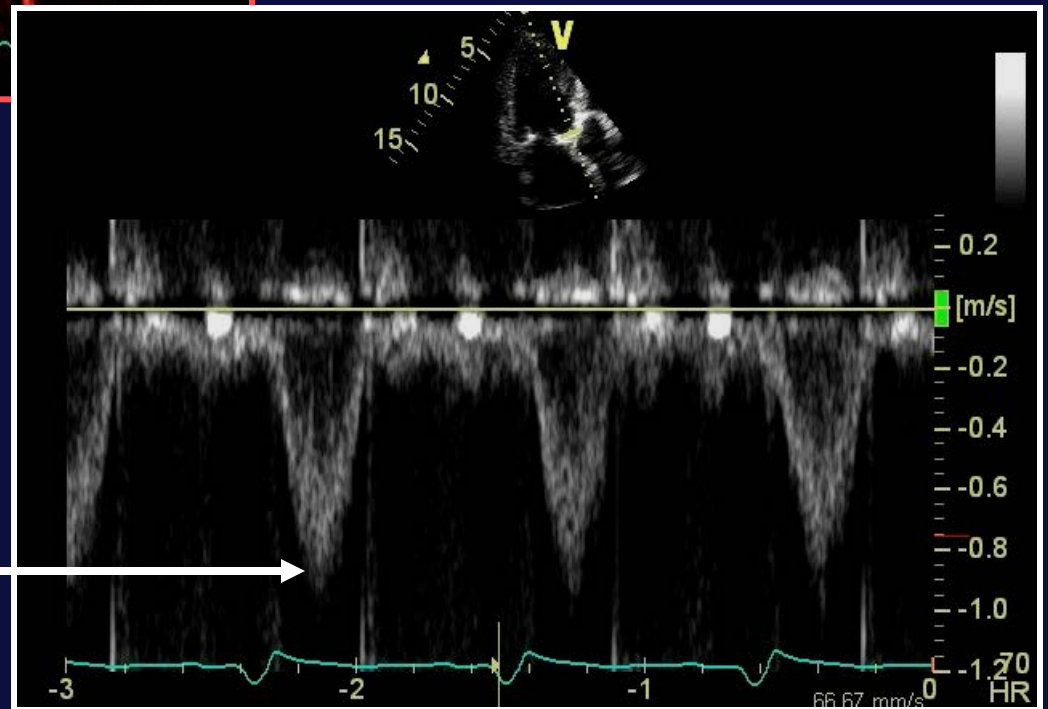


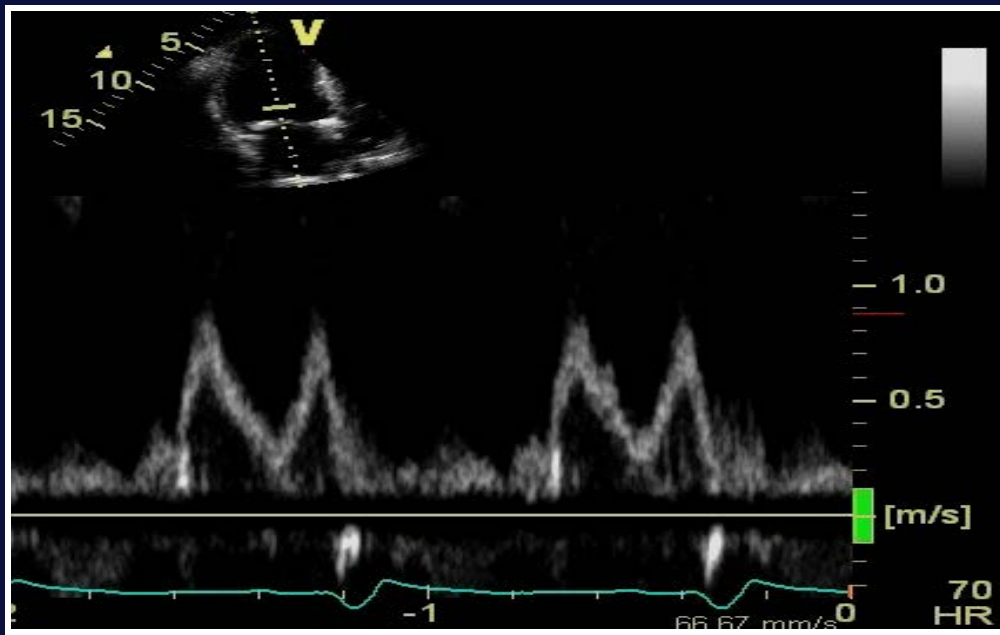




2007 LVOT
Vel: 0.9 m/s

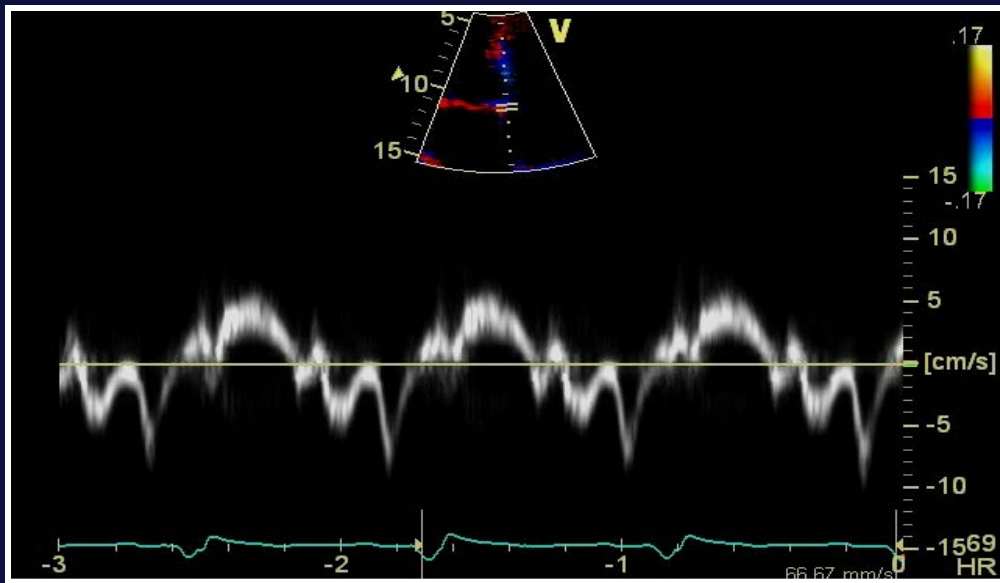
2010 LVOT
Vel: 0.9 m/s





E: 0.8 cm/s

E/A: 1.13



Decel: 200 ms

E/e':18

What is diastolic function grade?

1. Grade I

E: 0.8 cm/s

2 Grade II

E/A: 1.13

3. Grade III

Decel: 200 ms

4. Grade IIIb

E/e':18

Diastolic function

Preserved EF

Grade II DD= moderately elevated filling pressure

$$\text{LAVI} \geq 34 \text{ml/m}^2$$

$$\text{E/A } 0.8\text{-}1.5; \Delta \text{ Valsalva} \geq 0.5$$

$$\text{DT } 160\text{-}200 \text{ ms}$$

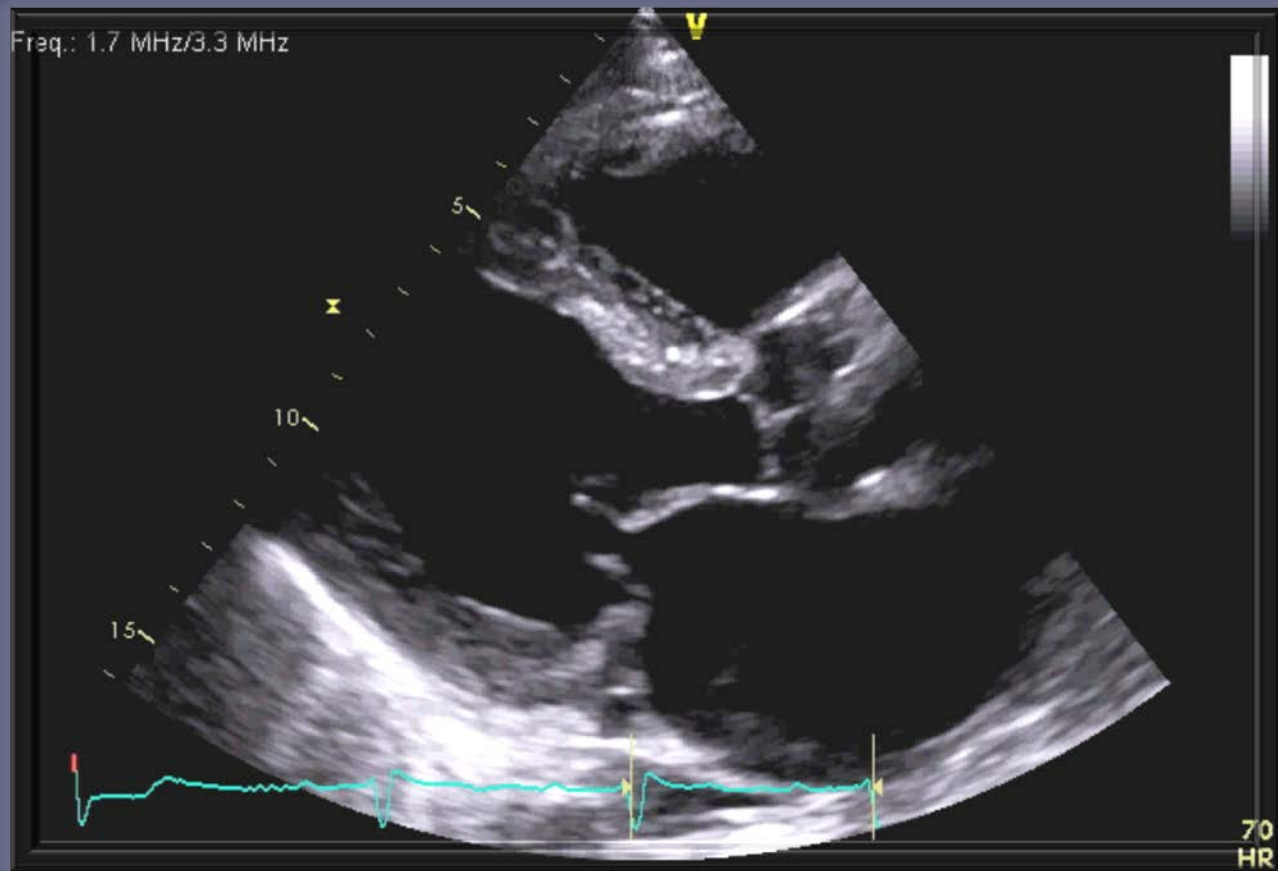
$$\text{Av E/e}' \geq 13; \text{ Sep} \geq 15; \text{ Lat} \geq 12;$$

$$\text{Ar-A} \geq 30 \text{ ms}$$

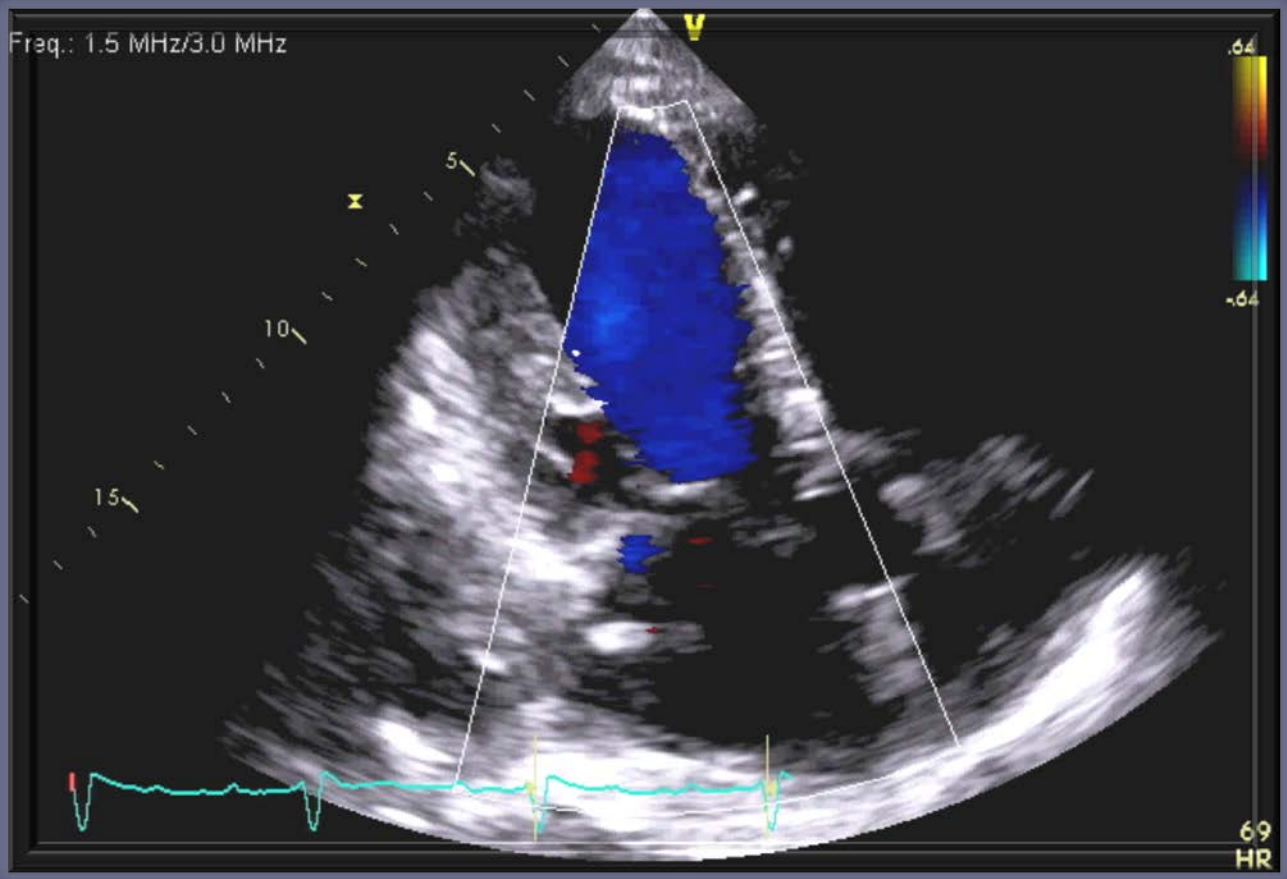
Case

- **85 year old male presents to ER with fatigue and dyspnea on exertion**
- **HR 70 BPM BP 90/60 mmHg**
- **JVP at angle of jaw**
- **Grade II/VI PSM apex**
- **Bibasilar crackles**

EF 44% LAVI 62 cc/m²



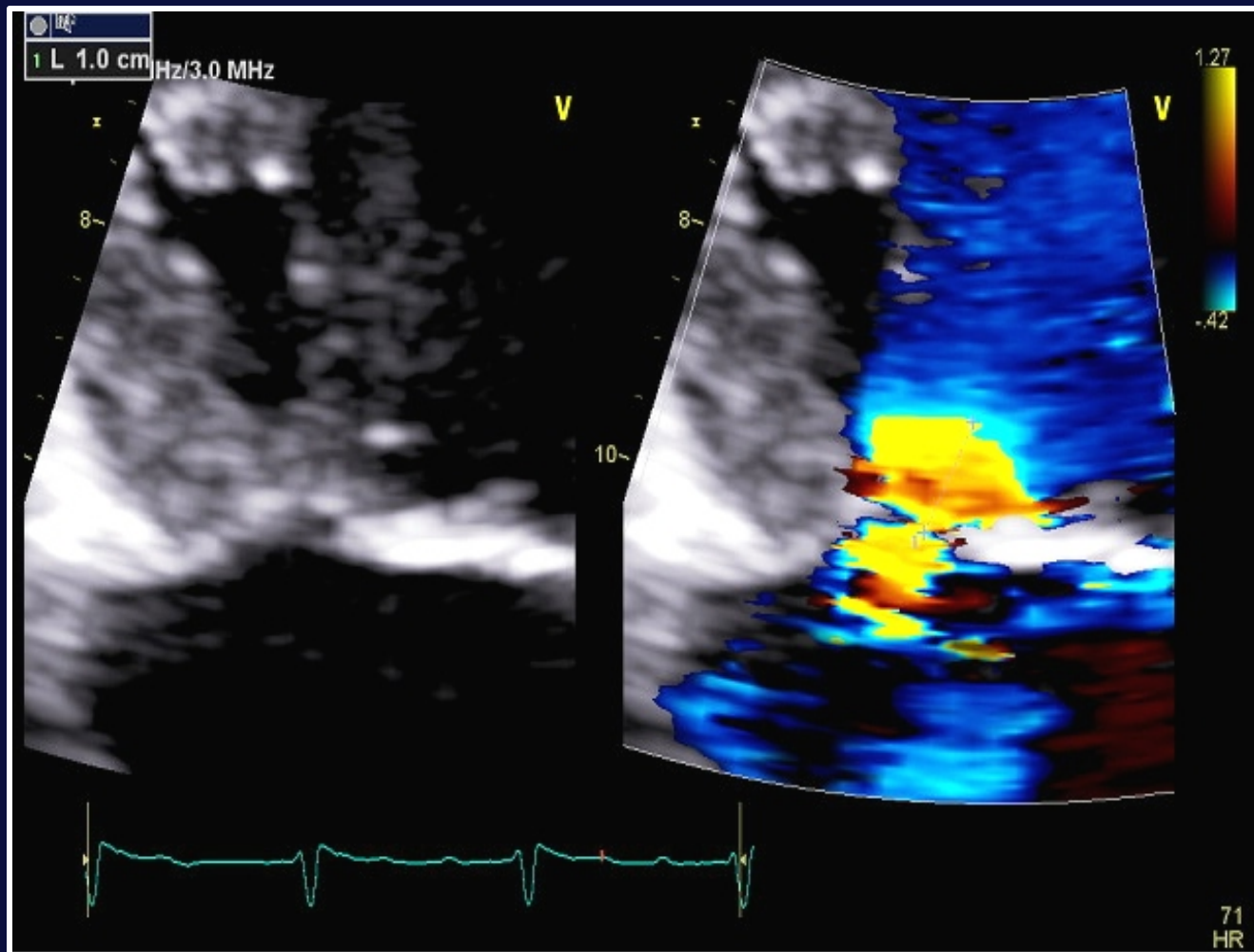
Freq.: 1.5 MHz/3.0 MHz

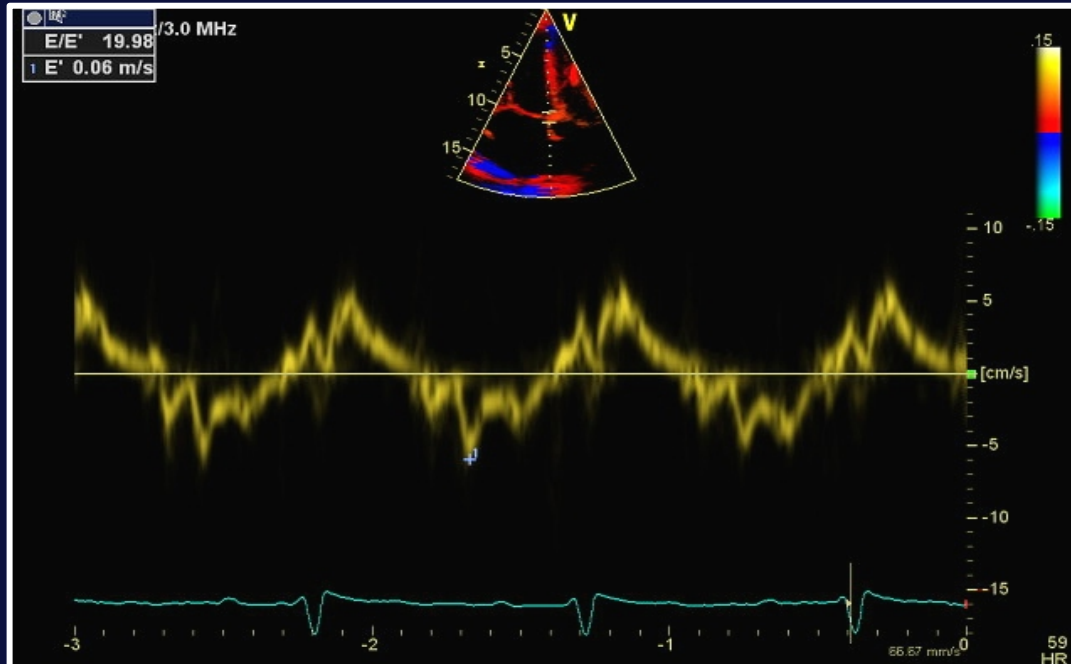
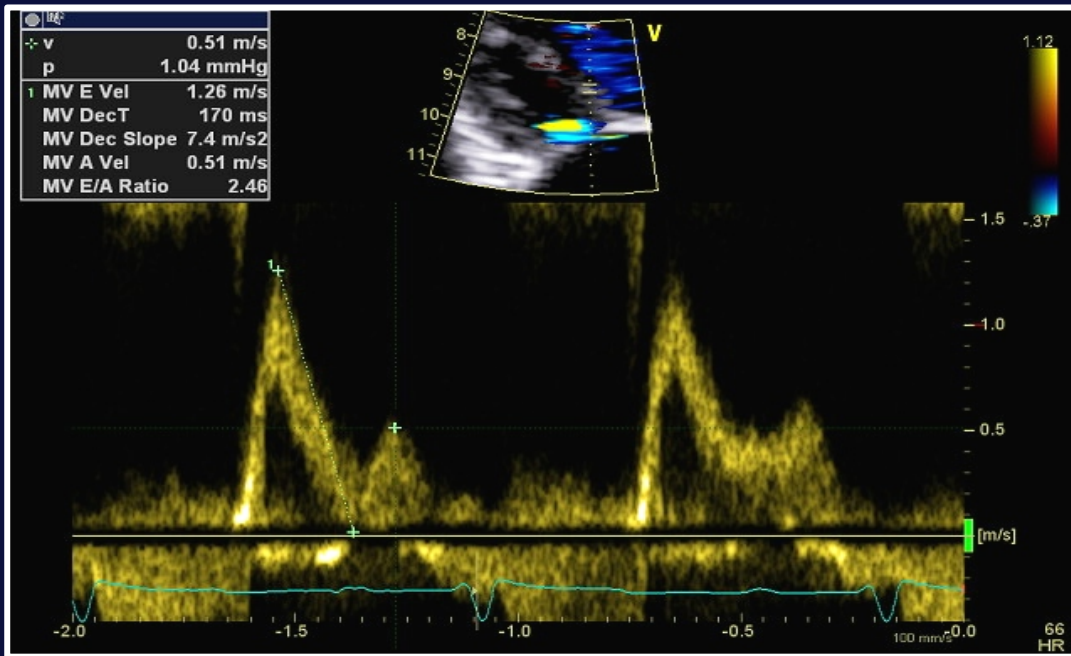


0.64
-0.64

69
HR

RV: 78 cc ERO: 0.52 cm²





E/A: 2.6
DT: 170 msec
E/e': 22

? Diastolic Function Grade

1. Grade II
2. Cannot grade **E/A: 2.6**
DT: 170 ms
3. Grade III **E/e': 22**
4. Grade IIIb

**E/e' does not reflect filling pressures
in the following MV disorders**

≥ Moderate MR

Mitral annular calcification

Mitral stenosis

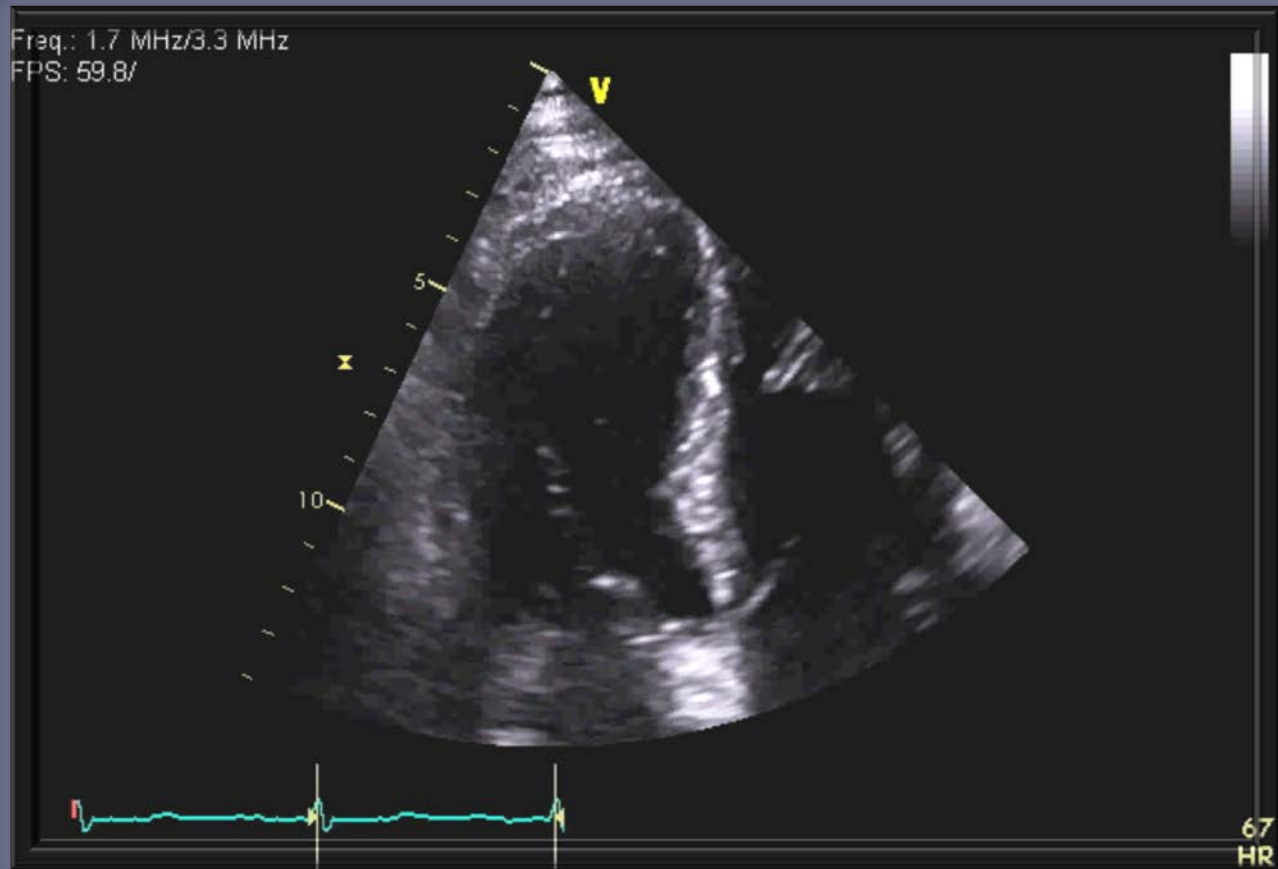
Mitral anuloplasty rings

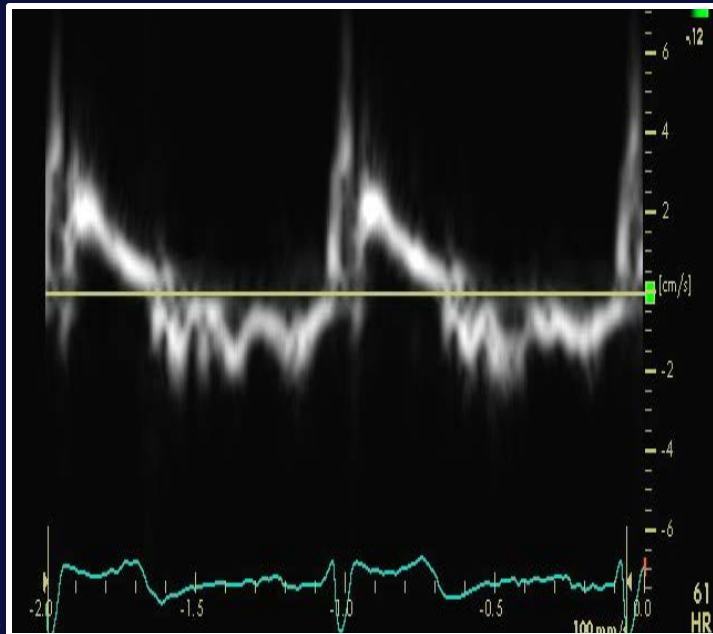
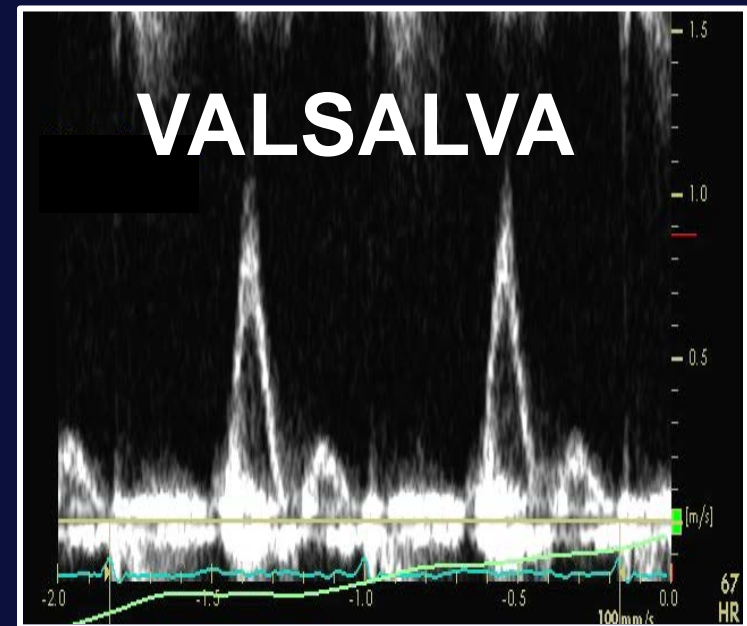
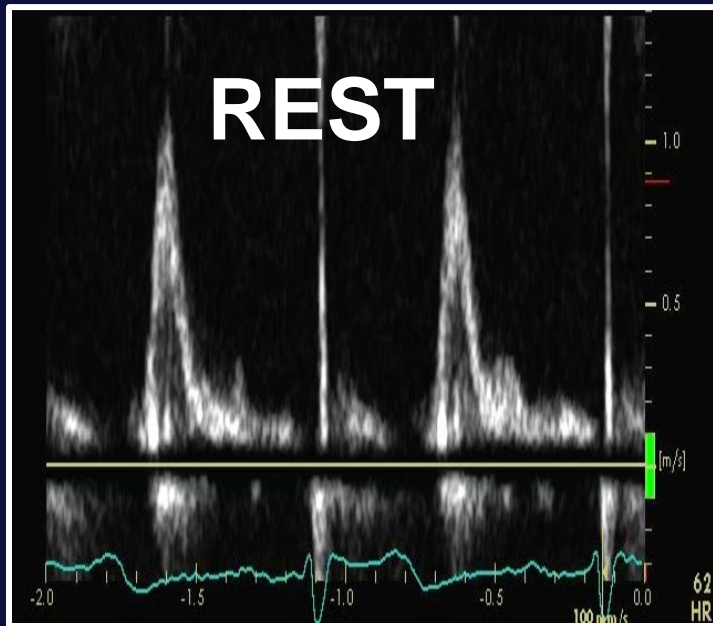
Mitral prostheses

Case

- **57 year old male presents to the ER with progressive angina**
- **PMH: ACB 1998 and 2012; CHF, hypertension and familial hyperlipidemia**

EF 60% LAVI 47 cc/m²





E/A: 3.7

DT 111 ms

E/e': 50

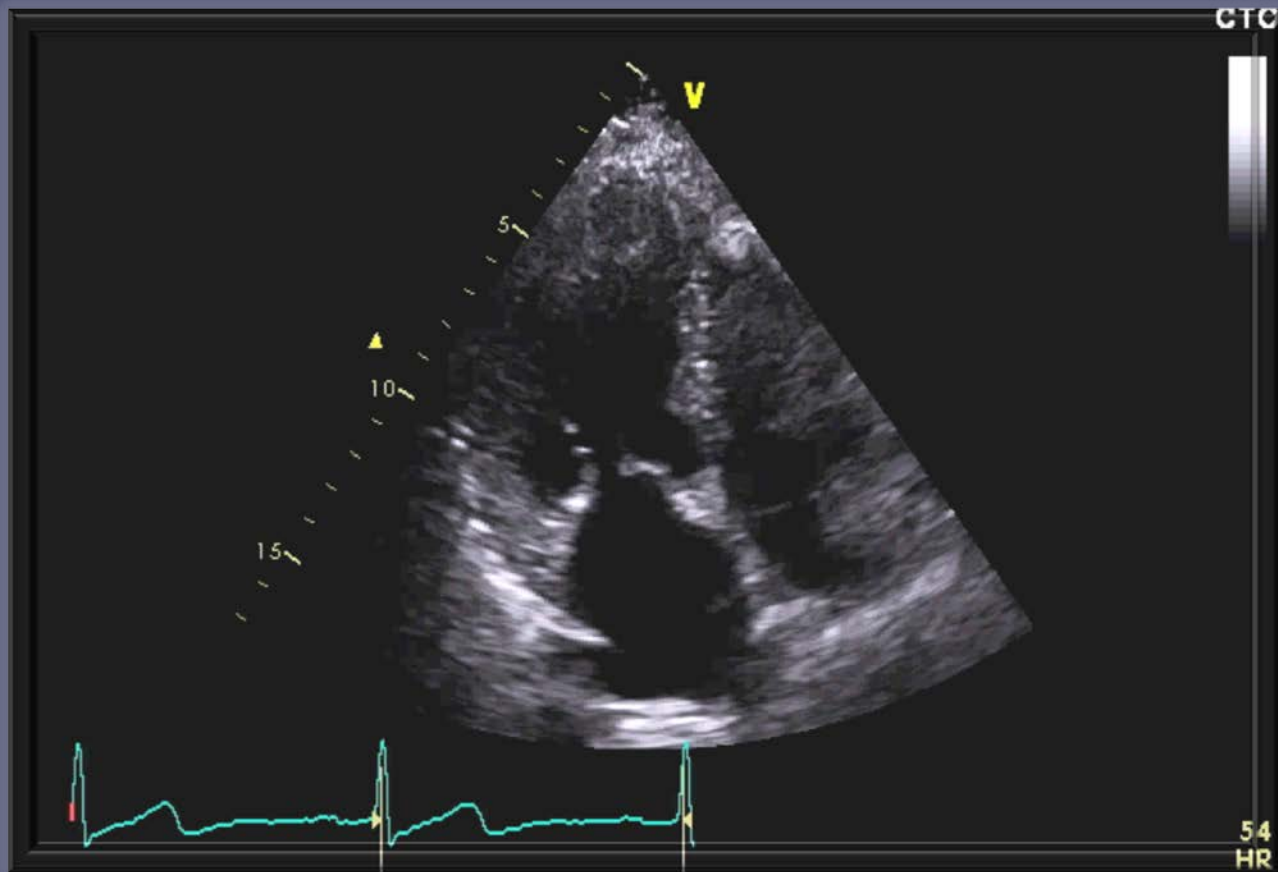
?Diastolic Function Grade

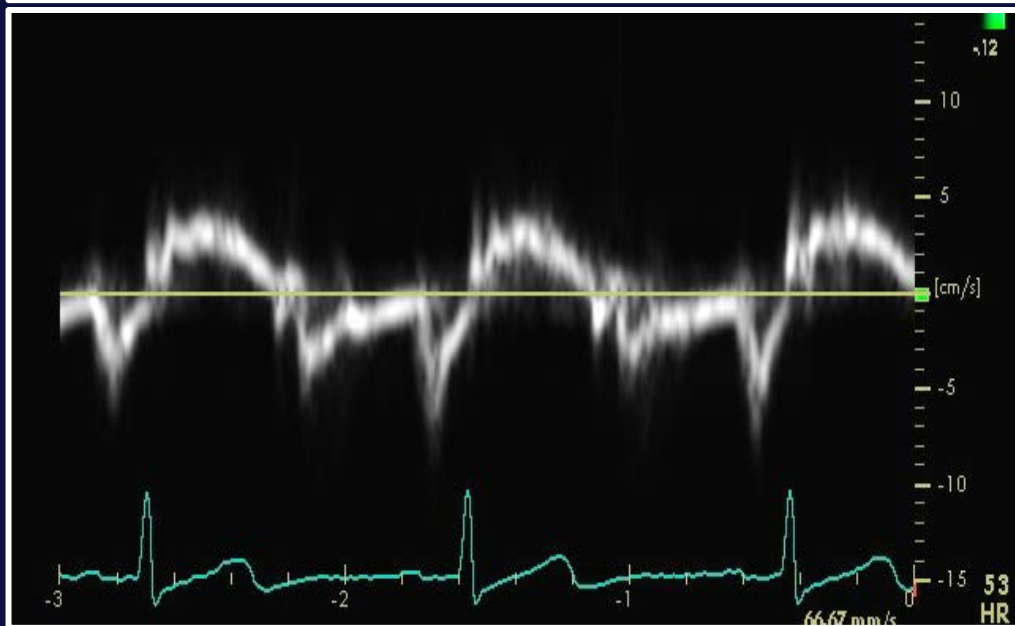
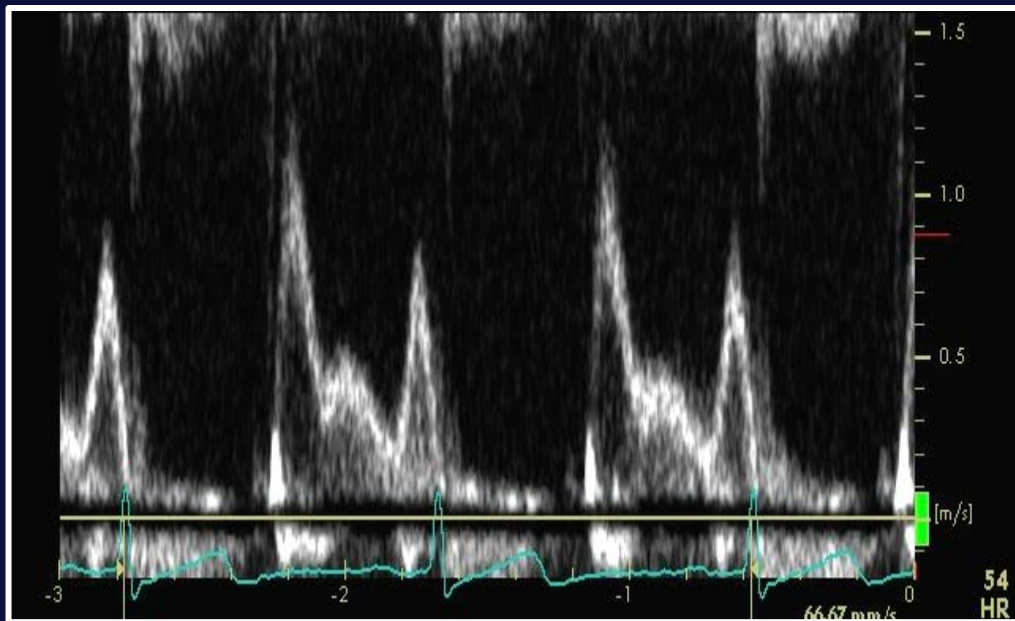
1. Grade II E/A: 3.7
2. Grade III DT 111 ms
3. Grade IIIb E/e': 50

Case

- **88 year old woman**
- **Echo for F/U PHT**
- **Asymptomatic**

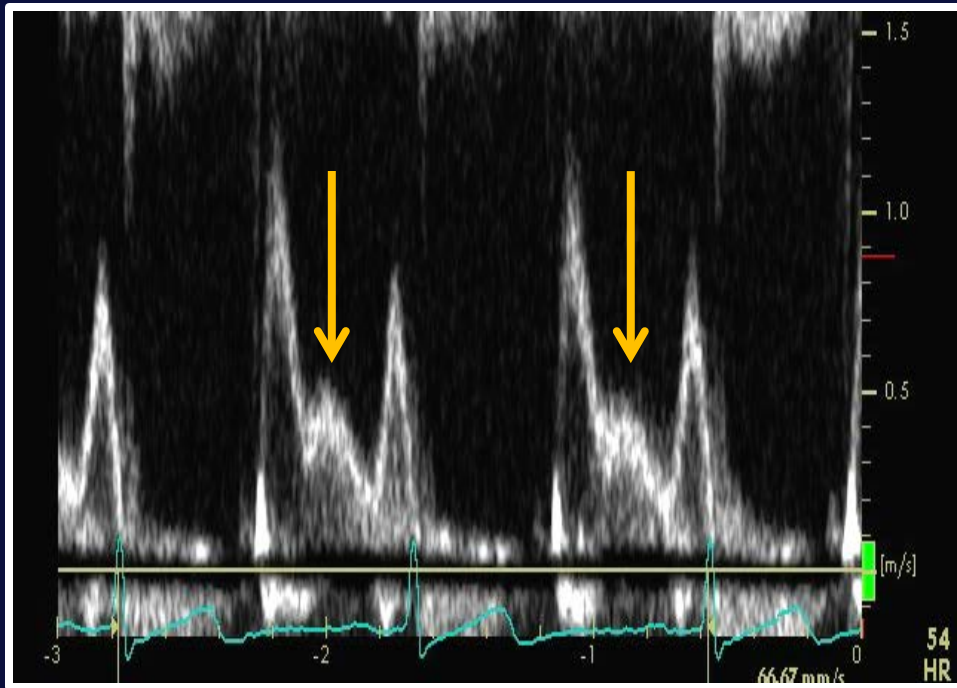
EF 65% LAVI 43 cc/m²





E/A: 1.3
DT: 177 ms
E/e': 30

What is this flow and what does it mean?



1. L wave: don't know
2. B notch: high LVEDP
3. L wave: high LAP
4. Artifact

Triphasic Mitral Inflow Velocity with
Middiastolic Filling: Clinical Implications and
Associated Echocardiographic Findings

Triphasic mitral inflow with mid-diastolic flow is related to elevated filling pressures, delayed relaxation and slow heart rate indicating advanced diastolic dysfunction.

JASE 2004; 17:428

contraction. However, mitral inflow may have additional forward flow velocity during middiastole (Figure 1). This triphasic mitral inflow pattern with prominent middiastolic flow has been described previously in a patient with hypertension and severe left ventricular (LV) hypertrophy.¹ Although markedly prolonged LV relaxation continuing into middiastole has been proposed as a possible mechanism, other associated diastolic properties and hemodynamic implications have not been assessed in detail. The purpose of our study was to explore possible mechanisms and clinical implications of triphasic mitral inflow with middiastolic filling.

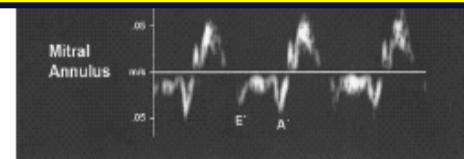


Figure 1 Mitral inflow (*top*) and mitral annulus velocity (*bottom*) patterns for patient with triphasic mitral inflow with prominent middiastolic filling (*arrow*). Middiastolic mitral annulus velocity is also seen between E' and A' . A , Peak velocity of mitral inflow late filling during atrial contraction; A' , late diastolic mitral annular velocity; E , peak velocity of mitral inflow early filling; E' , early diastolic mitral annular velocity.

?Diastolic Function Grade

1. Grade II

E/A: 1.3

2. Grade III

DT: 177 ms

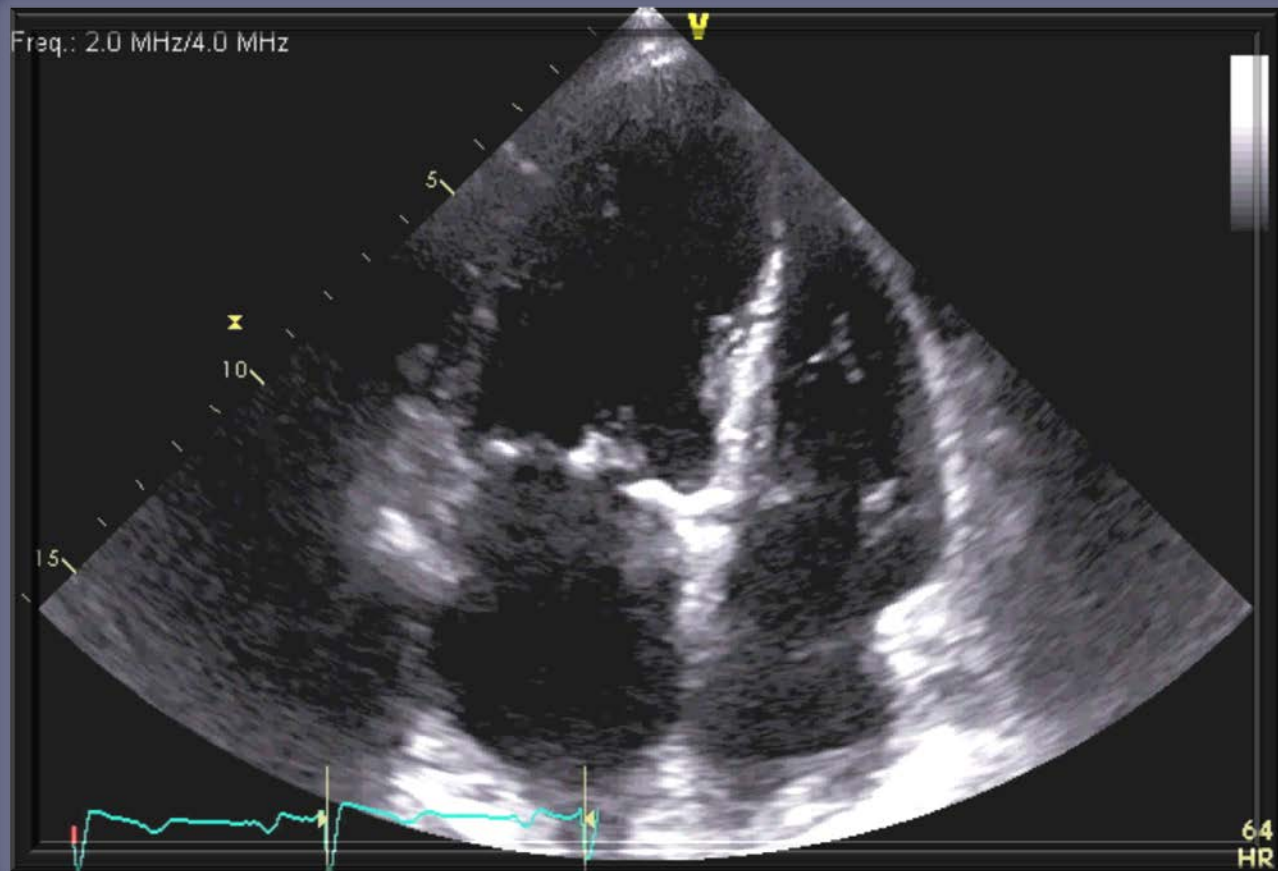
3. Grade IIIb

E/e': 30

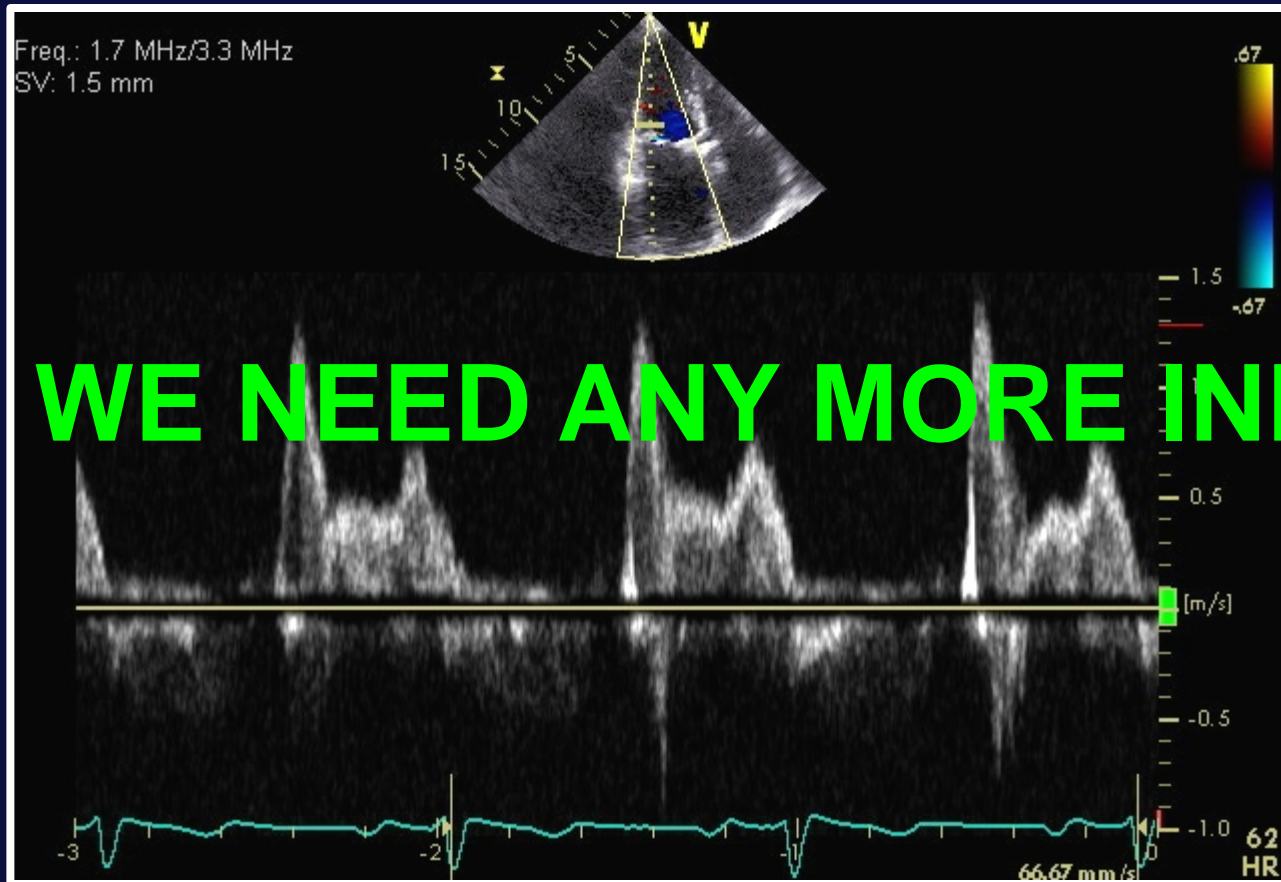
Case

- **89 year old woman presents to ER with progressive dyspnea**
- **PMH: hypertension**
- **Exam: BP 168/96 mmHg; mildly increased JVP; bibasilar crackles**
- **CXR: mild vascular redistribution, bilateral pleural effusions**

EF 66%; Mild LVH; LAVI 62 cc/m²

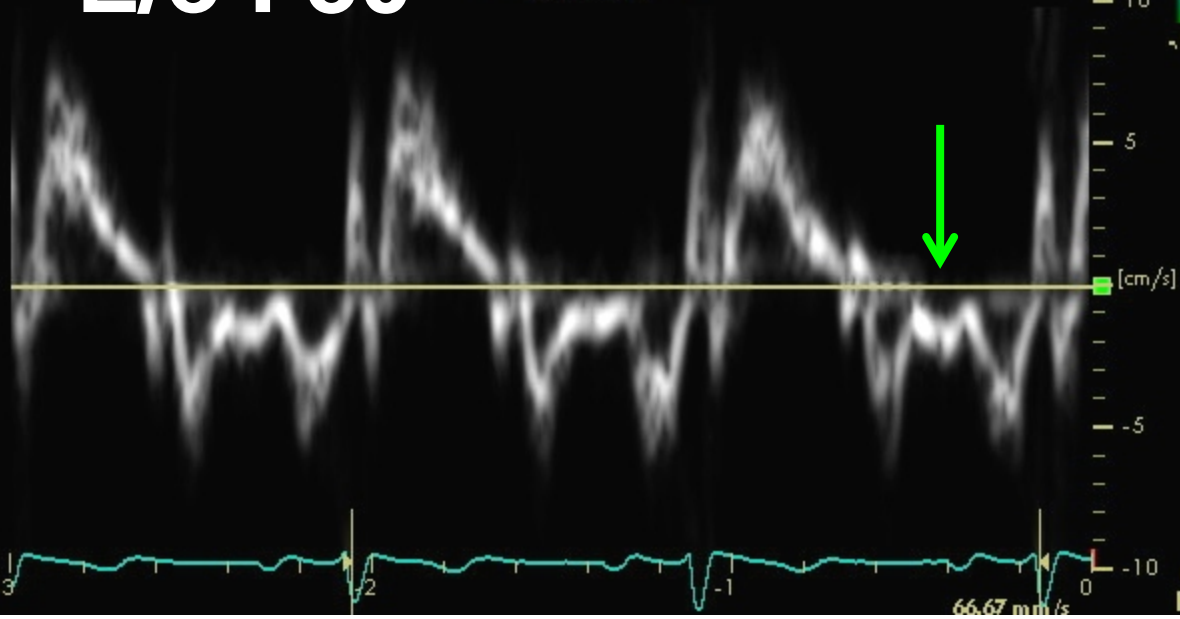
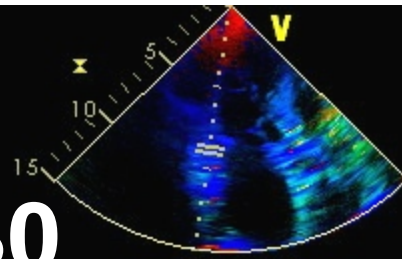


E vel: 1.4 m/s; E/A: 2; DT: 133 ms



Freq.: 1.7 MHz/3.3 MHz
SV: 4.0 mm

E/e': 30

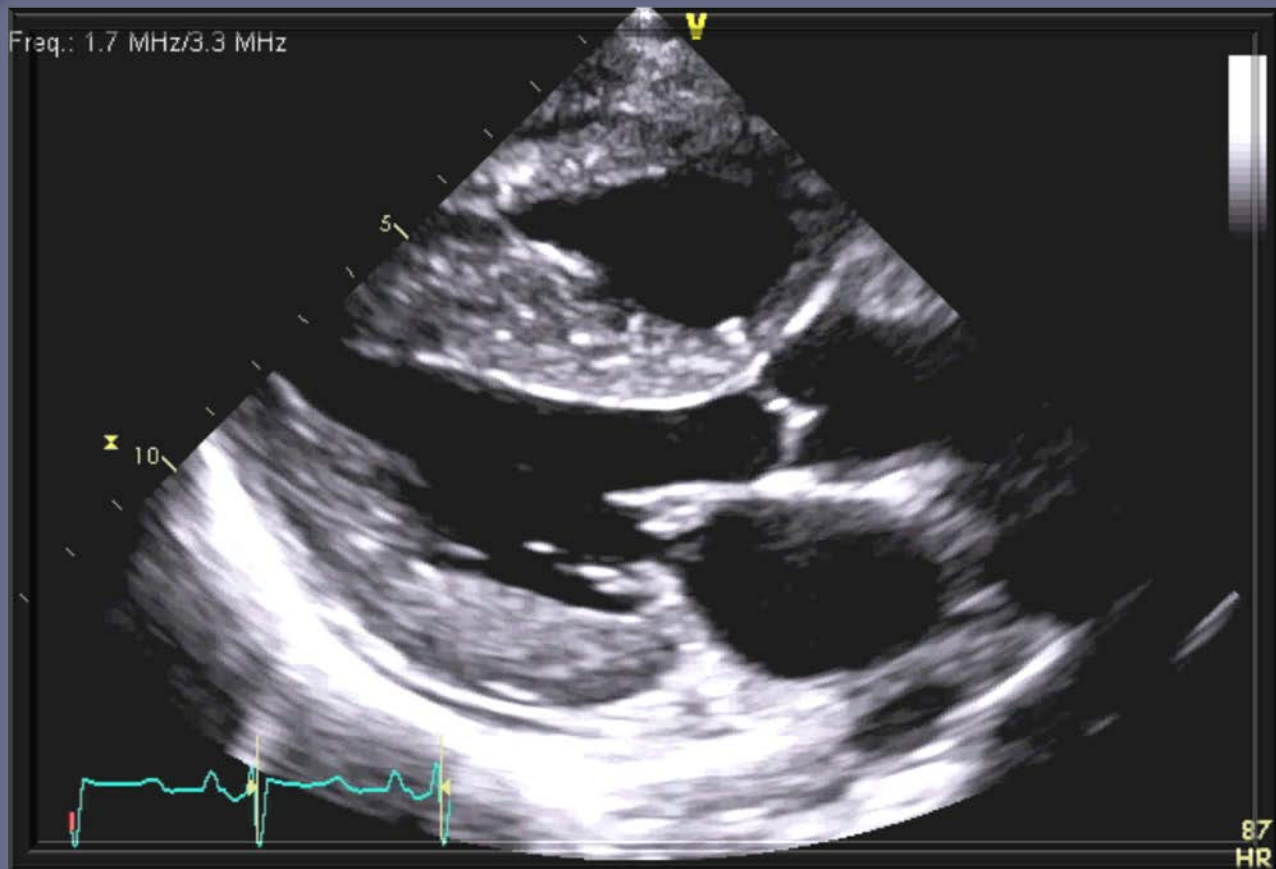


Case

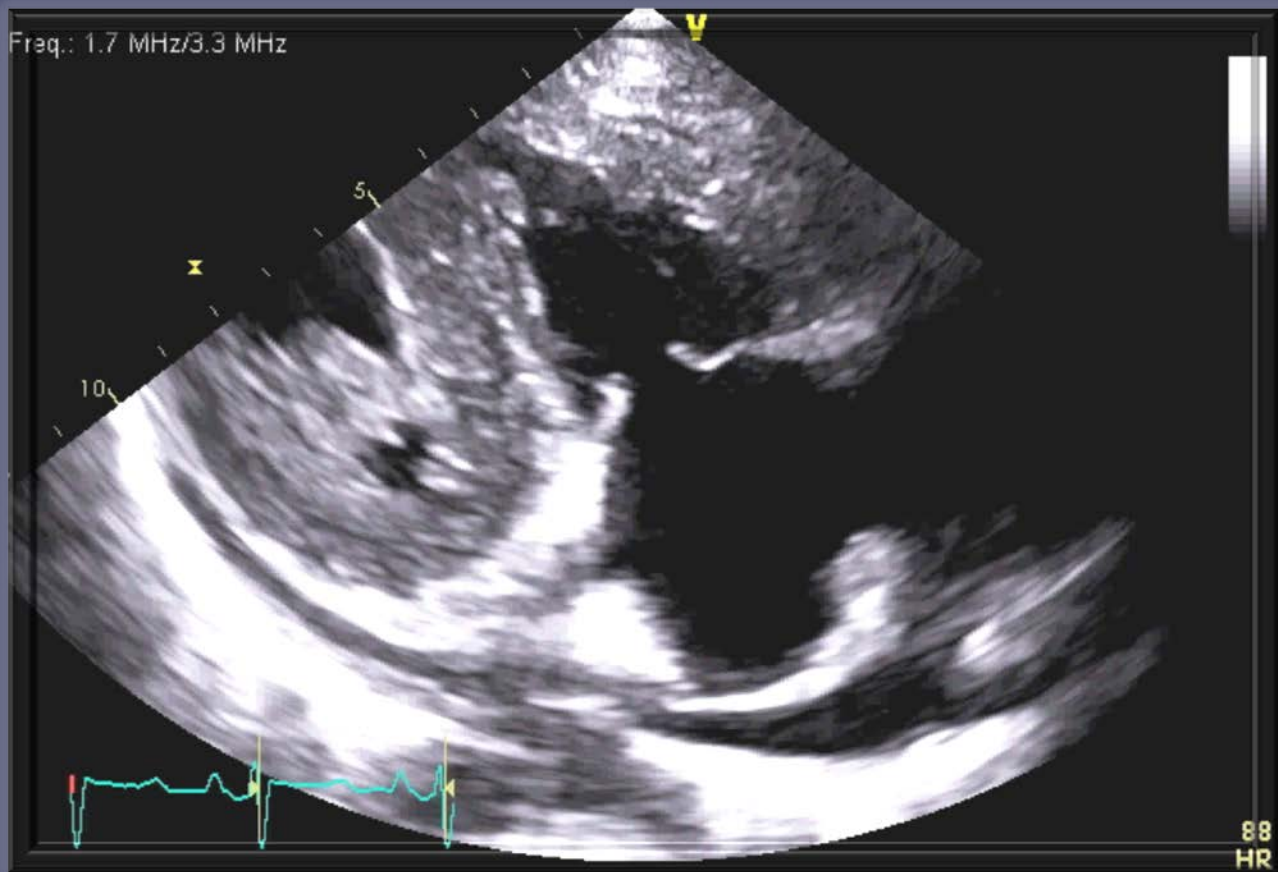
- 40 year old female referred for transplant evaluation
- 2012: fatigue and dyspnea
- 2013: Syncope on Midodrine Rx
- Bilateral hand paresthesia
- Recurrent admissions for CHF
- Now NYHA class III

Septum 14 mm

Posterior wall 14mm

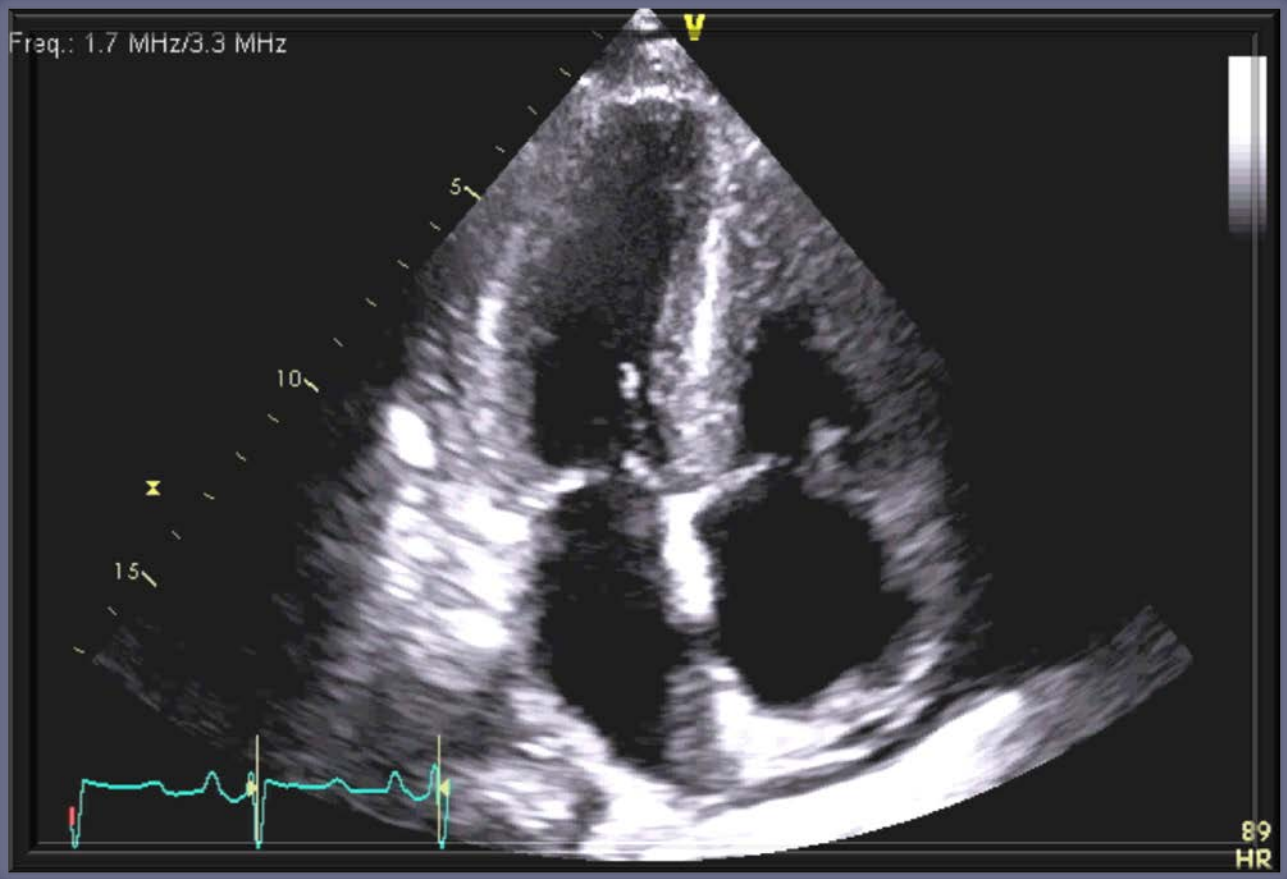


Freq.: 1.7 MHz/3.3 MHz

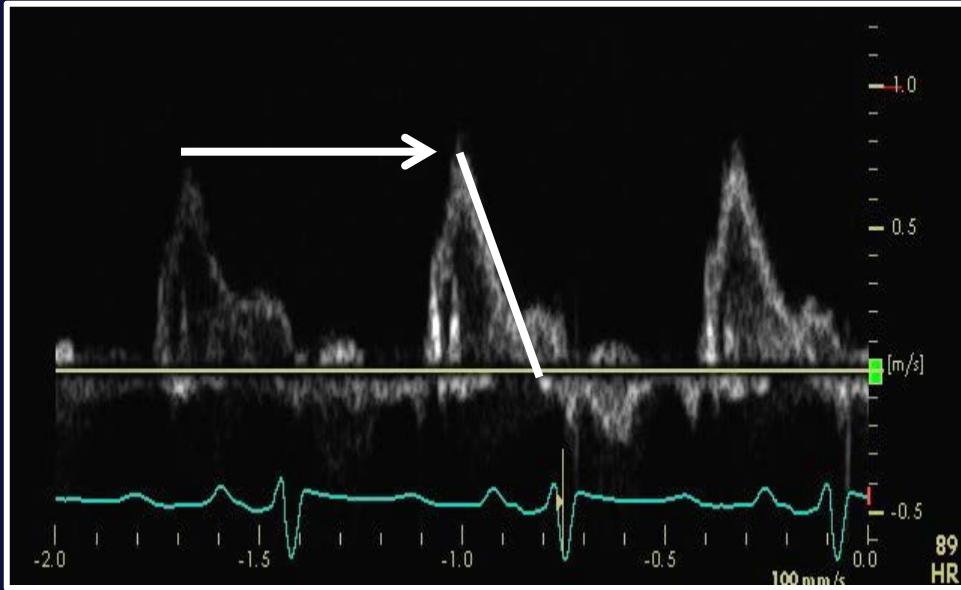


88
HR

Freq.: 1.7 MHz/3.3 MHz

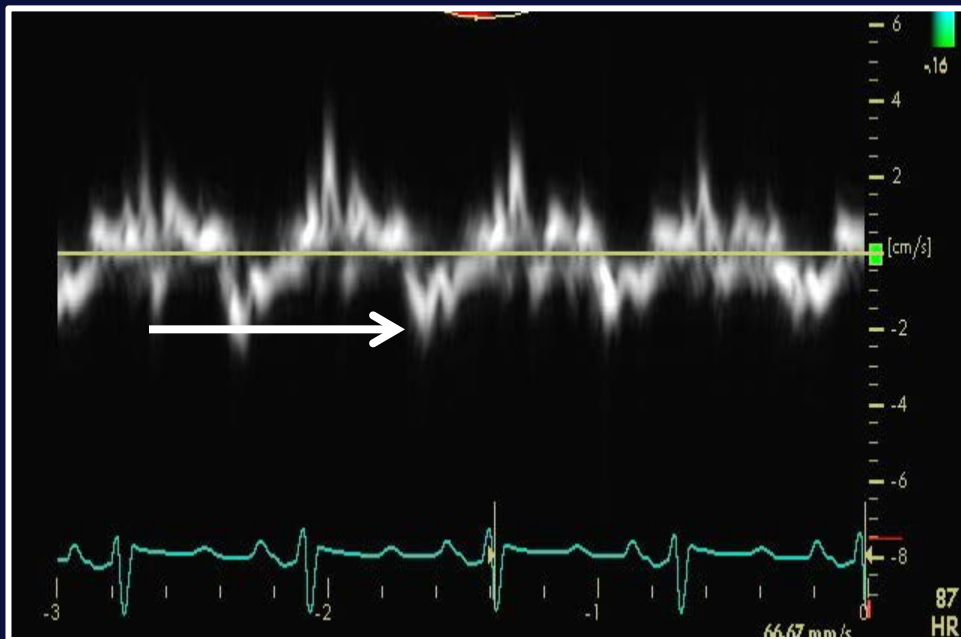


89
HR



Peak E wave: 0.7 m/s
E/A: 3.5

DT: 155 ms



e' velocity: 0.03
E/e': 23

What is the most likely diagnosis?

1. Hypertrophic cardiomyopathy
2. Amyloid cardiomyopathy
3. Hypertensive heart disease

?Diastolic Function Grade

1. Grade II

2. Grade III

3. Grade IIIb

4. Grade III/IIIb

E/A: 3.5

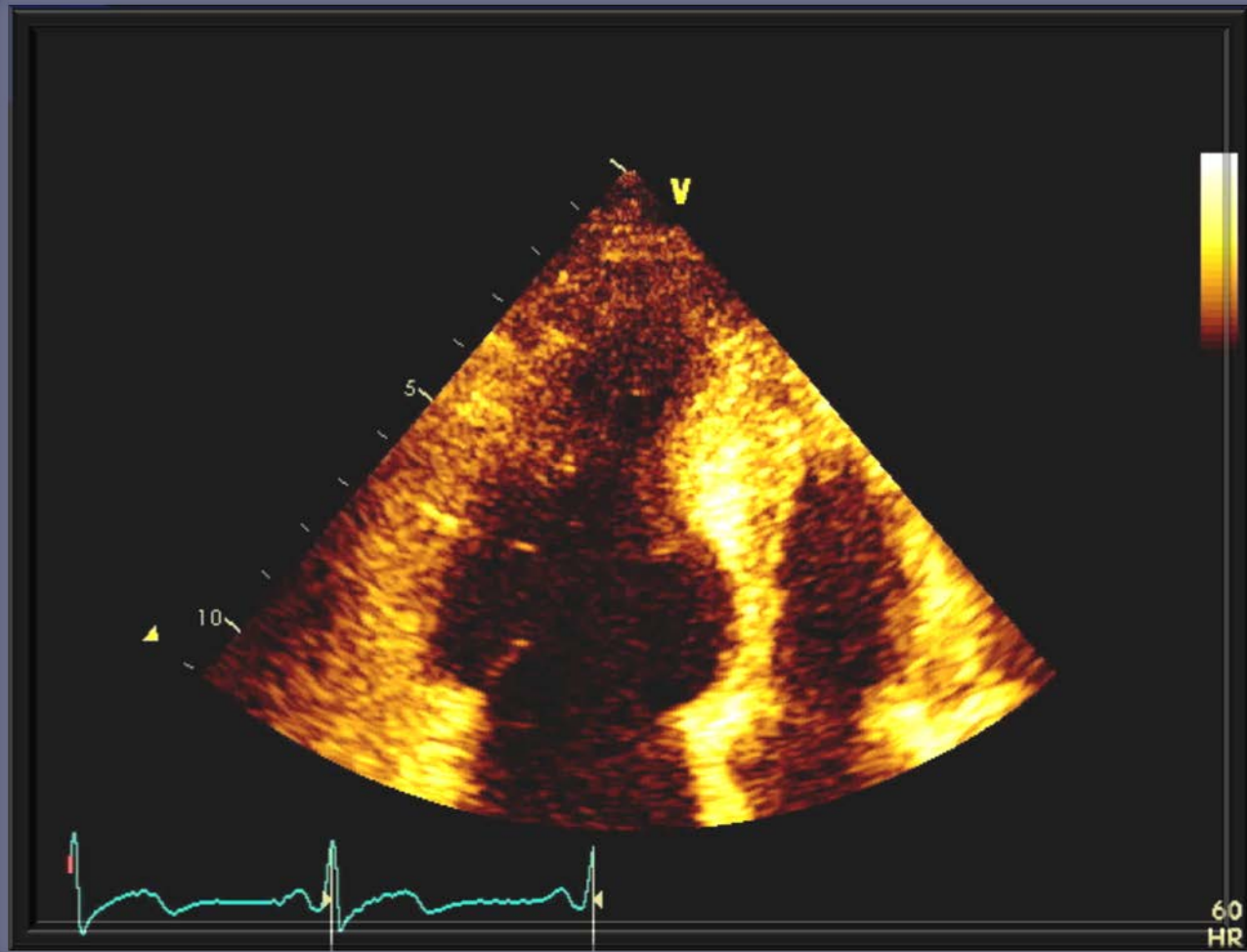
DT: 155 ms

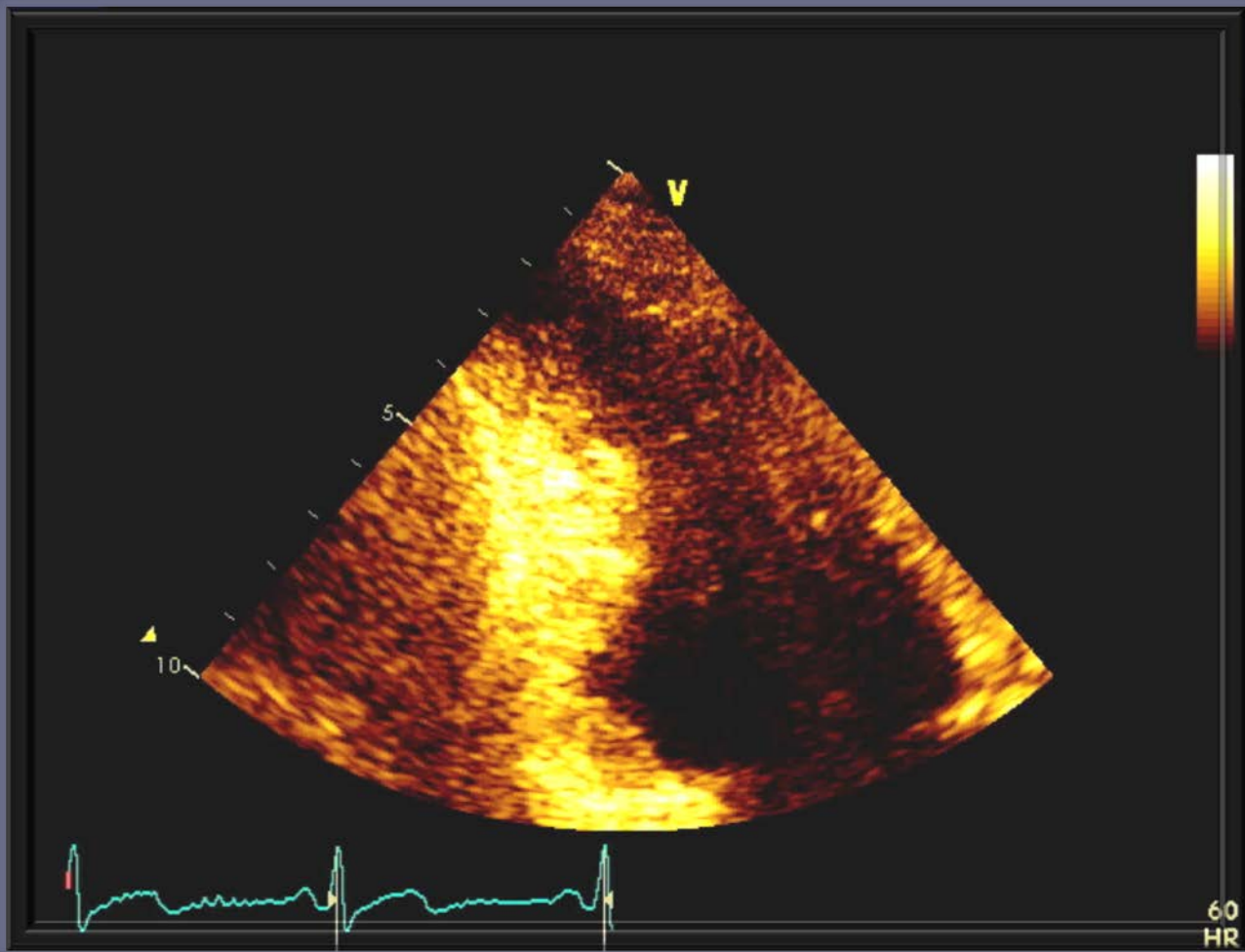
E/e': 23

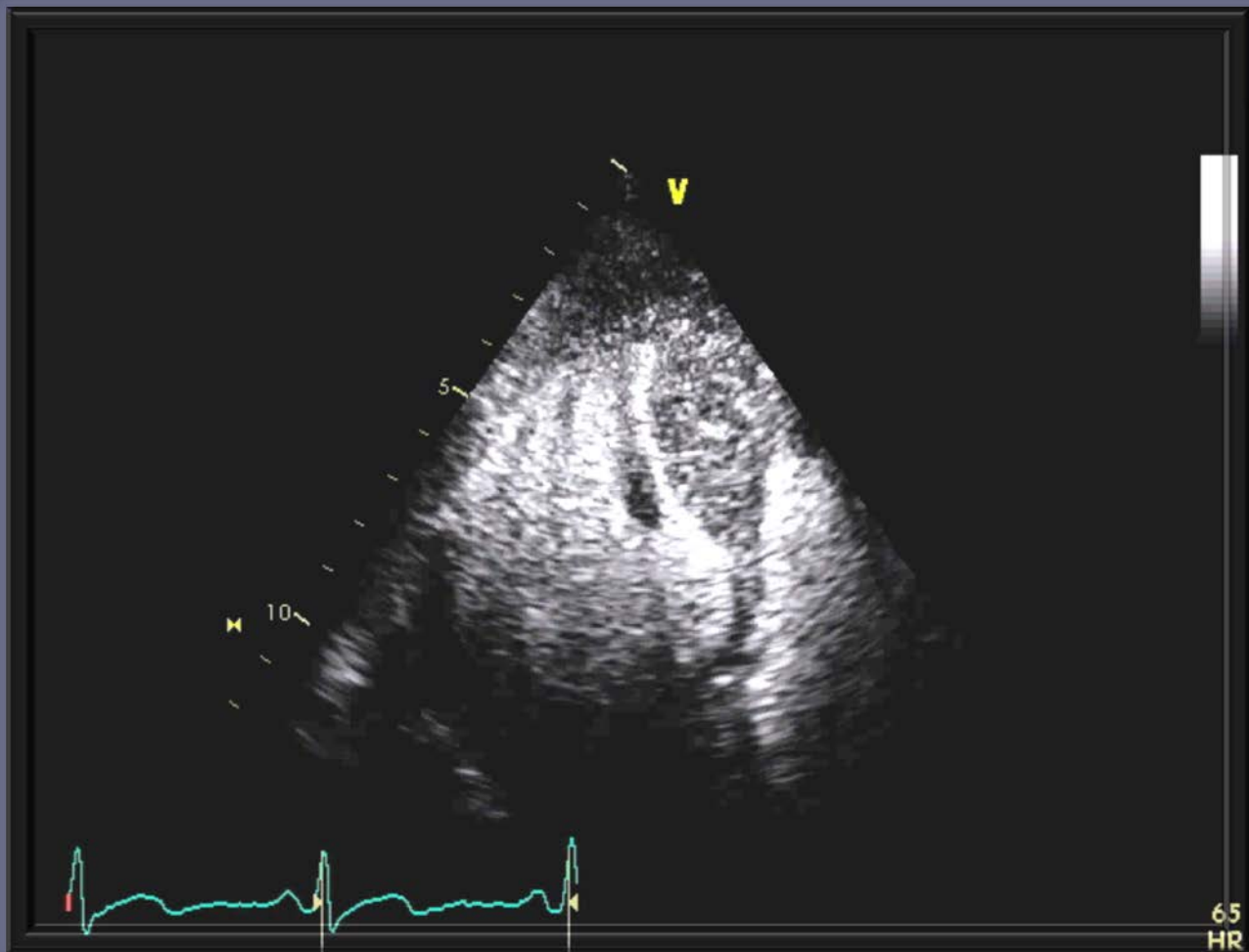
Case

- **49 year old woman: palpitations and near syncope**
- **Mild chest pressure on exertion**
- **Mother had cardiac issues**
- **No family history SCD**

EF 70% LAVI 47 cc/m²

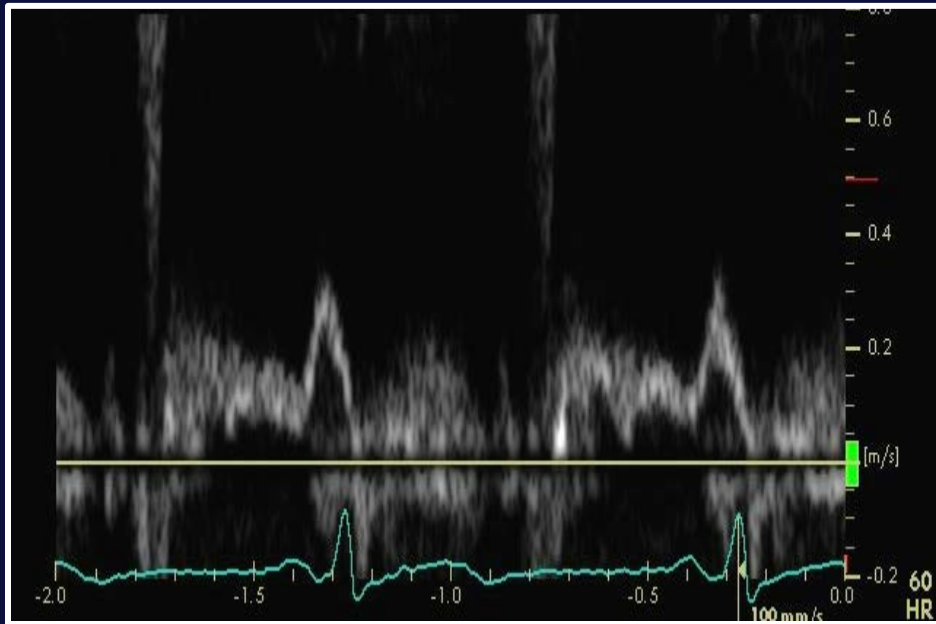






?Diagnosis

1. Apical HCM
2. Hypertensive HD
3. Apical HCM with apical pouch
4. Need more information

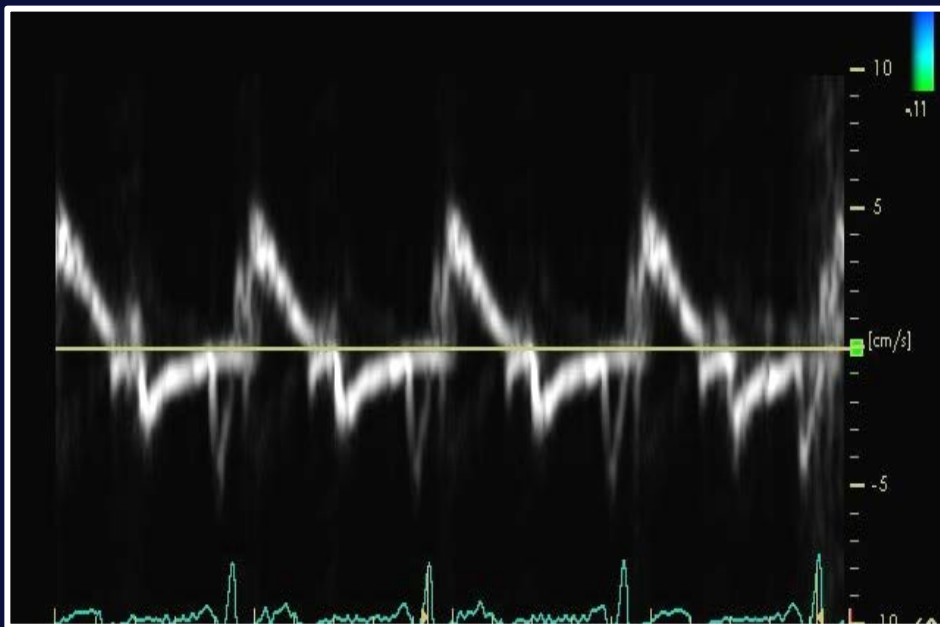


E velocity: 0.4 m/s

E/A: 1.33

DT: 240 ms

E/e': 10



?Diastolic Function Grade

1. Grade I

2. Grade II

3. Grade III

4. Need more
information

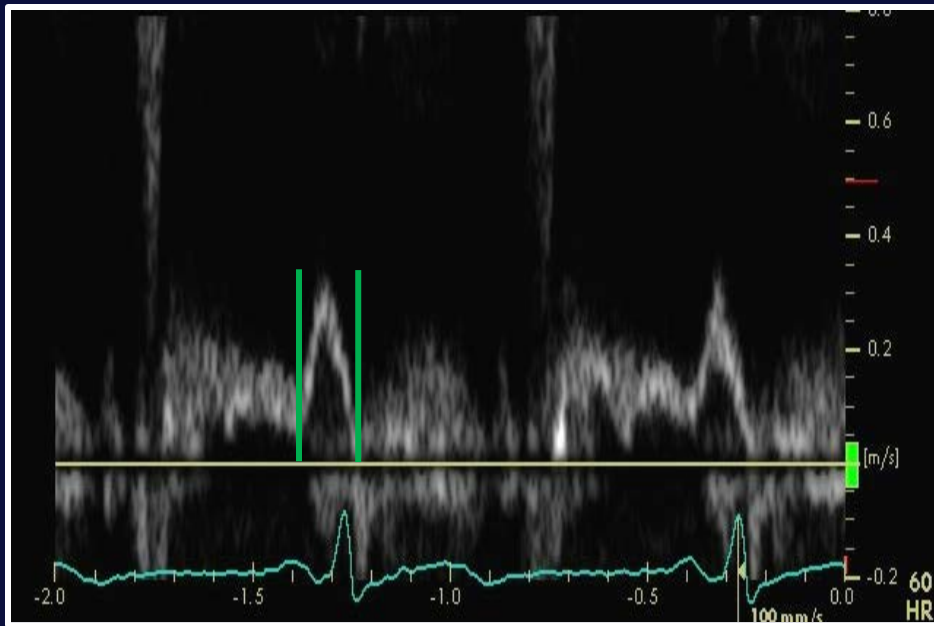
E/A: 1.33

DT: 240 ms

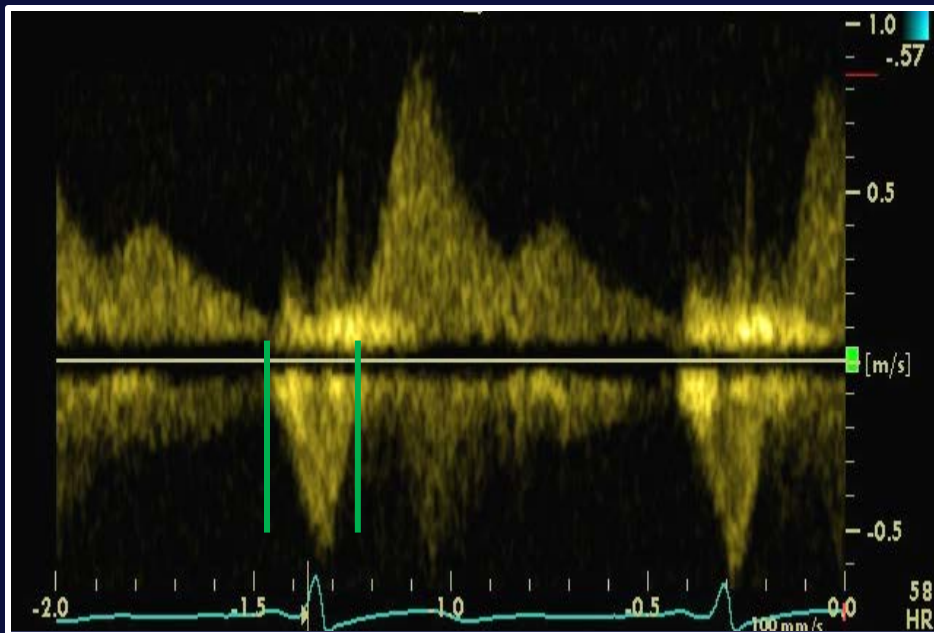
E/e': 10

↑ LVEDP

A duration: 122 ms



$A_{(PV)}$ duration: 195 ms

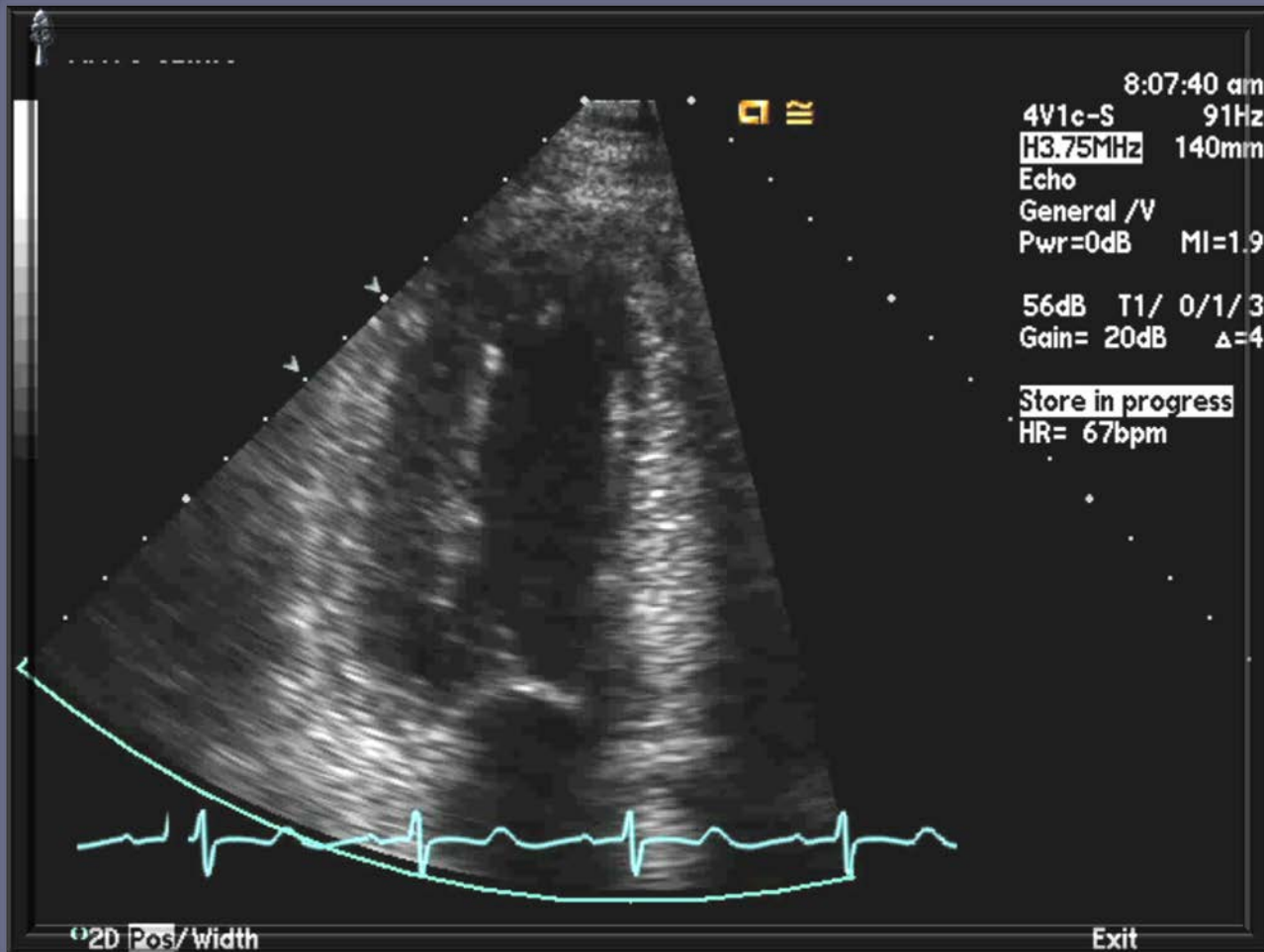


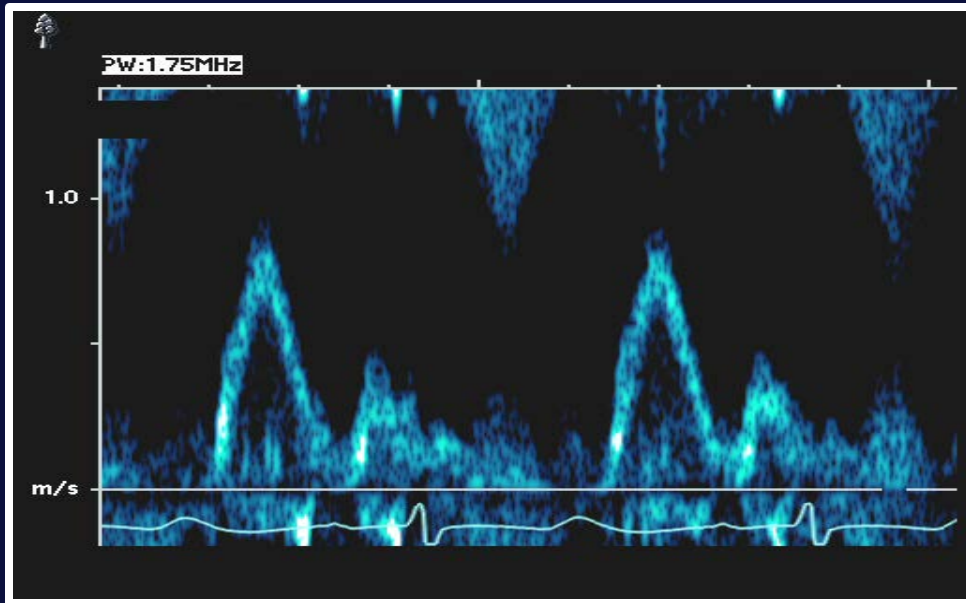
$A_{(PV)} - A_{(MV)} = 63 \text{ ms}$

Case

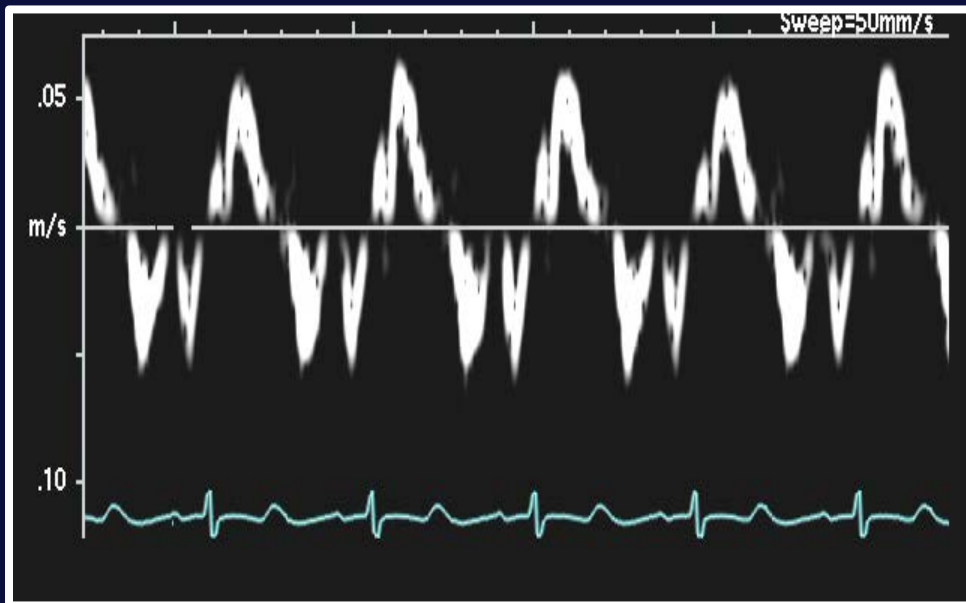
- **50 year old male: dyspnea on exertion NYHA Class III**
- **S/P stem cell transplant for amyloidosis**

Septum 29 mm EF 68% LAVI 41 cc/m²





E/A: 2
DT: 145 ms



E/e': 16

?Diastolic Function Grade

1. Grade I

2. Grade II

3. Grade III

4. Grade III/IIIb

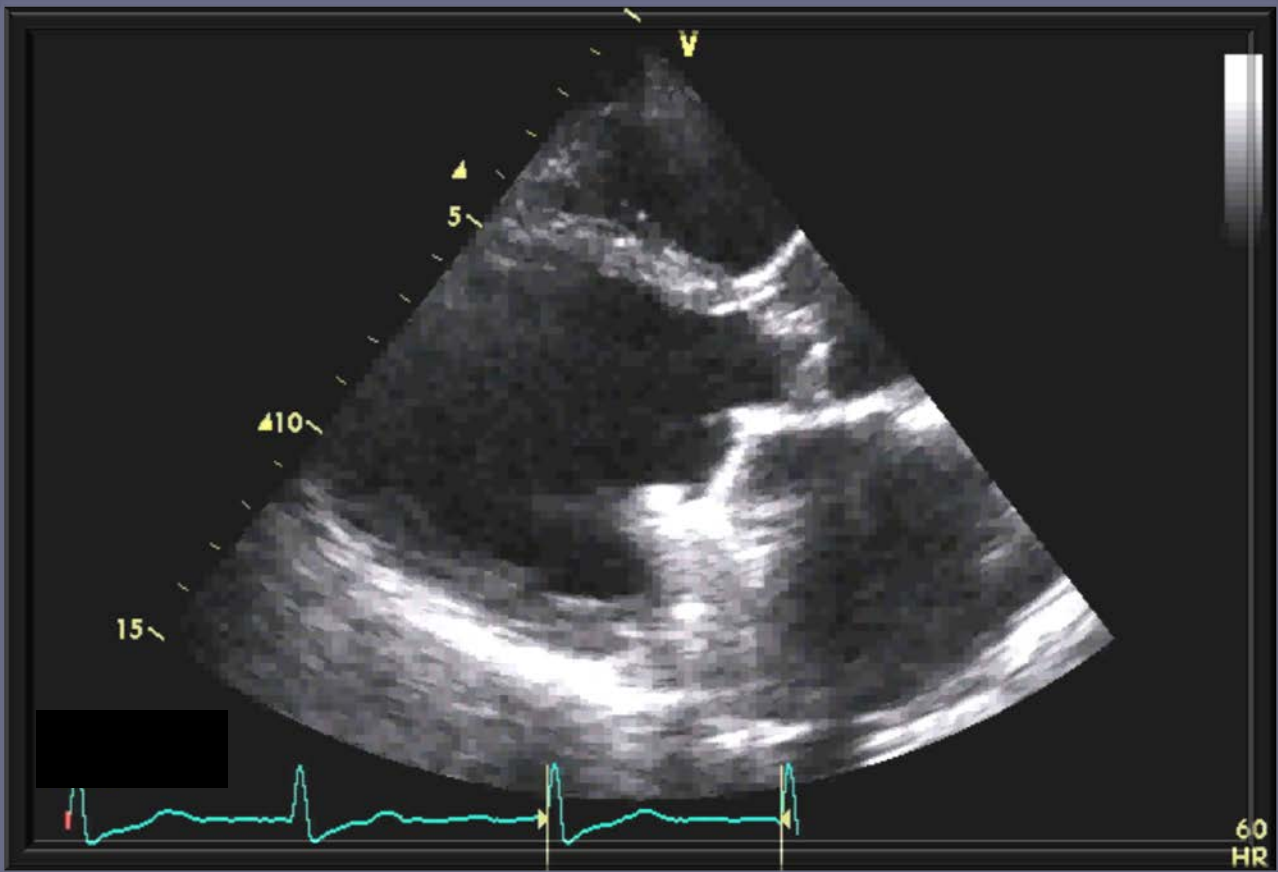
E/A: 2

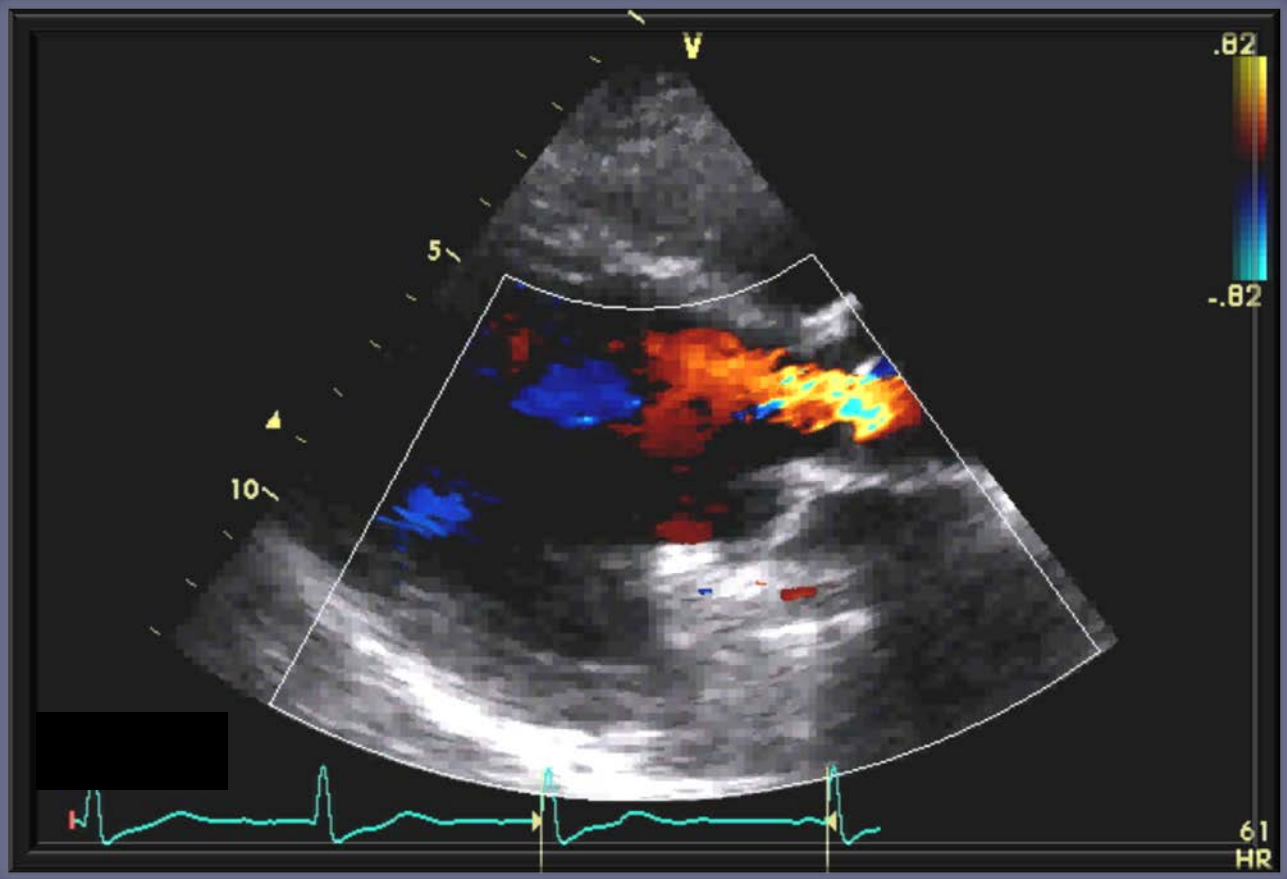
DT: 145 ms

E/e': 16

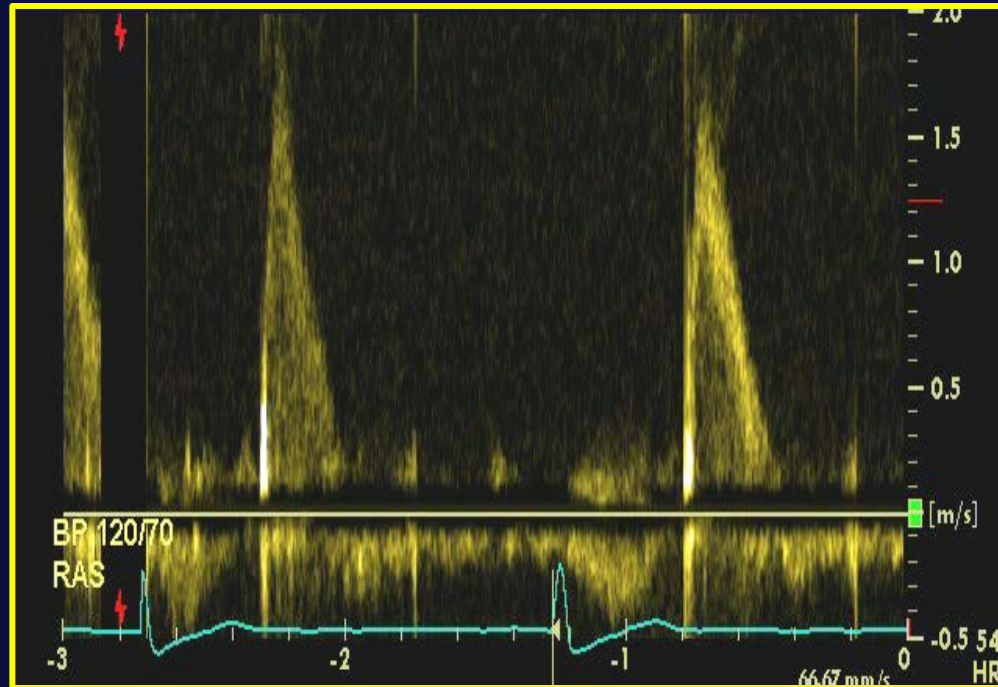
Case

- **78 year old woman: dyspnea on exertion**
- **S/P MVR St. Jude #29 10 years prior**





?Doppler abnormality

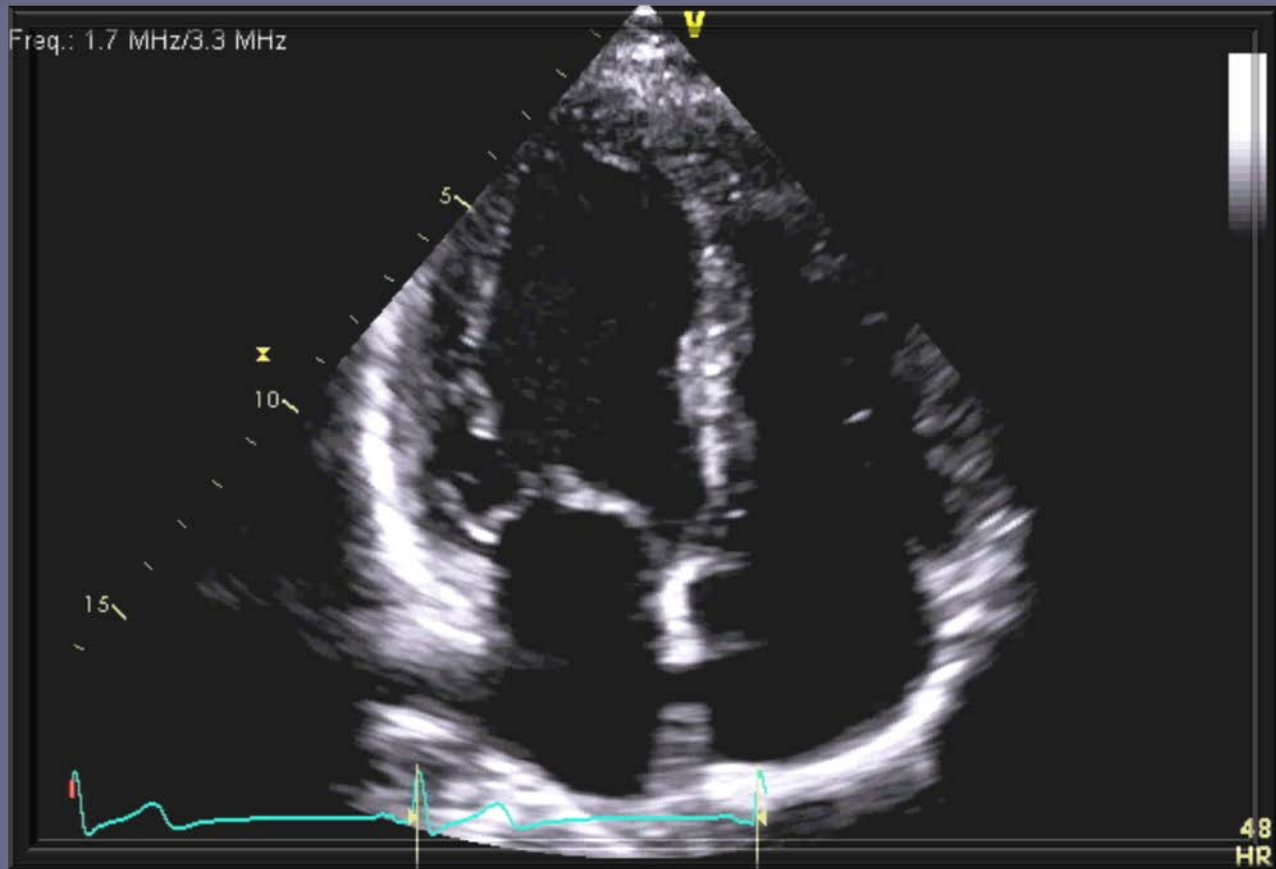


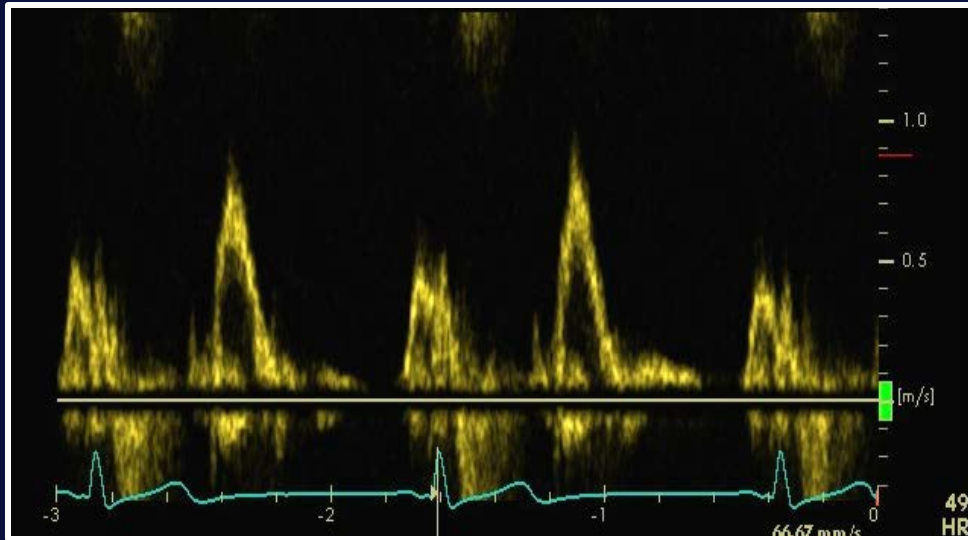
1. Normal prosthesis
2. Irregular profile due to atrial fib
3. Increased LVEDP
4. High filling pressures

Case

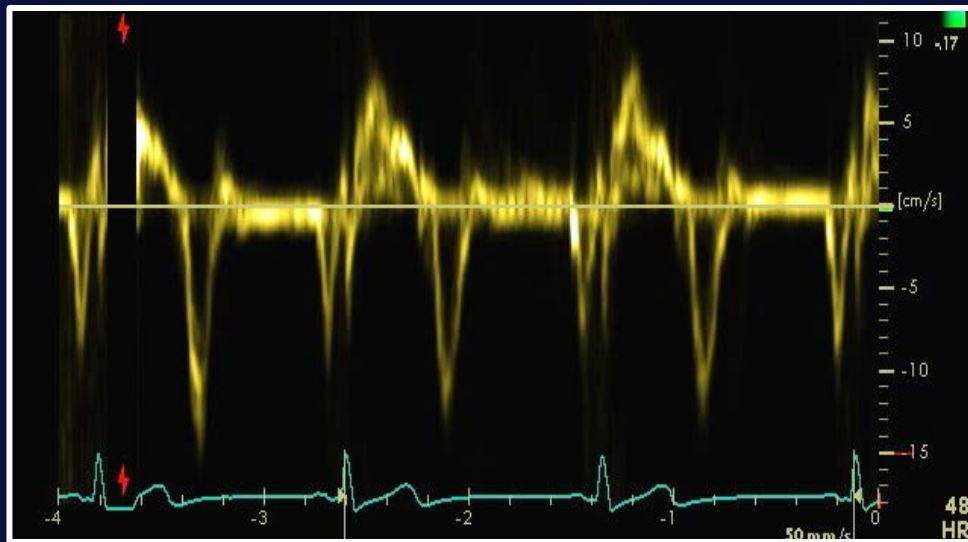
- **52 year old male:
abnormal stress test**
- **Asymptomatic**
- **Remote smoker**

EF 65% LAVI 45 cc/m²





E wave: 0.9m/s
E/A: 2.25
DT: 182 ms



e': .13 ms
E/e': 9

?Diastolic Function Grade

1. Grade I
2. Grade II
3. Grade III
4. Normal filling pressures

E/A: 2.25

DT: 182 ms

E/e': 9

mayo

The word "mayo" is written in a bold, lowercase, sans-serif font. Below the text are three overlapping shield outlines, arranged in a row and slightly offset to create a sense of depth. The shields are simple, with a pointed bottom and a flat top.