



*Committed to excellence in cardiovascular ultrasound  
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## **ASCeXAM / ReASCE**

### **Practice Board Exam Questions**

Monday Afternoon

- **Aortic Valve Prostheses**
- **Aortic Regurgitation**
- **Stress Echocardiography**
- **Ischemic Heart Disease and Myocardial Infarction**
- **3D Echocardiography**



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## **Quantitation of Aortic Regurgitation**

**David B. Adams, RCS, RDCS, FASE**

**Which of the following is NOT on the list of AR etiologies.**

1. Endocarditis
2. Ao dissection
3. Rheumatic
4. Ao coarctation

**Which of the following is NOT on the list of AR etiologies.**

1. Endocarditis
2. Ao dissection
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## MV pre-closure is caused by

1. Ao dissections
2. Elevated LVEDP
3. Elevated pulm pressures
4. Type III diastolic dysfx

*DUKE: Adams*

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*DUKE: Adams*

**Which of the following would increase the size of jet area in color flow Doppler?**

1. Lower Doppler gain
2. Higher Nyquist limit
3. Smaller regurgitant orifice
4. Lower Nyquist limit

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1. Lower Doppler gain
2. Higher Nyquist limit
3. Smaller regurgitant orifice
4. Lower Nyquist limit

**The cut off for severe AR based on pressure half-time is:**

1. < 200 msec
2. > 200 msec
3. < 500 msec
4. > 500 msec

**The cut off for severe AR based on pressure half-time is:**

1. < 200 msec
2. > 200 msec
3. < 500 msec
4. > 500 msec

**The cut off for severe AR based on vena contracta width is:**

1. < 0.3 CM
2. > 0.3 CM
3. < 0.6 CM
4. > 0.6 CM

**The cut off for severe AR based on vena contracta width is:**

1. < 0.3 CM
2. > 0.3 CM
3. < 0.6 CM
4. > 0.6 CM



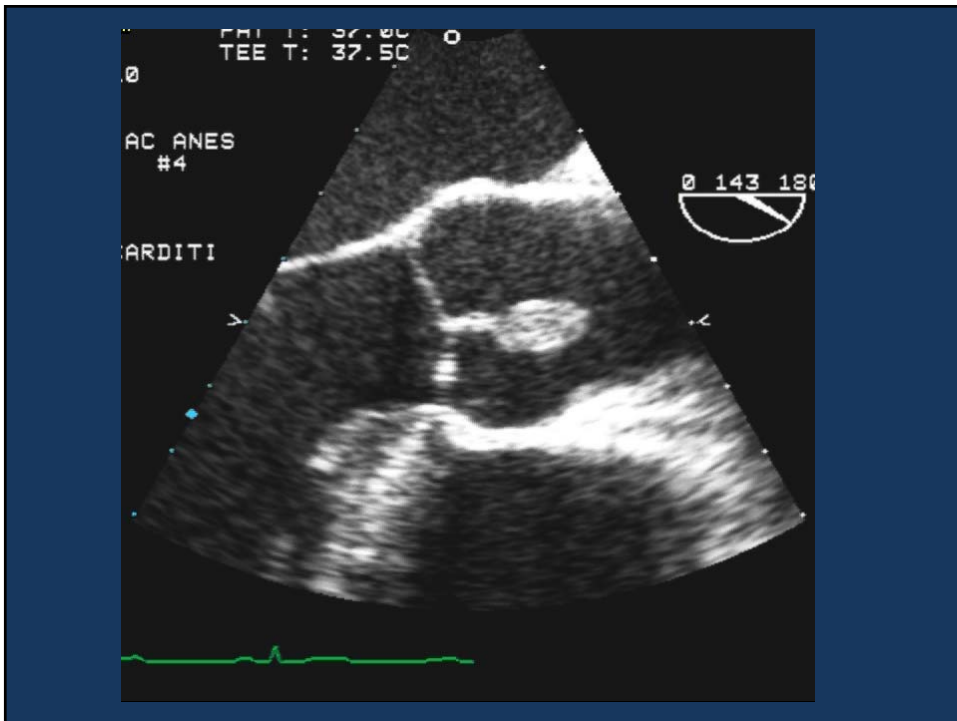
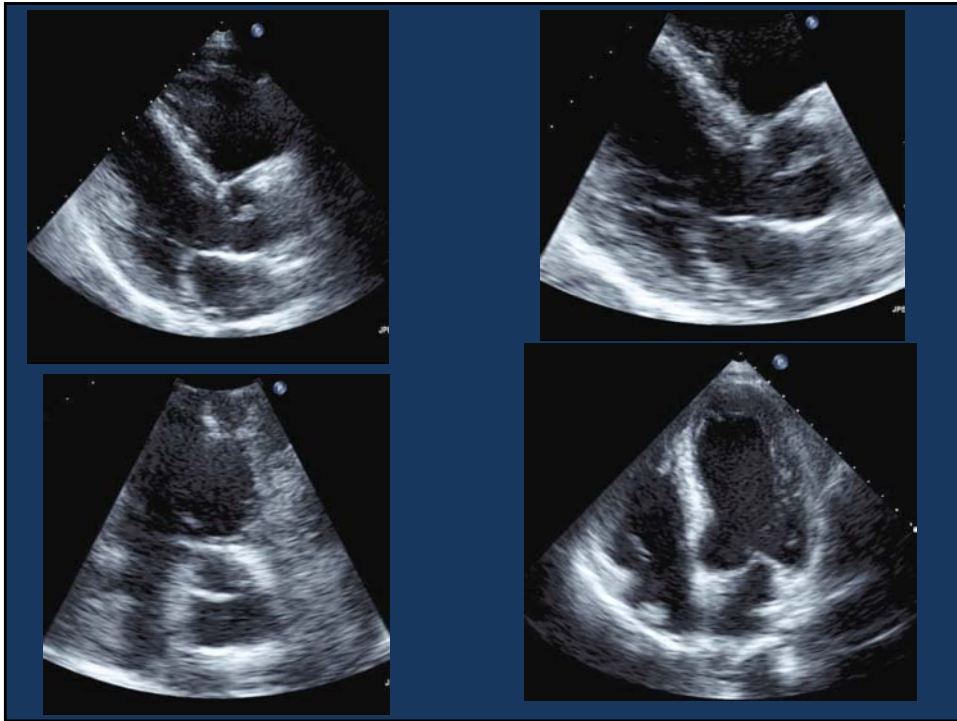
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## **Echo in Ischemic Heart Disease and Myocardial Infarction**

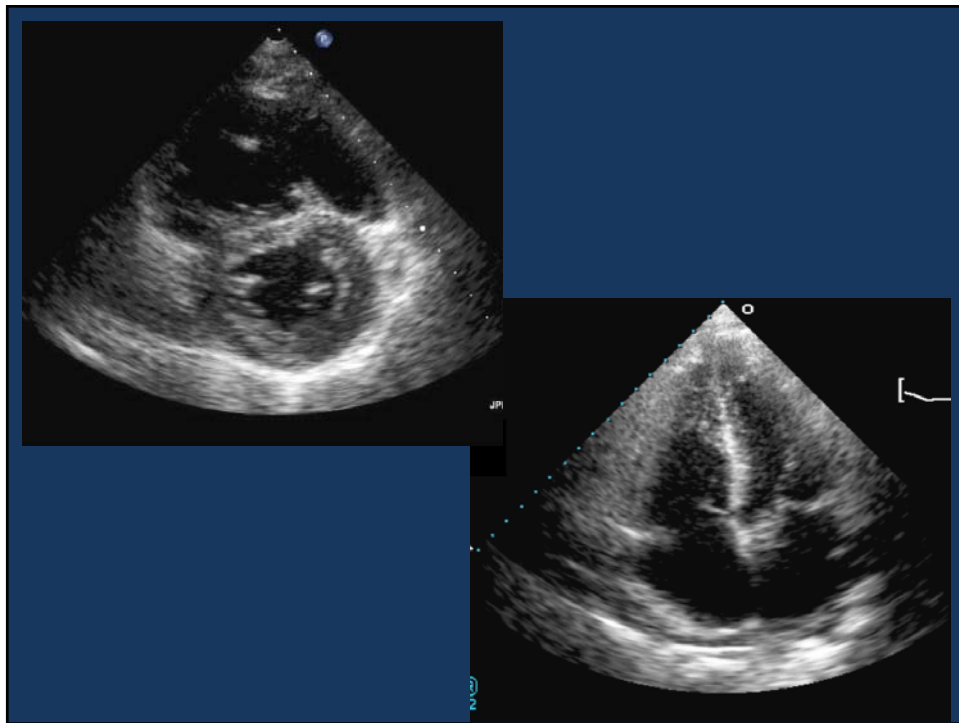
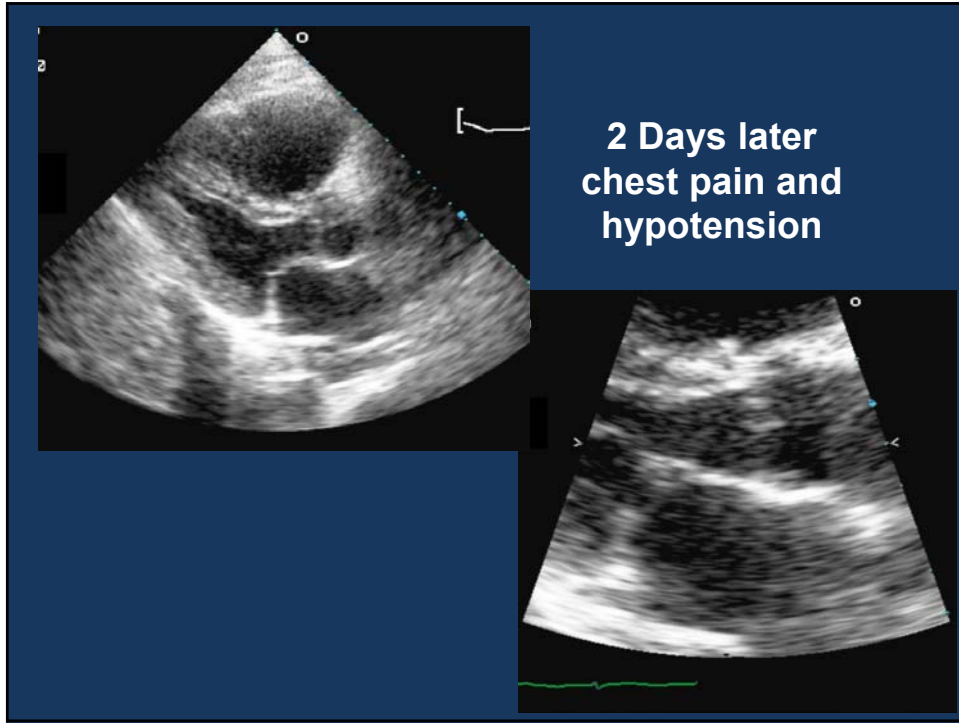
Gerard P. Aurigemma, MD, FASE

### **55 year old woman**

- **Increasing fatigue, anorexia, weight loss, fever & chills**
- **Uveitis & scleritis**
- **On admission, BP 115/69, HR 97, RR 18, O2 sats 100% RA, temp 100.3**
- **Blood cultures: strep pneumonia**

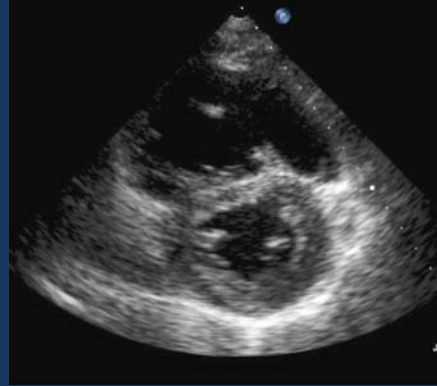






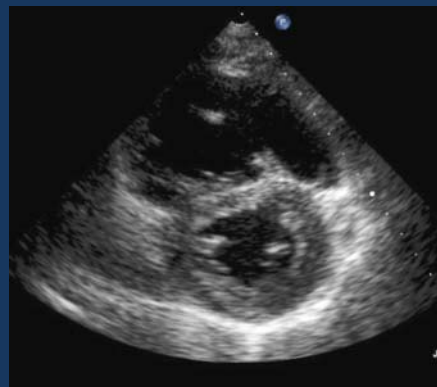
### What is the most likely diagnosis?

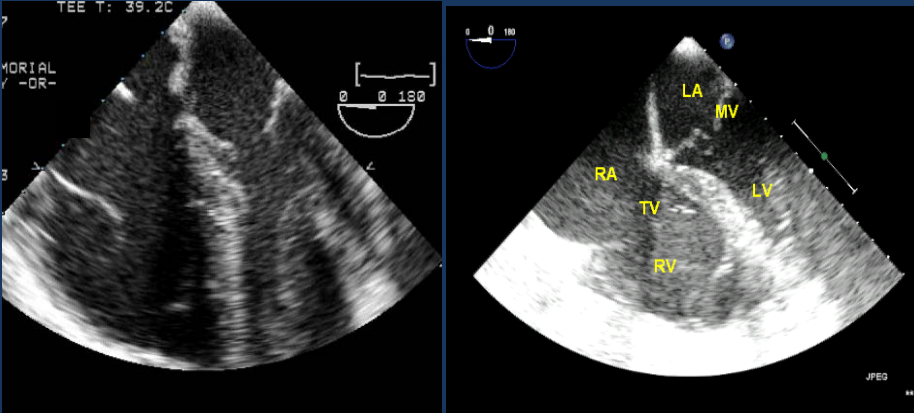
1. Acute pulmonary embolism
2. Overwhelming BE with hypotension
3. Coronary embolism to LAD
4. Coronary embolism to RCA



### What is the most likely diagnosis?

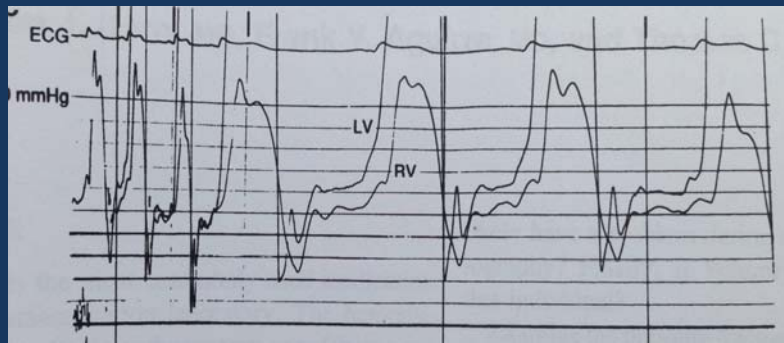
1. Acute pulmonary embolism
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3. Coronary embolism to LAD
4. **Coronary embolism to RCA**





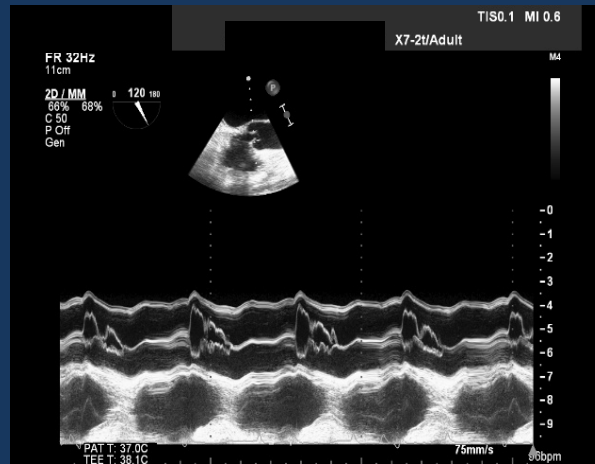
RVFW akinetic  
transeptal gradient  
rightward expansion of septum in systole  
ventricular interaction  
LV filling compromised  
importance of RA contraction and septal function

### Constrictive-like haemodynamics



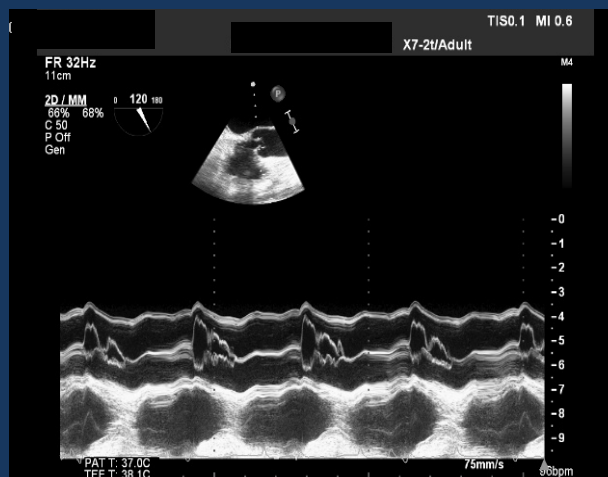
**A 49 year old woman is in cardiogenic shock**  
*What is the most likely diagnosis?*

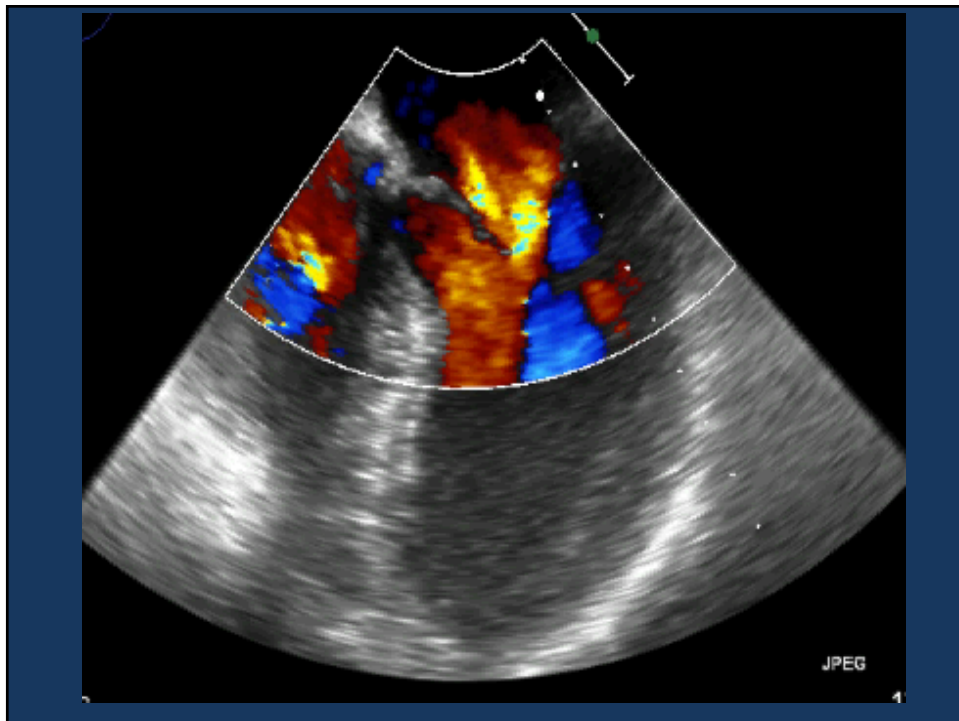
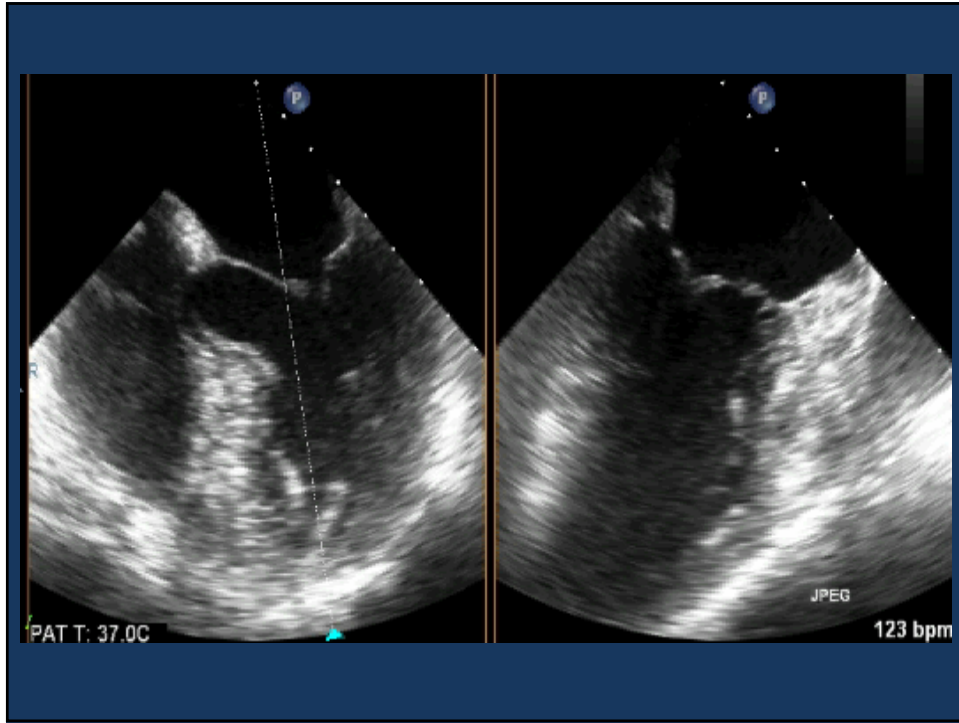
1. LBBB
2. Severe MR
3. Severe AR
4. None of the above



**A 49 year old woman is in cardiogenic shock**  
*What is the most likely diagnosis?*

1. LBBB
2. Severe MR
3. Severe AR
4. **None of the above**

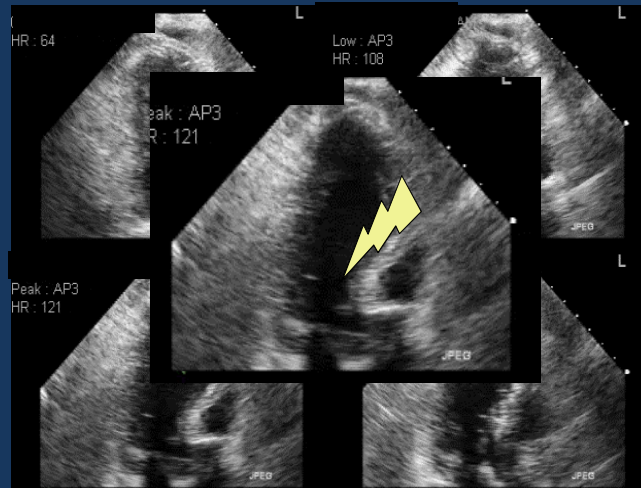


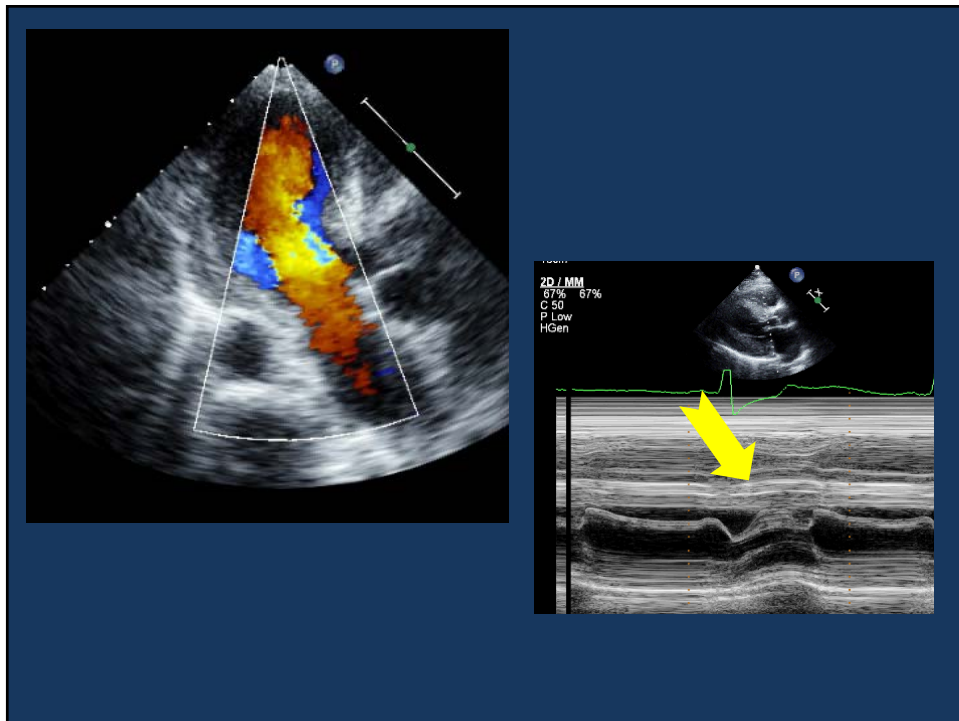
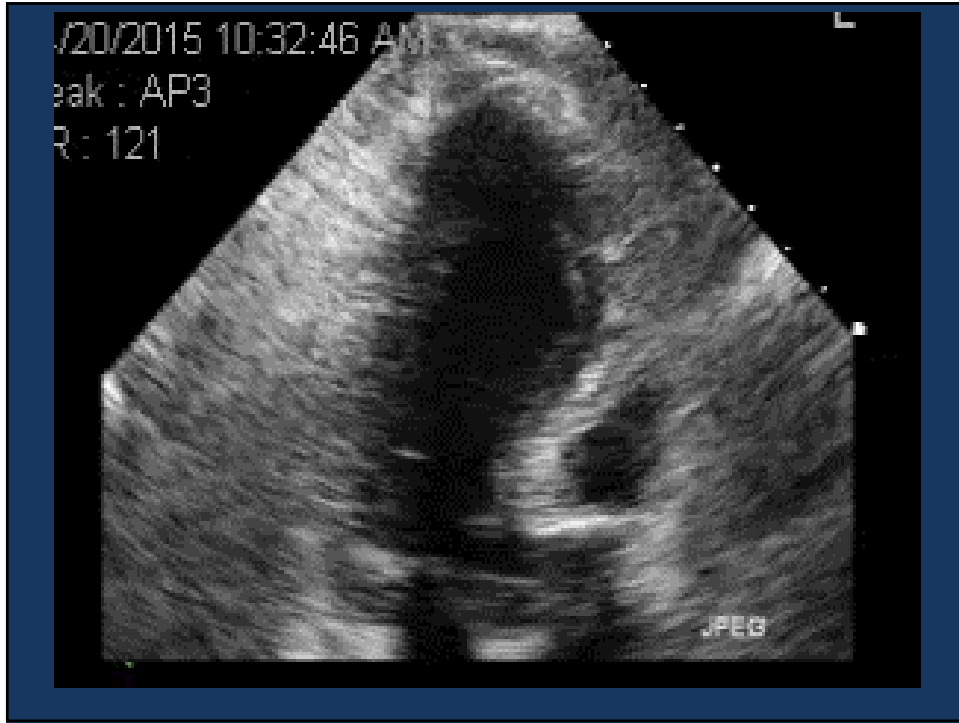


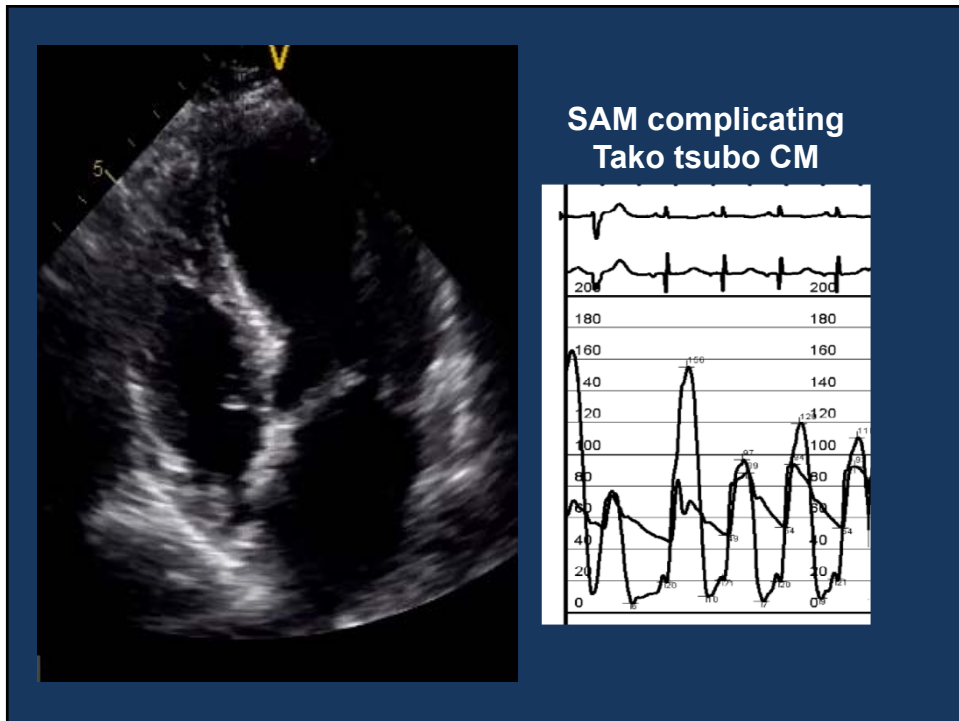
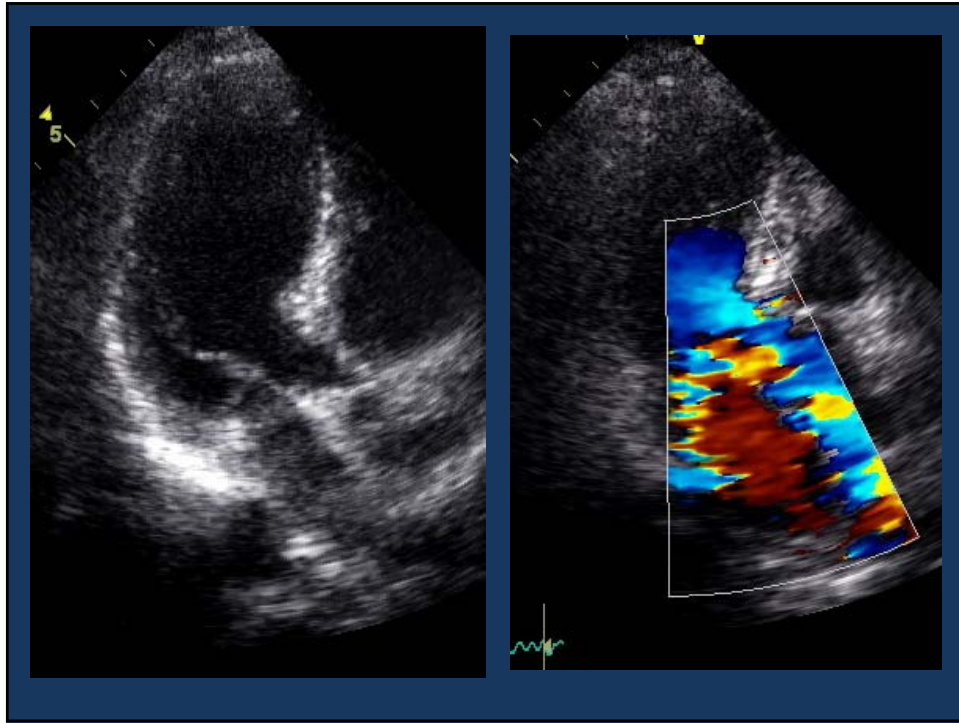
## What can be said about dynamic LV OT obstruction?

1. It is an uncommon complication of DSE
2. It produces anteriorly directed MR
3. It can be seen in anterior MI
4. It is seen in patients undergoing MV repair with a flexible annuloplasty ring
5. It is ameliorated by insertion of an IABP

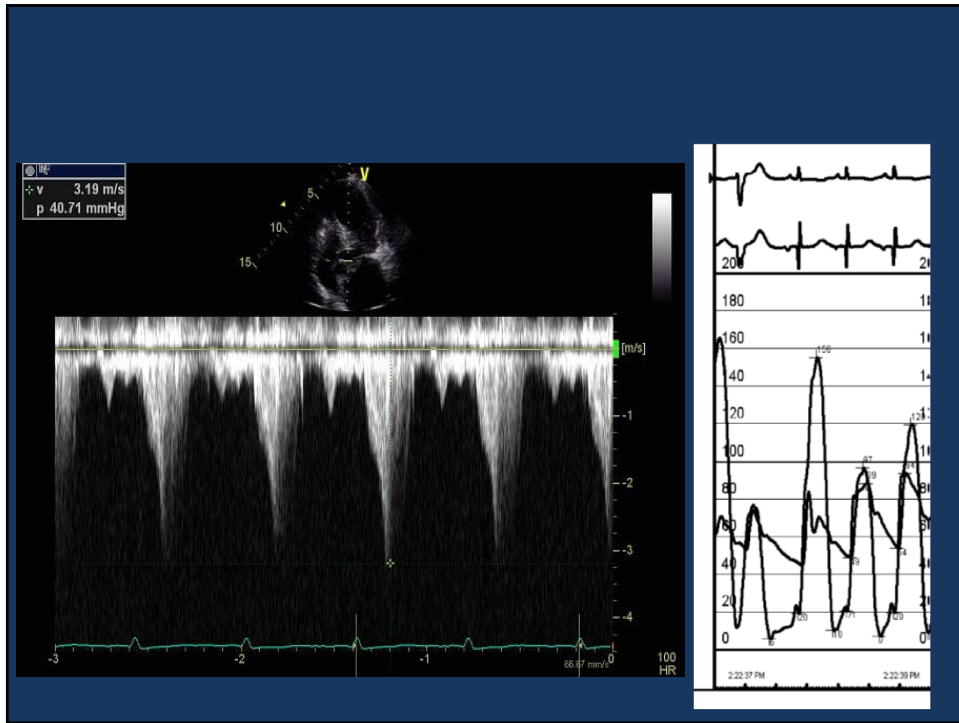
## SAM complicating DSE



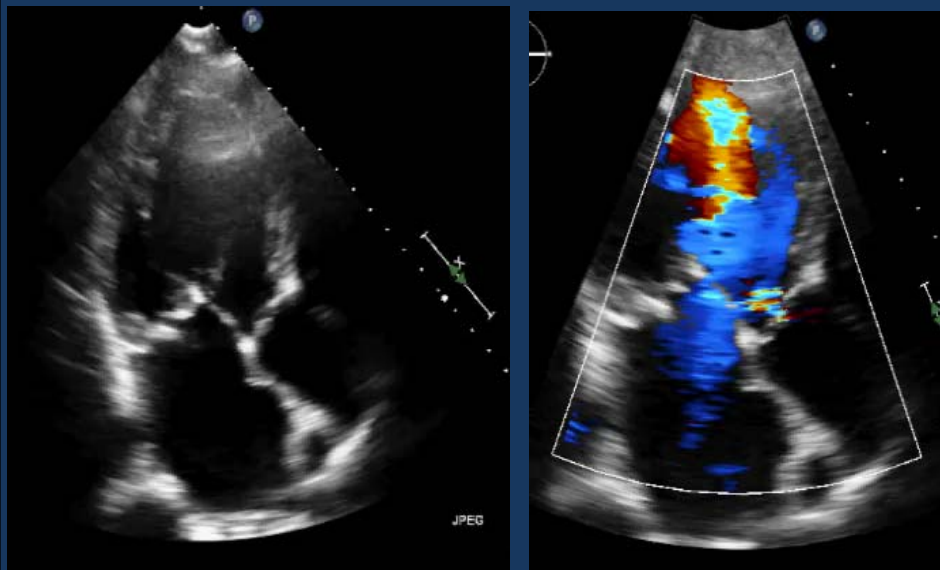








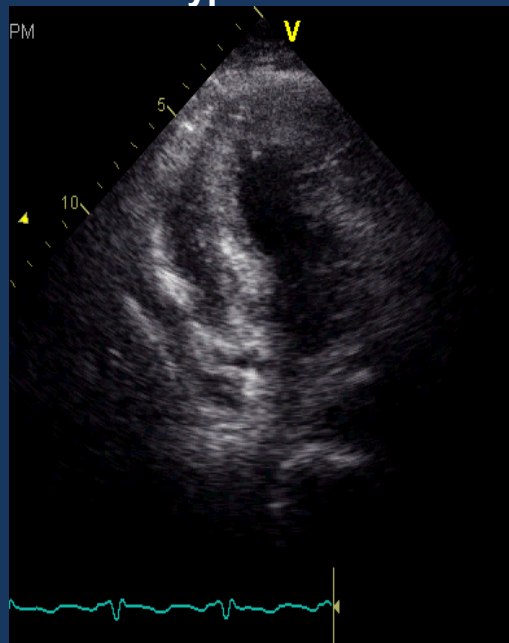
### MV Repair with Rigid Annuloplasty Ring



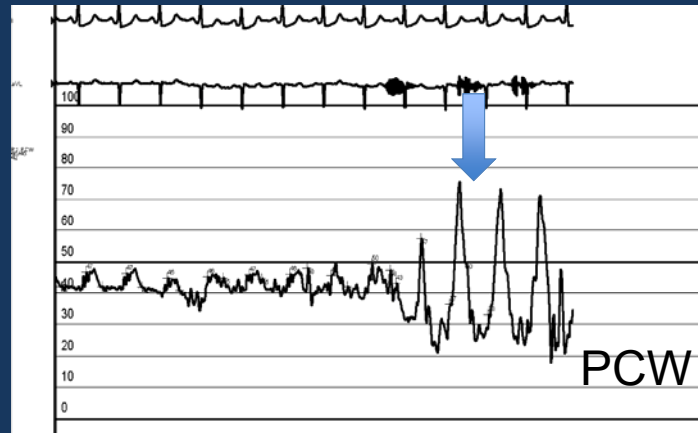
## 48 year old man

- Anterior STEMI w ostial occlusion of LAD
- S/p primary PTCA with bifurcation stenting to proximal lad-diagonal
- Admitted to CCU
- Integrillin bolus x 2 given in the lab
- ASA, ticagrelor, high potency statin

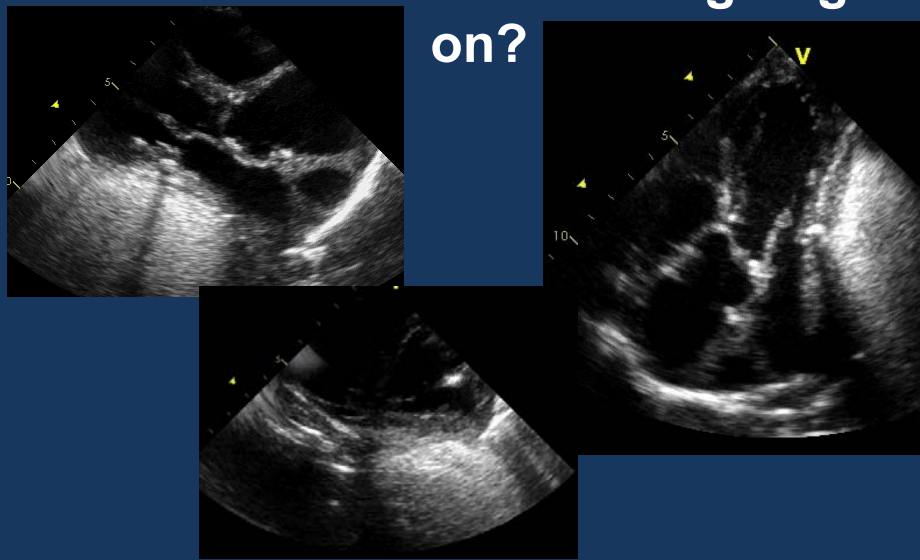
## Hypotension

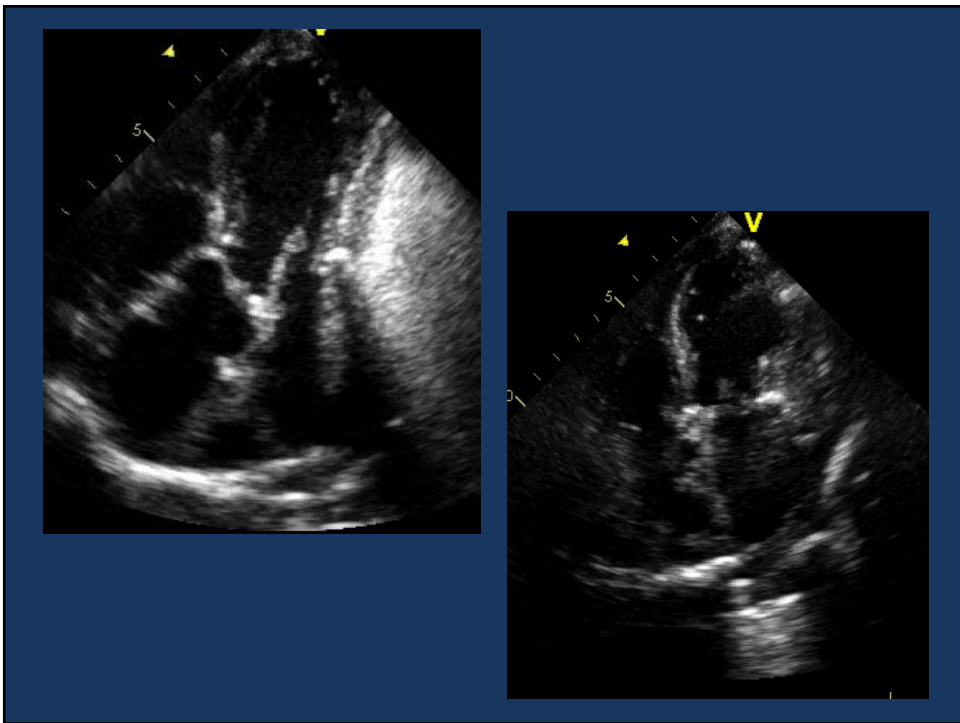
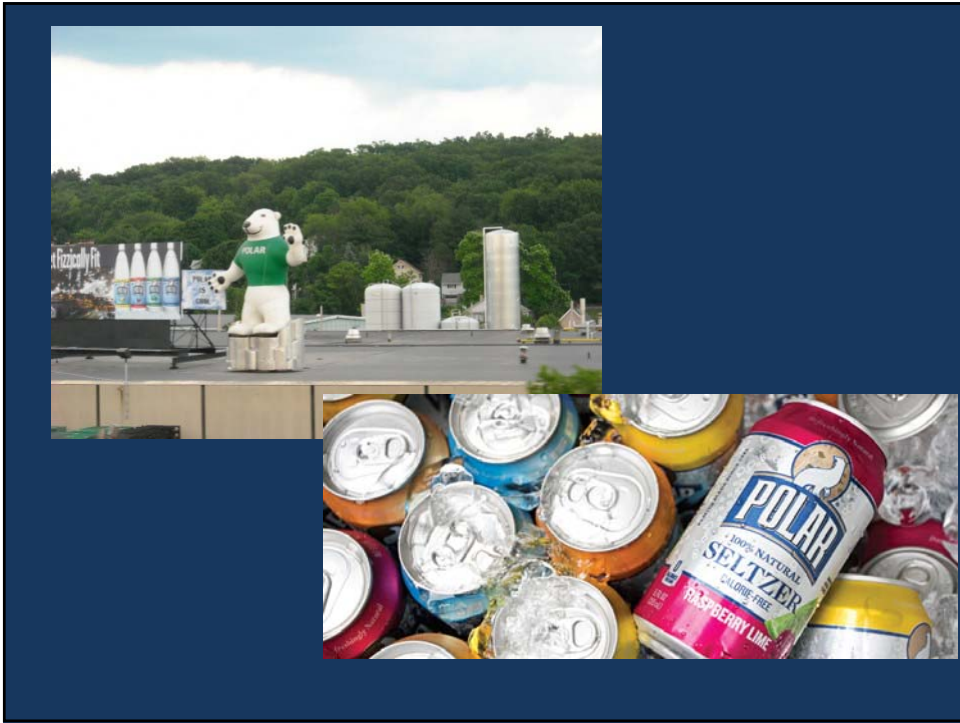


### IABP inserted for refractory hypotension



### A sonographer brings you this echo and asks: what is going on?







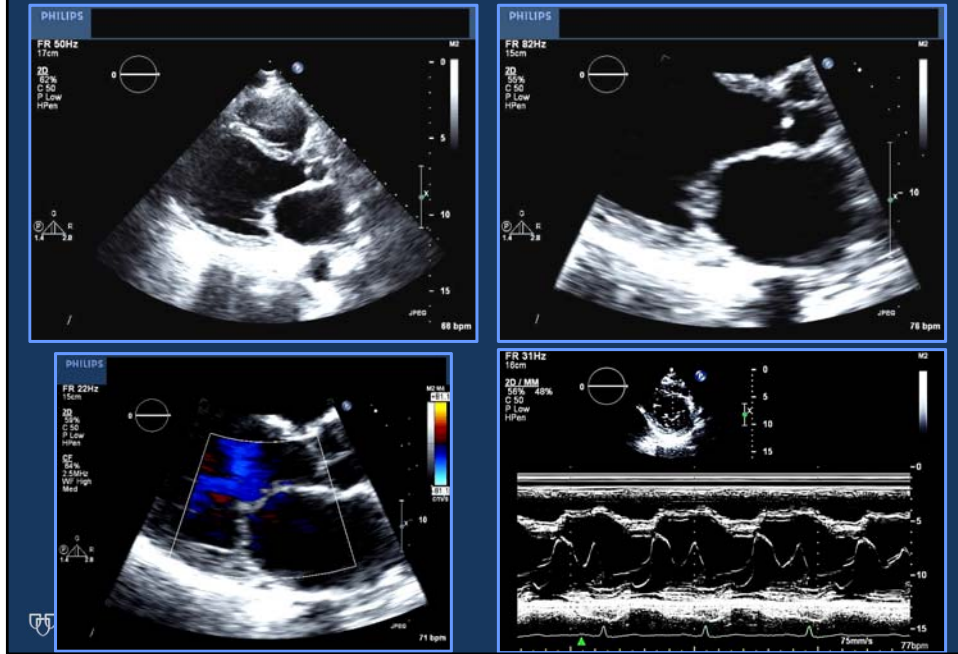
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## **3D Echocardiography: Principles and Applications Image**

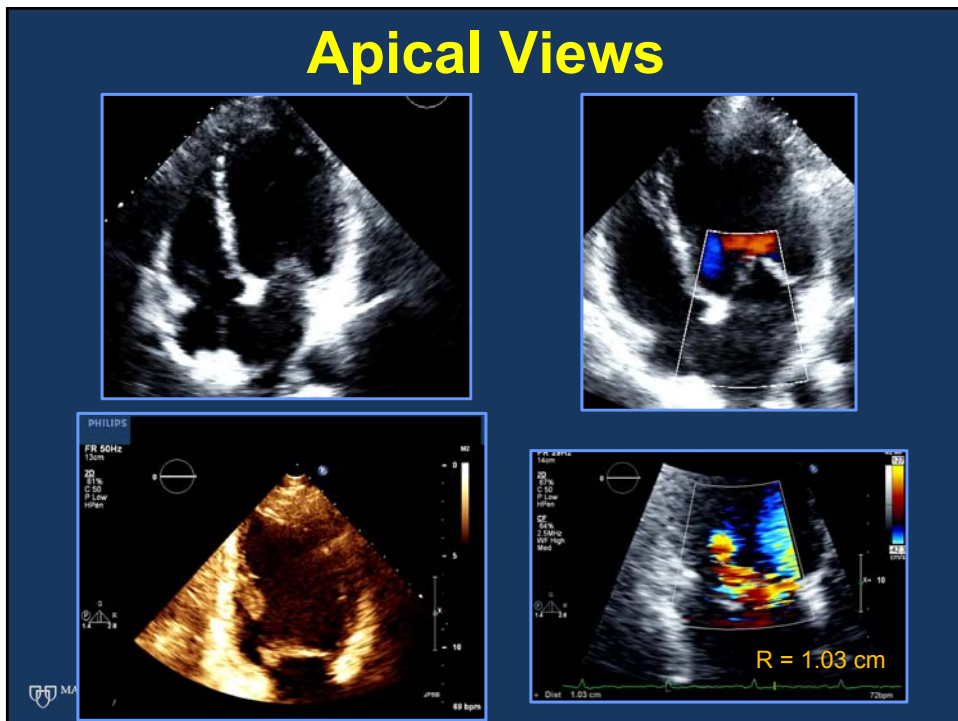
Sunil Mankad, MD, FASE

### **Question 1**

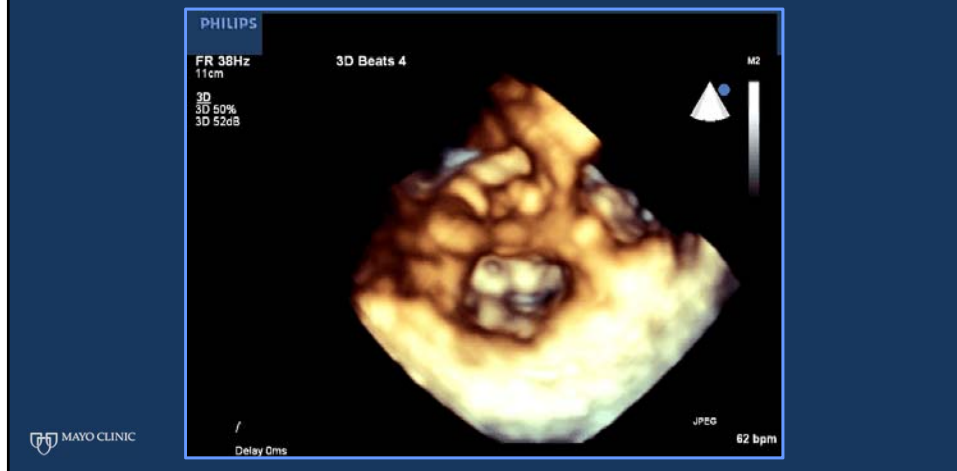
## Parasternal Views: What's wrong with MV?



## Apical Views

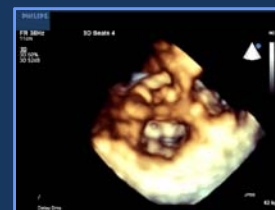


## 3D Echocardiography: View from the Left Atrium (Surgeon's View)

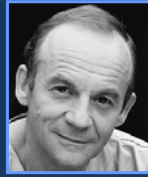


## Question

- What is the specific mitral abnormality shown?
  1. Flail/prolapse middle scallop of posterior leaflet (P2)
  2. Flail/prolapse middle scallop of anterior leaflet (A2)
  3. Mitral valve vegetation
  4. Flail/prolapse medial scallop of posterior leaflet (P3)
  5. Flail/prolapse medial scallop of anterior leaflet (A3)

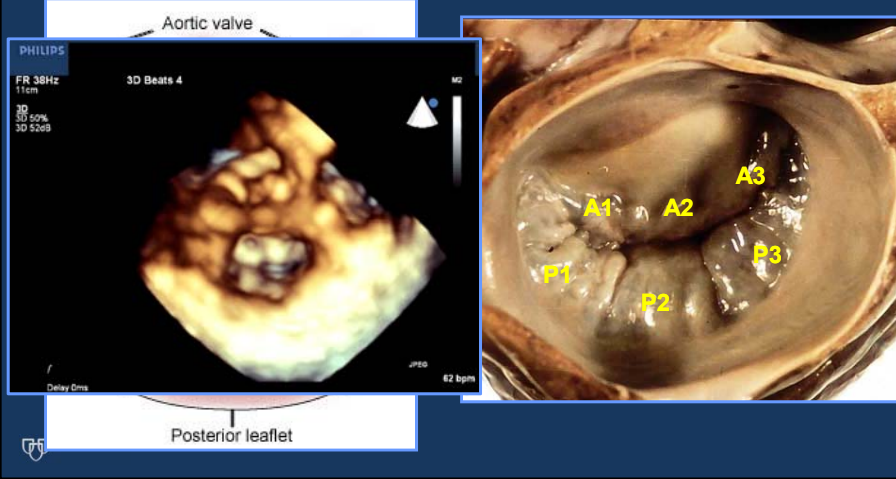


View from LA



# Mitral Valve Anatomy: View from the Left Atrium

## Carpentier Nomenclature

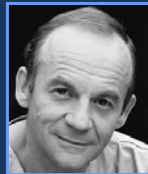
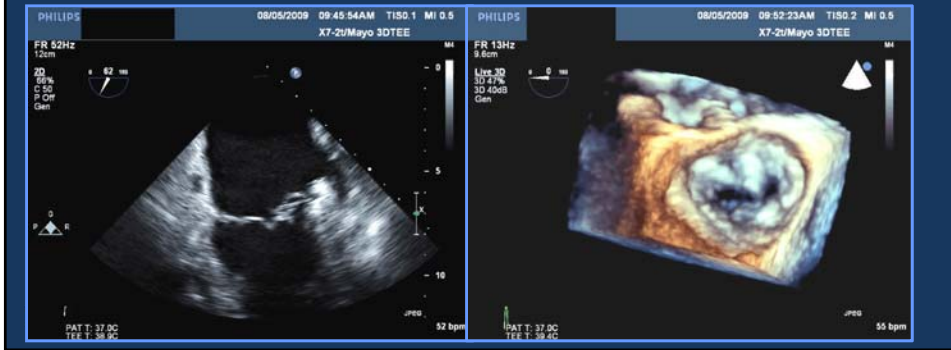


## Question 2



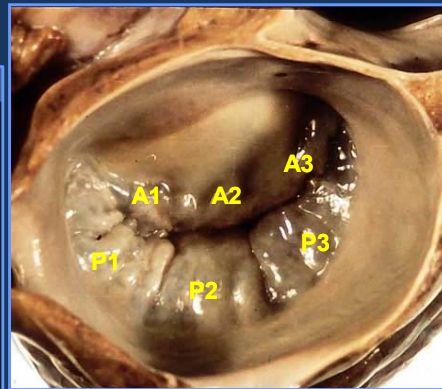
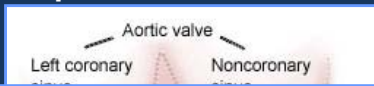
# What is wrong with this mitral valve?

- 1. Flail A1
- 2. Flail P1
- 3. Flail P2
- 4. Flail P3



# Mitral Valve Anatomy: View from the Left Atrium

## Carpentier Nomenclature



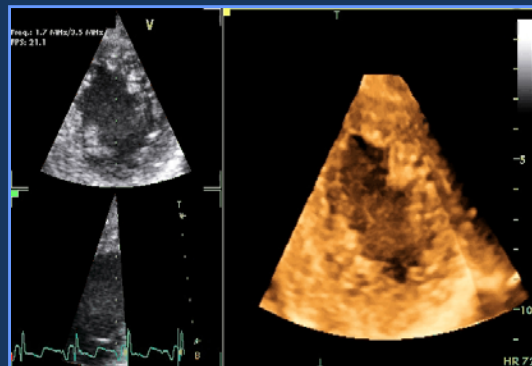
Posterior leaflet

## Question 3

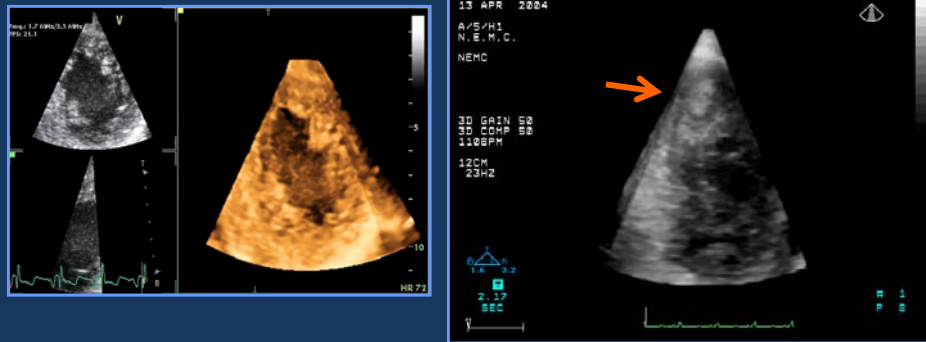


## What is the specific diagnosis?

1. ARVC
2. LV Noncompaction
3. HCM
4. Eosinophilic myocardial disease



## LV Noncompaction

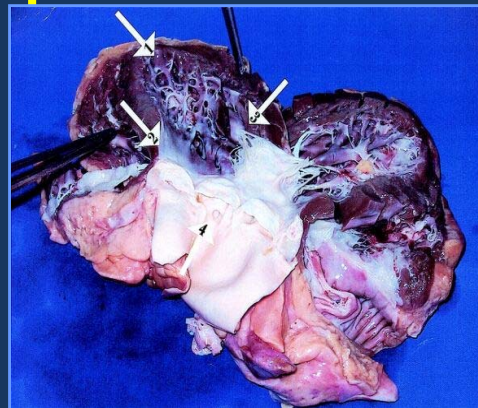


Courtesy of Dr. Natesan Pandian



## Left Ventricular Noncompaction

- “Spongy Myocardium”
- Results from an arrest in normal endomyocardial embryogenesis
- Both isolated noncompaction as well as type associated with other complex congenital diseases
- RV involved in less than  $\frac{1}{2}$  of cases

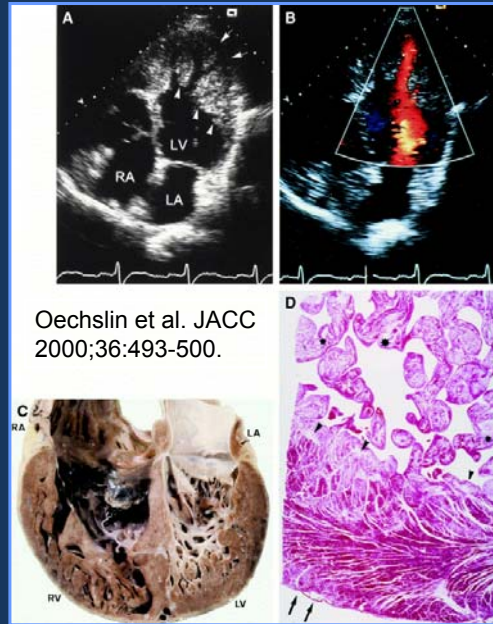


Stollberger et al. *JASE* 2004;17:91-100



## LV Noncompaction

- Echocardiography
  - Key to diagnosis
  - Deep sinusoids
  - Multiple prominent ventricular trabeculations
  - Contrast very helpful
  - Multiple deep intertrabecular recesses communicating with the ventricular cavity
    - Color Doppler
  - 0.045% of adult TTE's in a recent series
    - Ritter M et al. *Mayo Clin Proc* 1997;72:26-31



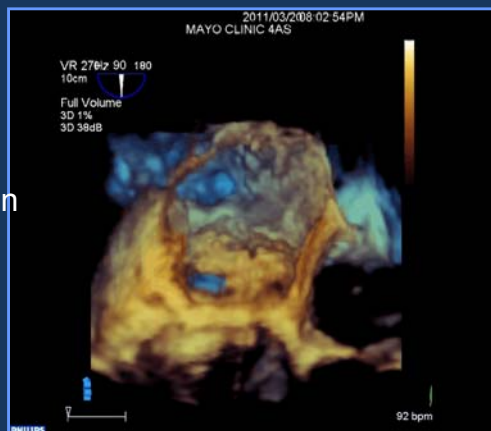
MAYO CLINIC

## Question 4

MAYO CLINIC

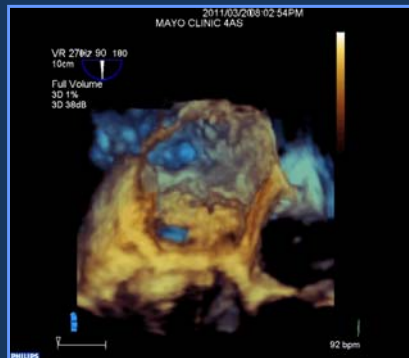
## What is the specific finding shown and the reason this patient is short of breath?

1. Mitral prosthetic obstruction
2. Mitral prosthetic dehiscence
3. Pannus of mitral prosthesis
4. Mitral systolic anterior motion



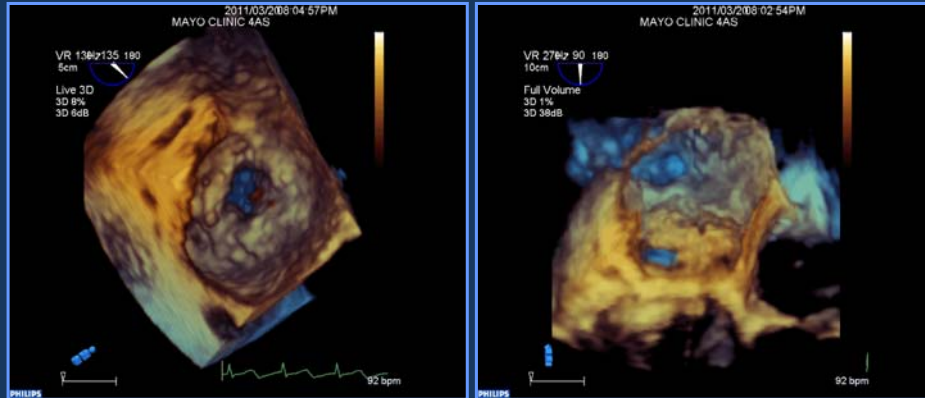
MAYO CLINIC

## Mitral Valve Dehiscence



MAYO CLINIC

# Mitral Valve Dehiscence



MAYO CLINIC

# Surgically Explanted Prosthesis



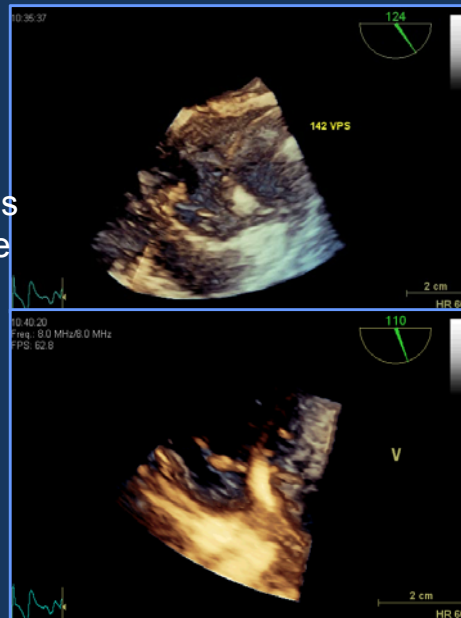
MAYO CLINIC

## Question 5




### What is the most likely diagnosis shown by 3D Echo?

1. Pacemaker lead vegetations
2. Prominent Eustachian valve
3. Pacer lead dislodgement
4. Normal CRT lead





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**Echocardiographic Evaluation of Aortic  
Valve Prostheses**

Amr E. Abbas, MD, FASE

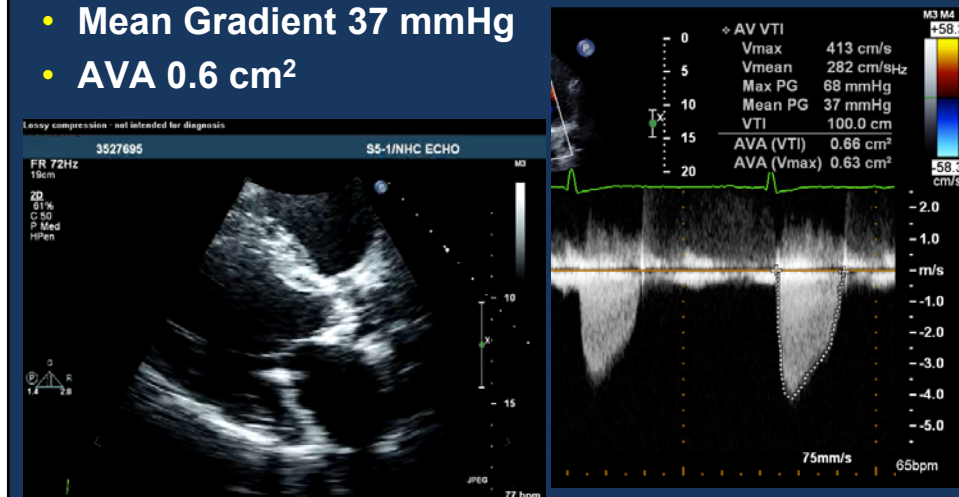


## Case Presentation

- 65 Y/O CAD H/O CABG
- Progressive SOB and Chest Pain x 2 months
- H/O ESRD currently renal transplant

## Echocardiogram

- AVA 4.1 m/sec
- Mean Gradient 37 mmHg
- AVA 0.6 cm<sup>2</sup>

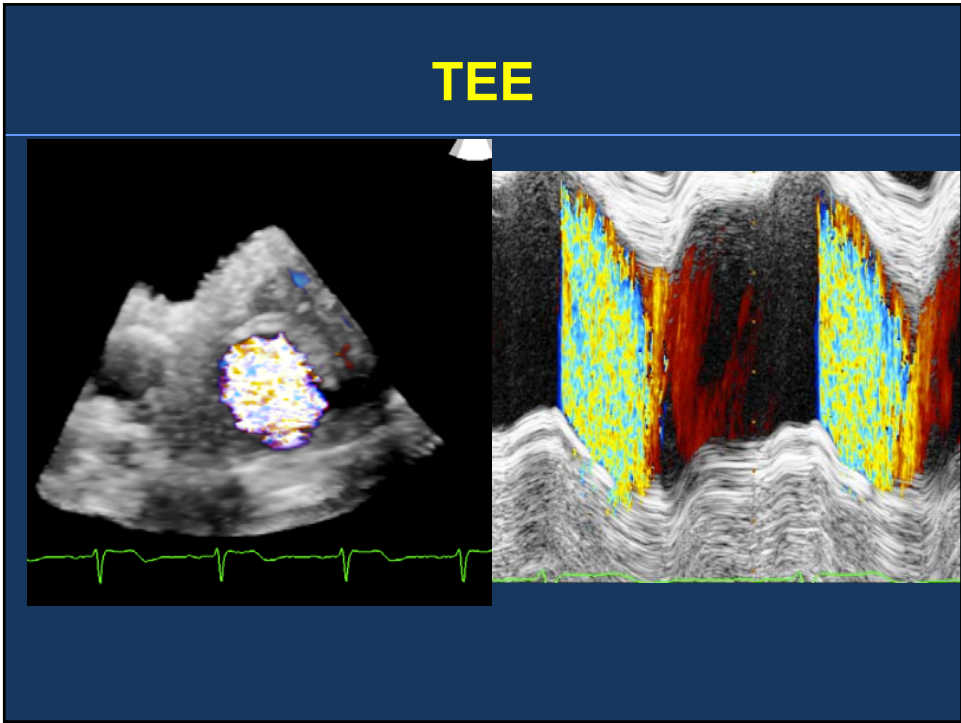
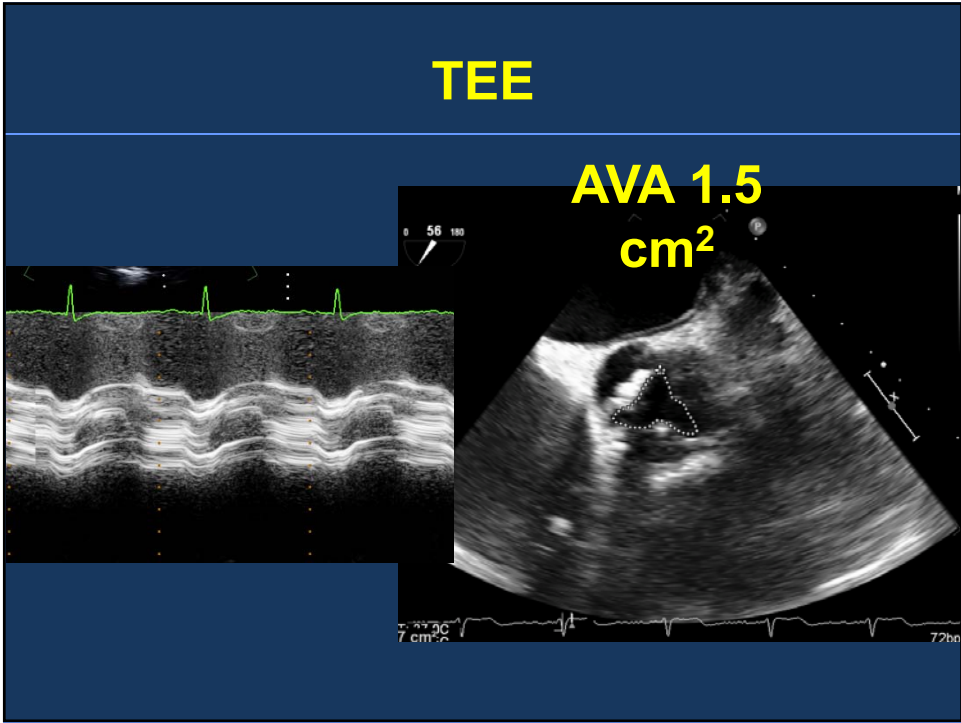


## Aortic Stenosis?

1. Mild
2. Moderate
3. Severe

## TEE

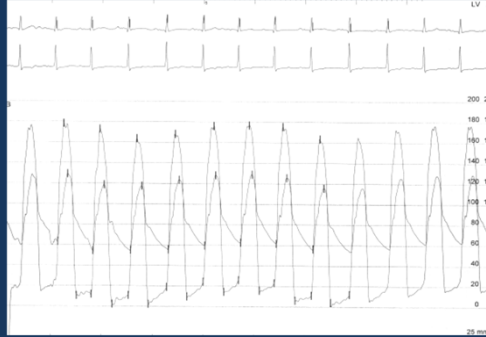




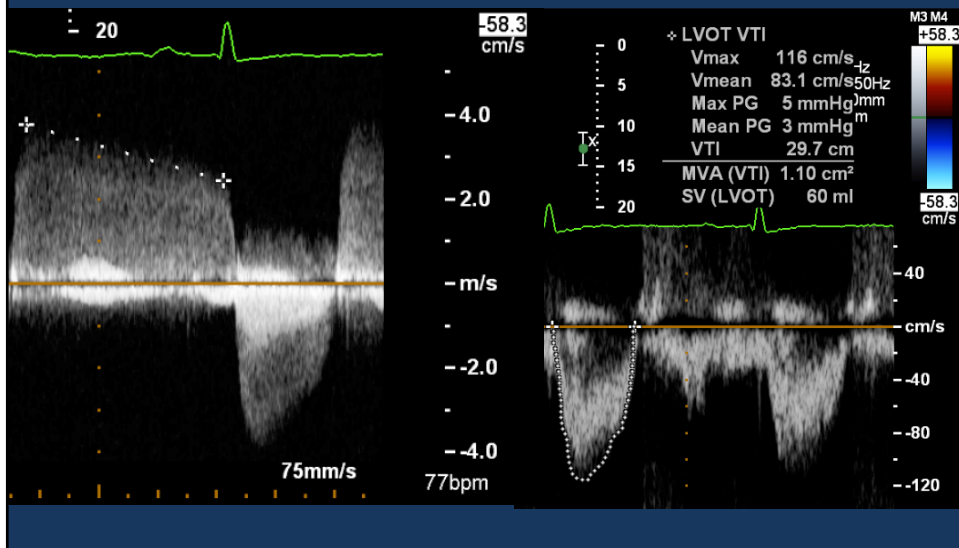
# Cardiac Catheterization

## Aortic Valve Gradient

- Peak to Peak 50 mmHg
- Mean Gradient 40 mmHg
- AVA 1.5 cm<sup>2</sup>
- **CO 12 l/minute**
- Cardiac Catheterization
  - 90% stenosis SVG-RCA



# Doppler



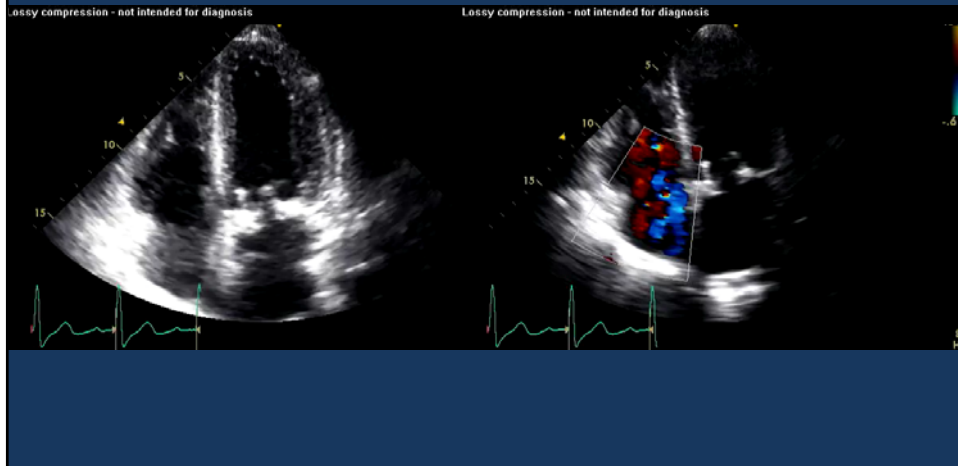
## Findings

- High Gradient/Large area
- GOA vs EOA
- Patient with residual AV shunt (dialysis) with high flow
- With compression of fistula, gradient decreased to 20 mmHG

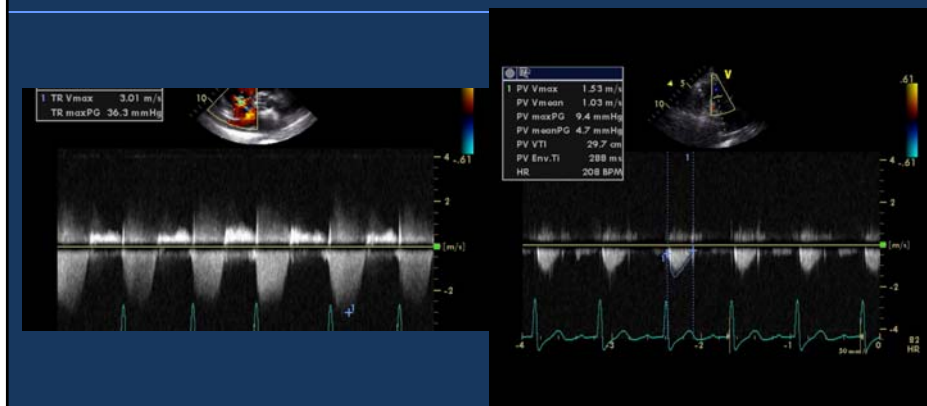
## Case Presentation

## Case Presentation

### 65 Y/O S/P Mitral and Aortic Replacement



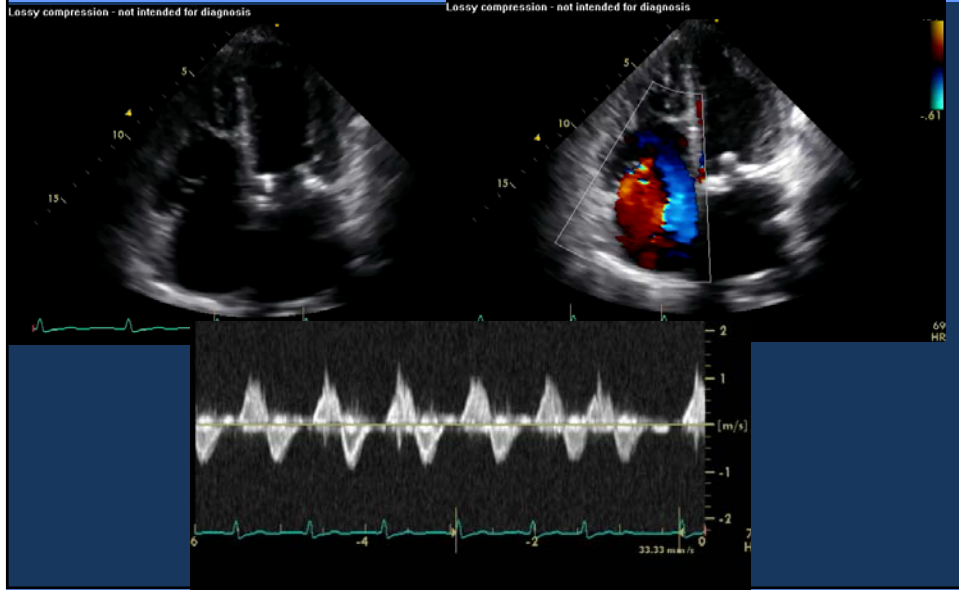
## Case Presentation



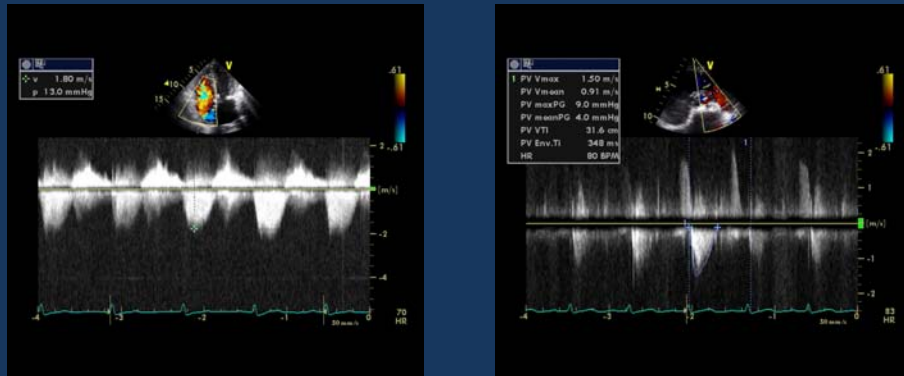
$$4TRV^2 = 4 \times (3.01)^2 = 36.3 \text{ mmHg}$$

$$RAP = 8, \text{ RVSP } 44 \text{ mmHg}$$

### 3 Months Later Endocarditis

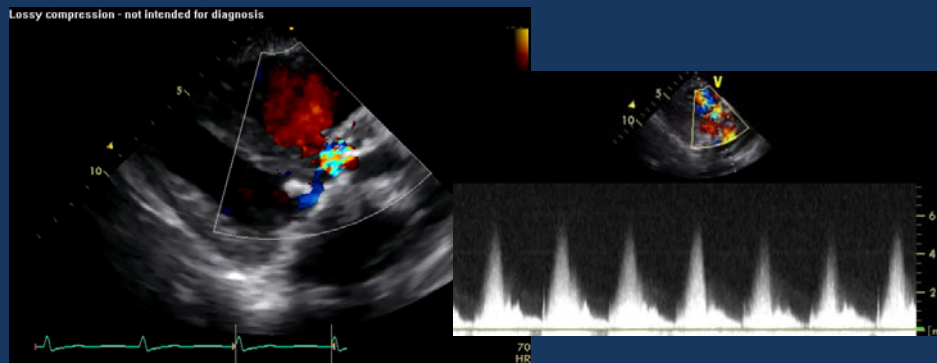


### 3 Months Later Endocarditis



**$4TRV^2 = 4 \times (1.8)^2 = 13 \text{ mmHg}$**   
**RAP = 8 (15-20)**  
**RVSP = 21- 33 mmHg**

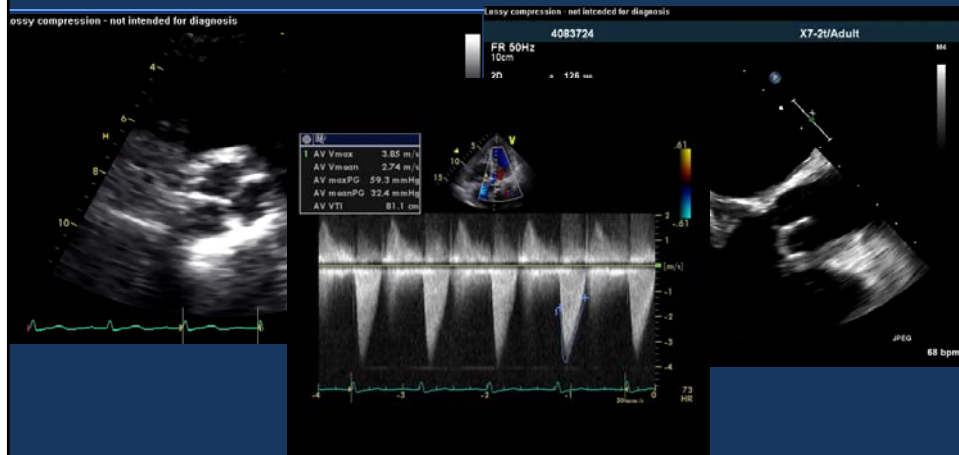
## 3 Months Later VSD



$$4VSD^2 = 4 \times (5.5)^2 = 121 \text{ mmHg}$$

$$SBP \ 124 \text{ mmHg}, \ RVSP = 124 - 121 = 3$$

## Case Presentation 3 Months



$$4AV^2 = 4 \times (3.85)^2 = 60 \text{ mmHg}$$

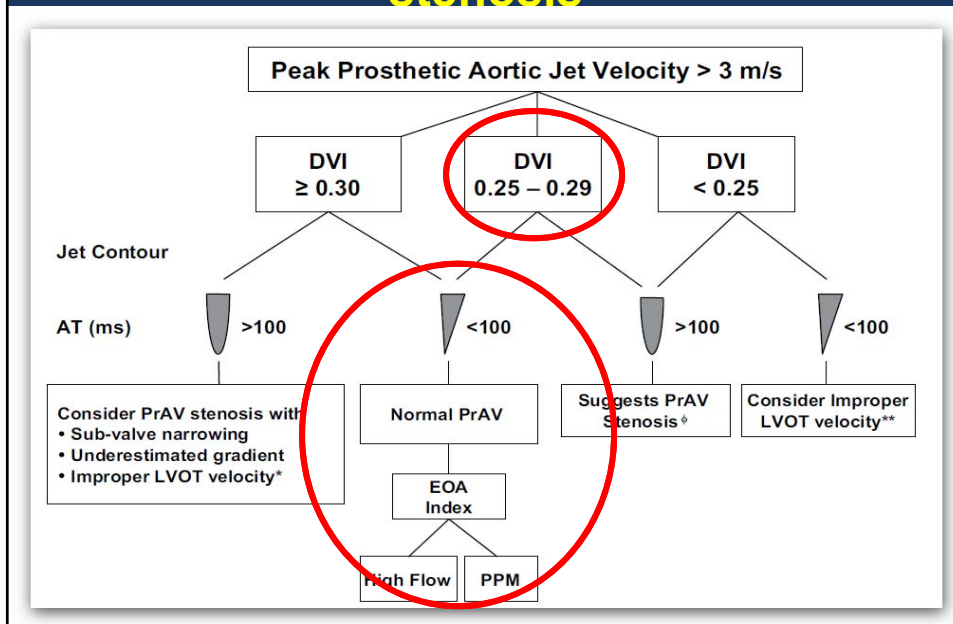
$$RVSP = 124 + 60 - 121 = 63 \text{ mmHg}$$



## Doppler Parameters of Prosthetic Aortic Valve Function

	Normal		Suggests Stenosis
Peak Velocity	< 3 m/s	<b>3.9</b>	> 4 m/s
Mean Gradient	< 20 mmhg	<b>32</b>	> 35 mmhg
Doppler Velocity Index	$\geq 0.3$	<b>0.25</b>	< 0.25
Effective Orifice area	> 1.2 cm <sup>2</sup>	<b>0.5</b>	< 0.8 cm <sup>2</sup>
Contour of Jet	Triangular Early Peaking	<b>TRI</b>	Rounded Symmetrical contour
Acceleration Time	< 80 ms	<b>70 ms</b>	> 100 ms

## An approach to prosthetic AV stenosis



## Invasive Data

- Right atrial pressure = 21 mmHg
- Pulmonary artery pressure =
  - PASP 44 mmHg (Echo: TR 28-33 mmHg, VSD 63 mmHg)
  - PADP 20 mmHg
  - PAMP 34 mmHg
- PCWP = 22
- Cardiac Output 11 l/min
- Qp/Qs = 2.4
- PVR =  $34 - 22/11 = 1$  WU
- (ECHO: Early 1.0 WU, Late 0.72 WU)

## Findings

- Prosthesis patient mismatch
- Severe TR
- VSD/TR inaccurate to assess PASP