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and its application to patient care.*

ASCeXAM / ReASCE

Practice Board Exam Questions

Tuesday Morning

- **Congenital Heart Disease in Adults**
- **Congenital Heart Disease Cases**
- **Diastolic Function**
- **Pericardial Disease**

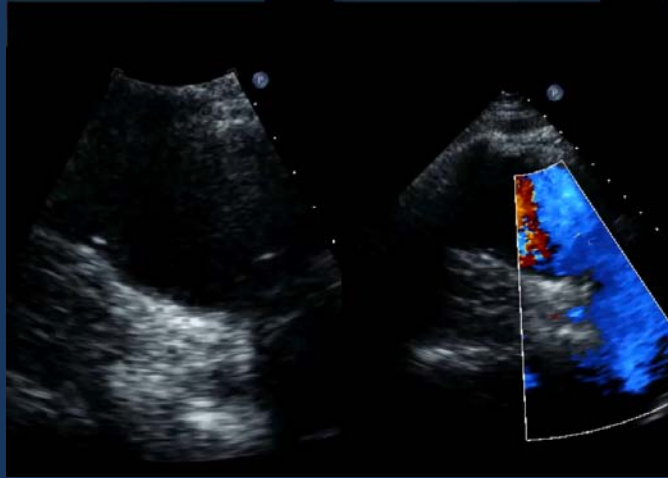


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Congenital Heart Disease Cases

Michael D. Pettersen, MD

Case 1



Case 1

The echocardiographic finding shown is highly associated with which of the following genetic syndromes?

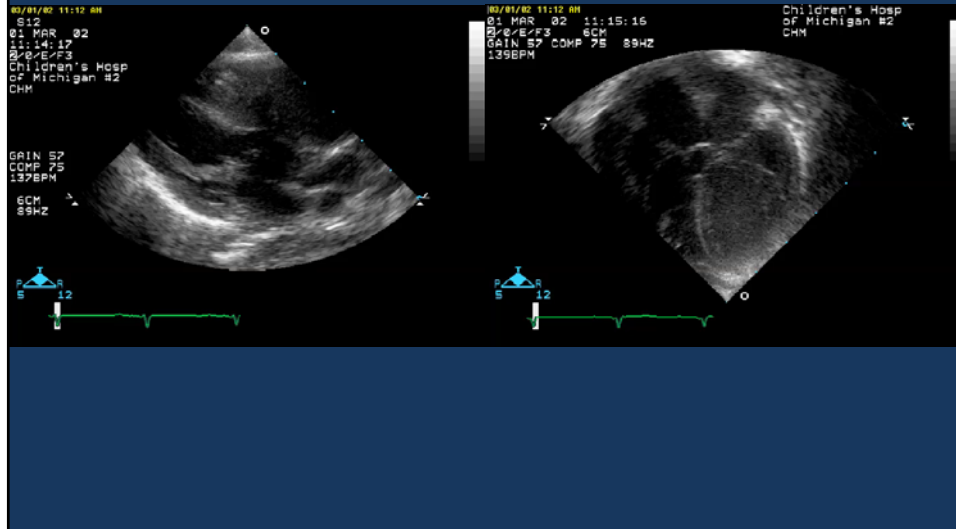
1. Williams syndrome
2. Noonan syndrome
3. Holt-Oram syndrome
4. Down syndrome
5. Turners syndrome

Case 1

The echocardiographic finding shown is highly associated with which of the following genetic syndromes?

1. Williams syndrome
2. Noonan syndrome
3. Holt-Oram syndrome
4. Down syndrome
5. Turners syndrome

Case 2



Case 2 – Question 1

The most common genetic syndrome associated with this heart defect is:

1. Williams syndrome
2. Noonan syndrome
3. Holt-Oram syndrome
4. Down syndrome
5. Turners syndrome

Case 2 – Question 1

The most common genetic syndrome associated with this heart defect is:

1. Williams syndrome
2. Noonan syndrome
3. Holt-Oram syndrome
4. Down syndrome
5. Turners syndrome

Case 2 – Question 2

After repair of this defect, the most common cause for re-intervention is due to problems with the:

1. Tricuspid valve
2. Mitral valve
3. Aortic valve
4. Aorta
5. Conduction system

Case 2 – Question 2

After repair of this defect, the most common cause for re-intervention is due to problems with the:

1. Tricuspid valve
2. Mitral valve
3. Aortic valve
4. Aorta
5. Conduction system

Case 2 – Question 3

This (unrepaired) defect in a 4 month old is associated with:

1. Cyanosis
2. Congestive Heart Failure
3. Sudden Death
4. Rhythm abnormalities
5. Sleep disorder

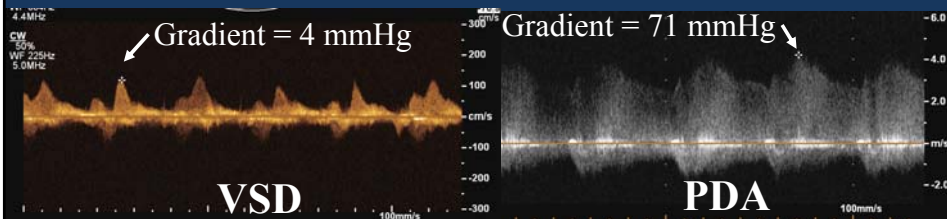
Case 2 – Question 3

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Case 3

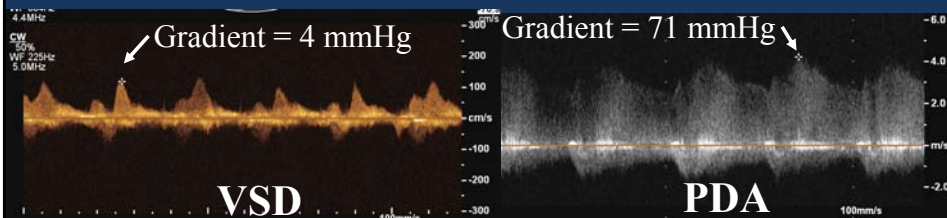
A 1 year old has a known history of VSD and PDA. CW Doppler tracings are shown. Patient's BP = 88/59 mmHg. Findings are consistent with:



1. Pulmonary hypertension
2. Coarctation of the aorta
3. Right ventricular outflow tract obstruction
4. Severe tricuspid regurgitation
5. Severe pulmonary regurgitation

Case 3

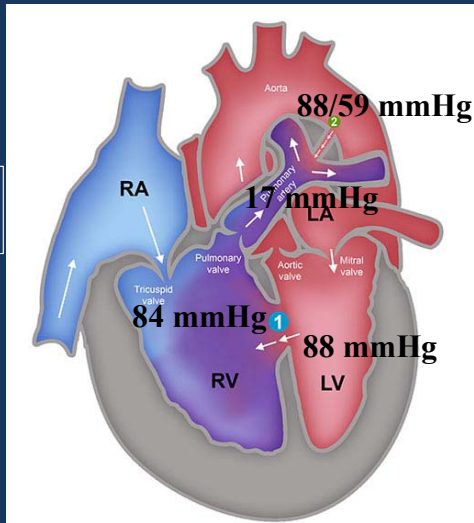
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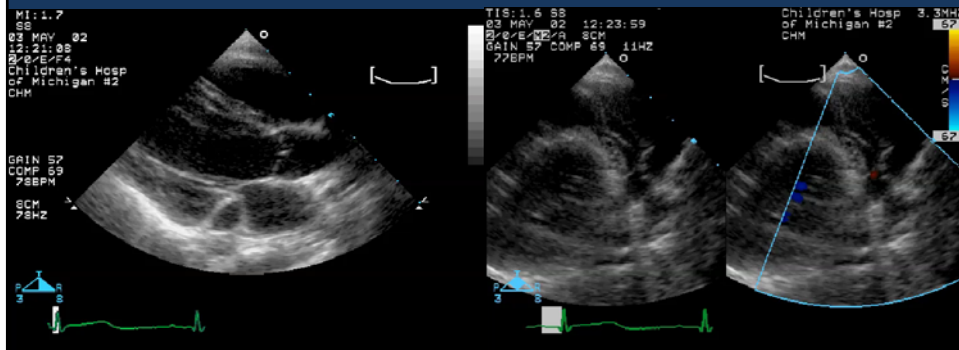
Case 3

**RVOT gradient
= 67 mmHg**



**VSD gradient = 4 mmHg
PDA gradient = 71 mmHg**

Case 4



Case 4 – Question 1

What congenital anomaly is shown?

1. Supra-mitral membrane
2. Total anomalous pulm. venous return
3. Interrupted inferior vena cava
4. Left superior vena cava
5. Cor triatriatum

Case 4 – Question 1

What congenital anomaly is shown?

1. Supra-mitral membrane
2. Total anomalous pulm. venous return
3. Interrupted inferior vena cava
4. Left superior vena cava
5. Cor triatriatum

Case 4 – Question 2

What is the hemodynamic consequence of this anomaly?

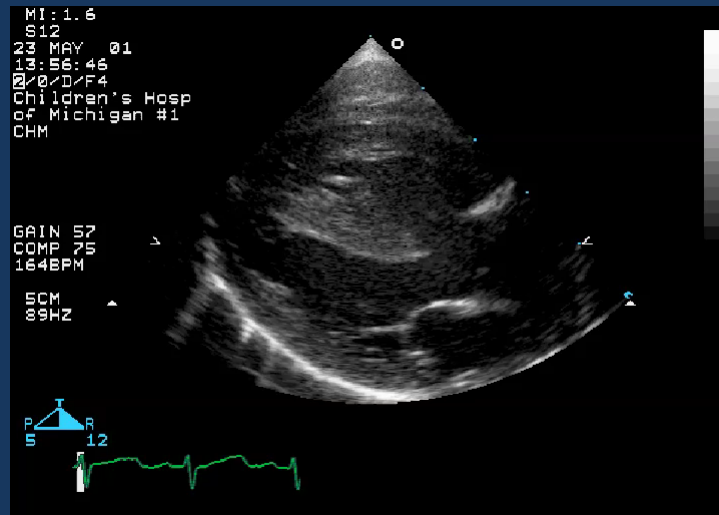
1. Left ventricular volume overload
2. Right ventricular volume overload
3. Pulmonary hypertension
4. Left ventricular inflow obstruction
5. No hemodynamic consequence

Case 4 – Question 2

What is the hemodynamic consequence of this anomaly?

1. Left ventricular volume overload
2. Right ventricular volume overload
3. Pulmonary hypertension
4. Left ventricular inflow obstruction
5. No hemodynamic consequence

Case 5



Case 5 – Question 1

What is the most common congenital heart defect presenting with this long axis view?

1. Transposition of the great arteries
2. Tetralogy of Fallot
3. Double-outlet right ventricle
4. Pulmonary atresia with VSD
5. Truncus arteriosus

Case 5 – Question 1

What is the most common congenital heart defect presenting with this long axis view?

1. Transposition of the great arteries
2. Tetralogy of Fallot
3. Double-outlet right ventricle
4. Pulmonary atresia with VSD
5. Truncus arteriosus

Case 5 – Question 2

What is the most common clinical presentation of patients with tetralogy of Fallot?

1. Heart murmur
2. Stroke
3. Cyanosis
4. Squatting
5. Chest pain

Case 5 – Question 2

What is the most common clinical presentation of patients with tetralogy of Fallot?

1. Heart murmur
2. Stroke
3. Cyanosis
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Case 5 – Question 3

In tetralogy of Fallot, what is the source of the murmur?

1. VSD
2. Tricuspid regurgitation
3. ASD
4. Pulmonary stenosis
5. Aortic stenosis

Case 5 – Question 3

In tetralogy of Fallot, what is the source of the murmur?

1. VSD
2. Tricuspid regurgitation
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Congenital Heart Disease Cases

Sabrina D. Phillips, MD, FASE

1. A 23 year old man presents for echocardiogram after systemic hypertension is noted. 2D imaging demonstrates a focal narrowing of the aorta just distal to the subclavian origin. Maximal instantaneous gradient obtained by Doppler interrogation through this area is 18 mmHg. You should report the following:

1. Findings are consistent with mild coarctation
2. Findings are consistent with moderate coarctation
3. Findings are consistent with severe coarctation
4. Cannot assess severity of coarctation

1. A 23 year old man presents for echocardiogram after systemic hypertension is noted. 2D imaging demonstrates a focal narrowing of the aorta just distal to the subclavian origin. Maximal instantaneous gradient obtained by Doppler interrogation through this area is 18 mmHg. You should report the following:

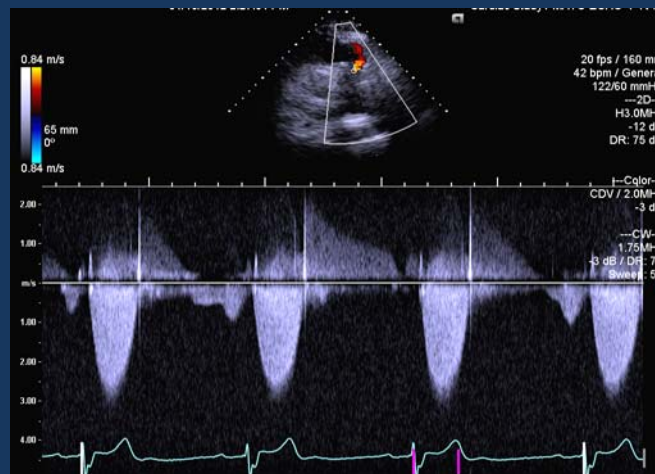
1. Findings are consistent with mild coarctation
2. Findings are consistent with moderate coarctation
3. Findings are consistent with severe coarctation
4. Cannot assess severity of coarctation

Correct Answer

4. The instantaneous gradient through the coarctation site is not the best marker of severity of coarctation in an adult. Gradients are reduced by the presence of collateral circulation, if present, and are influenced by other obstructions and cardiac output changes. By echocardiogram, a coarctation is likely significant if the abdominal aortic doppler signal is abnormal, with a slow upstroke and diastolic forward flow present.



2. A 30 year old woman is evaluated by echocardiogram. Continuous wave Doppler through her RVOT is shown:



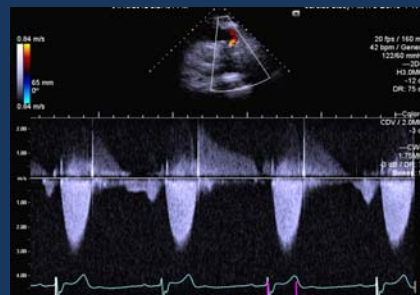
This Doppler tracing is indicative of?

1. Severe pulmonary valve regurgitation
2. Severe pulmonary valve stenosis
3. Right ventricular non-compliance
4. Patent ductus arteriosus



This Doppler tracing is indicative of?

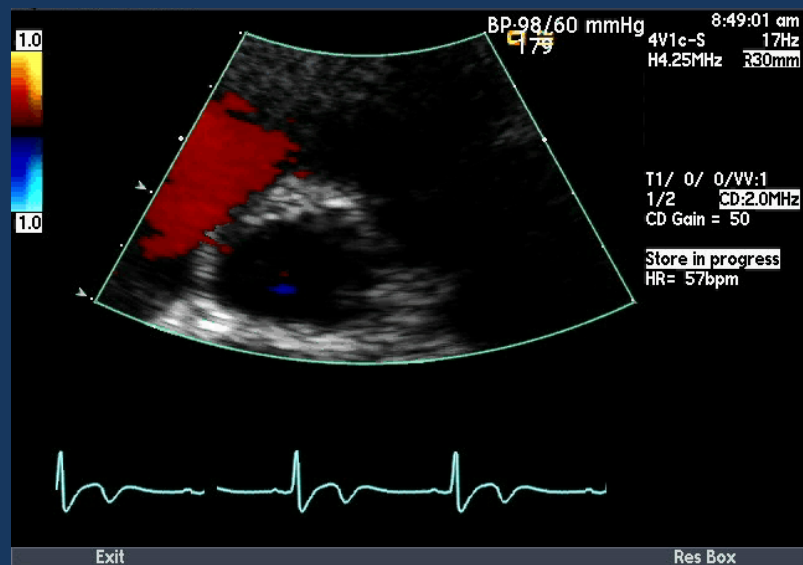
1. Severe pulmonary valve regurgitation
2. Severe pulmonary valve stenosis
3. Right ventricular non-compliance
4. Patent ductus arteriosus



Correct Answer

3. During inspiratory cycles with flow into the RV from the right atrium, there is flow out the RVOT.

A 42 year old man presents with this echo finding:



Accurate assessment of which of these parameters is indicated to determine if surgical intervention is warranted?

1. Right ventricular index of myocardial performance
2. Aortic valve regurgitation grade
3. Right ventricular mid-cavity dimension in diastole
4. Right atrial volume

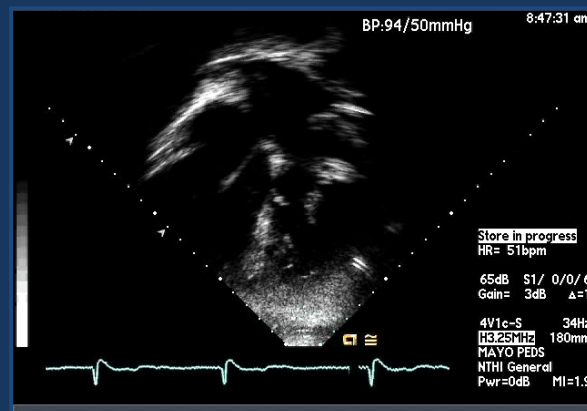
Accurate assessment of which of these parameters is indicated to determine if surgical intervention is warranted?

1. Right ventricular index of myocardial performance
2. Aortic valve regurgitation grade
3. Right ventricular mid-cavity dimension in diastole
4. Right atrial volume

Correct Answer

2. Aortic cusp prolapse with progressive aortic valve regurgitation may require a small VSD to be close to prevent further valve degeneration. Hemodynamically significant vsds cause LA/LV dilatation, not RV/RA.

35 year old woman presents for echocardiogram for assessment of dyspnea



What is your diagnosis?

1. AV discordance/ VA discordance or congenitally corrected transposition
2. AV concordance/VA discordance or complete transposition
3. Ebstein anomaly
4. LV non-compaction

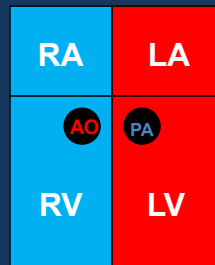
What is your diagnosis?

1. AV discordance/ VA discordance or congenitally corrected transposition
2. AV concordance/VA discordance or complete transposition
3. Ebstein anomaly
4. LV non-compaction

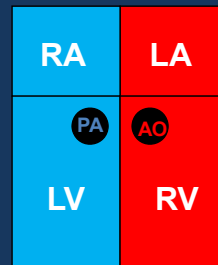
Correct Answer

1. AV and VA discordance (ccTGA, LTGA)

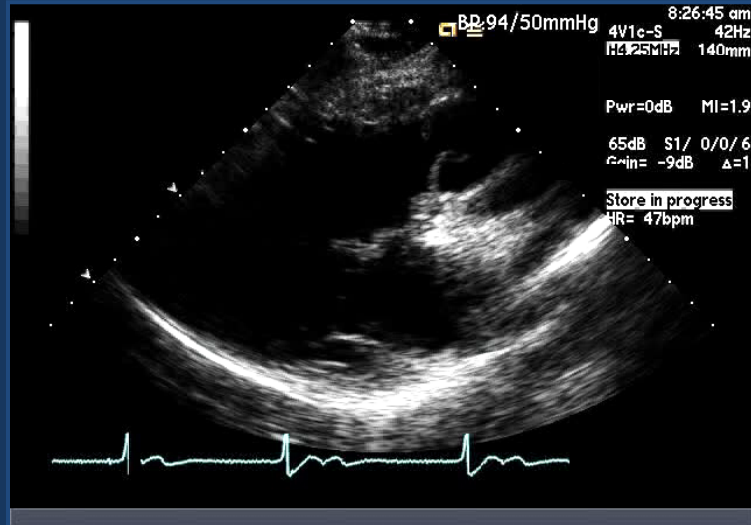
Complete Transposition
(D-TGA)



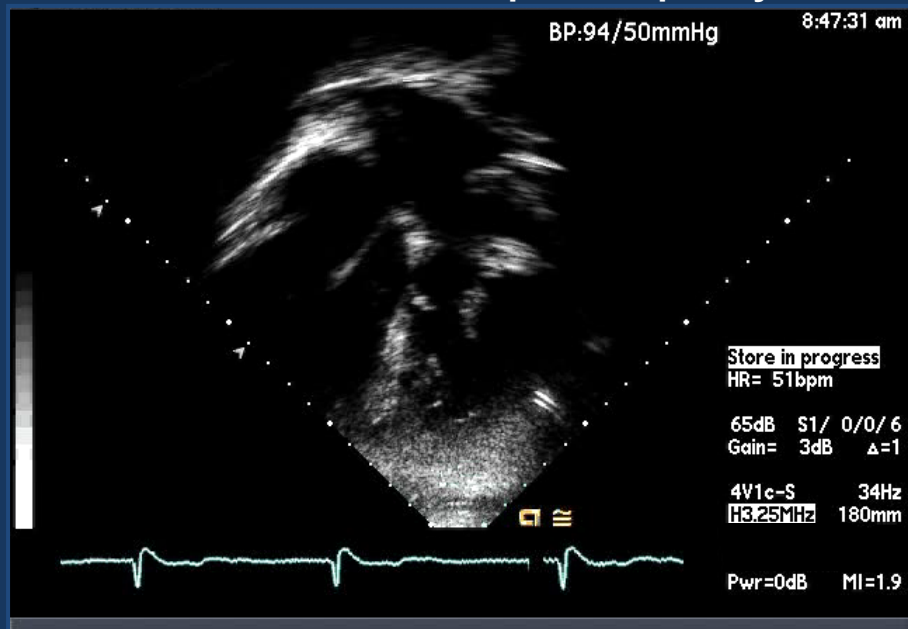
Congenitally Corrected
Transportation (L-TGA)

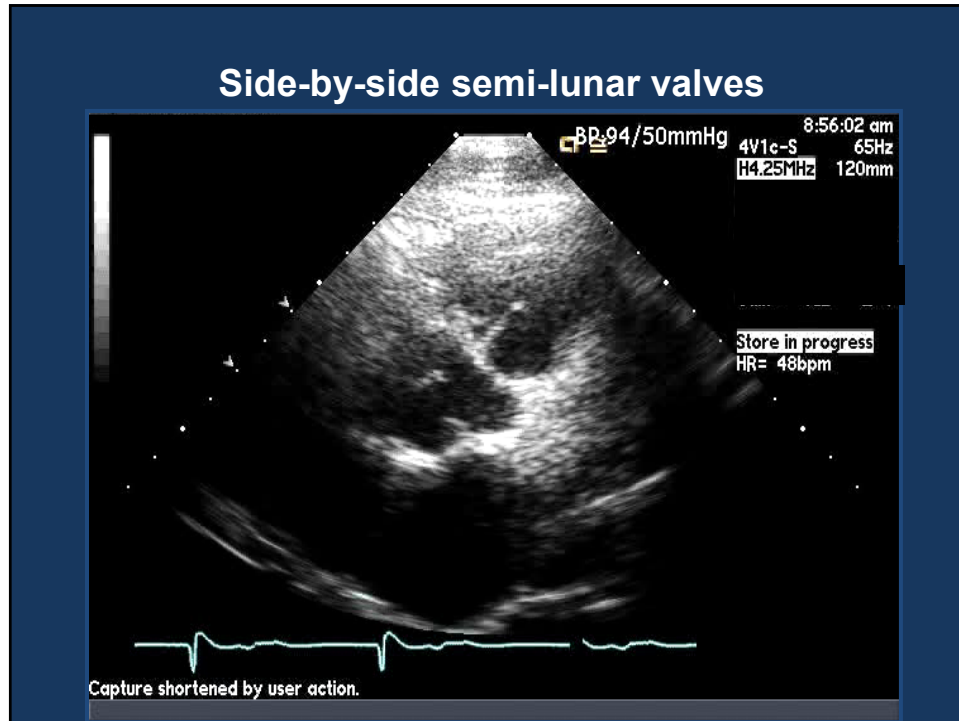


Conus present in the "LVOT"



Left A-V valve displaced apically

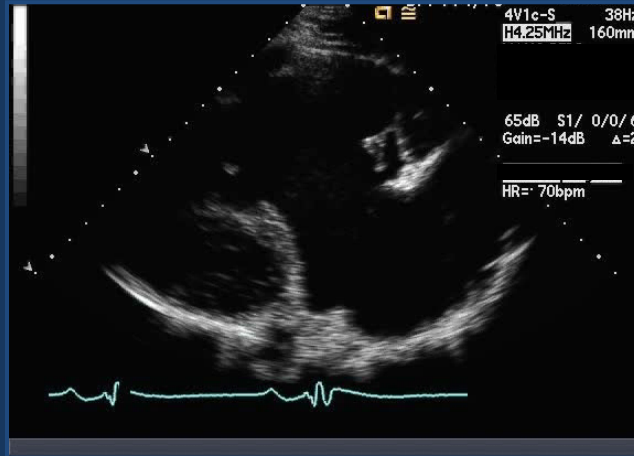




Lesions Associated with ccTGA

- Ventricular Septal Defect (70%)
- Subpulmonary ventricular outflow tract obstruction (40%)
- Tricuspid valve dysplasia/Ebstein malformation (90%)
- Situs inversus
- Dextrocardia

18 year old man presents for evaluation of palpitations



What other abnormality are you most likely to find on this echocardiogram?

1. Ventricular septal defect
2. Sub-aortic stenosis
3. Double chamber RV
4. Atrial septal defect

What other abnormality are you most likely to find on this echocardiogram?

1. Ventricular septal defect
2. Sub-aortic stenosis
3. Double chamber RV
4. Atrial septal defect

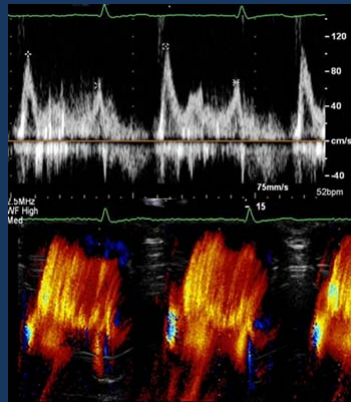


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Echocardiographic Evaluation of Diastolic Function

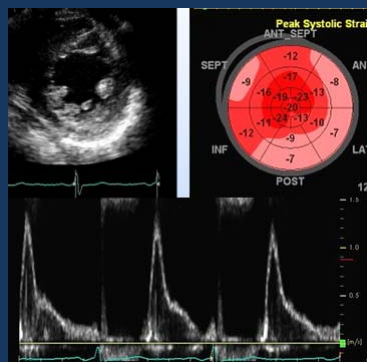
Jae K. Oh, MD, FASE

Case 1. Following PW Doppler and color-M mode of mitral inflow are seen in which situation?



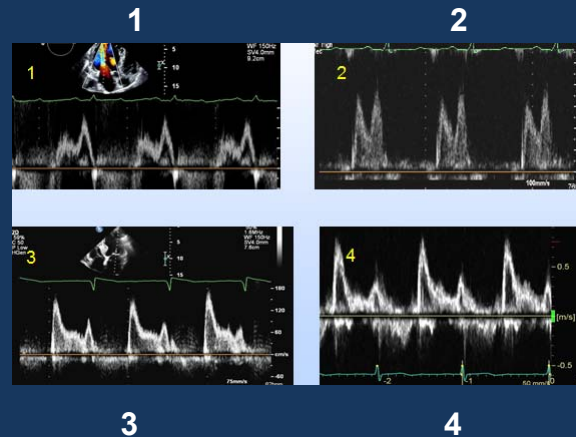
1. Delayed LV relaxation
2. Augmented isovolumic flow
3. Double mitral orifice
4. Grade 2 diastolic dysfunction

Case 2. Following 2-D, mitral inflow Doppler, and strain imaging were obtained from 72 year old man with pleural effusion. What is his diastolic function?



1. Grade 1
2. Grade 2
3. Grade 3
4. Indeterminate

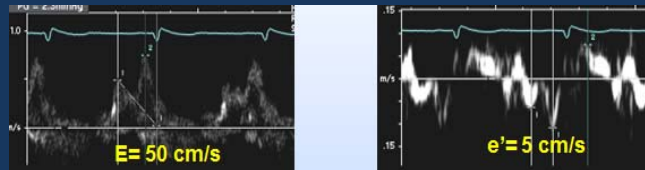
Case 3. Which of following mitral inflow patterns indicate the most optimal diastolic function status in 62 year old woman with ischemic CM?



Case 4. E/e' is proven to be reliable in estimating LV filling pressure in which of following conditions?

1. Hypertrophic CM
2. LBBB
3. Mitral annulus calcification
4. Atrial fibrillation

Case 5 A. Following mitral inflow and medial annulus velocity were obtained in 75 year old woman with exertional dyspnea. She has a history of hypertension. LA volume could not be measured and TR velocity was 2.6 m/sec. What is her diastolic function?



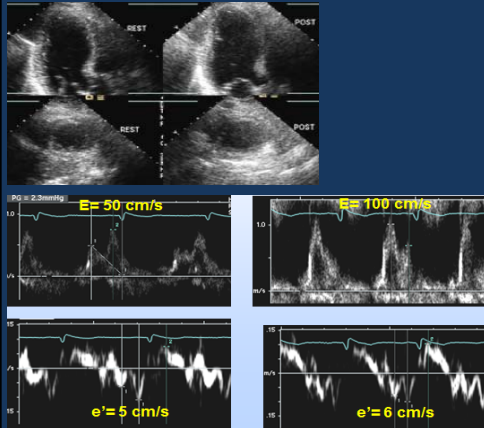
1. Grade 1
2. Grade 2
3. Grade3
4. Normal

Case 5B. What is the most appropriate next step?

1. Assure there is no cardiac reason for dyspnea
2. Diuretic therapy
3. Beta-blocker
4. Exercise test

Case 5C. What does exercise echo demonstrate?

1. Normal
2. Increased FP due to diastolic dysfunction
3. Increased FP due to CAD
4. Non-diagnostic. Needs TR

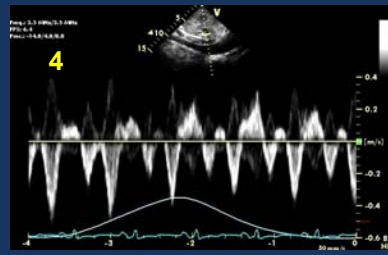
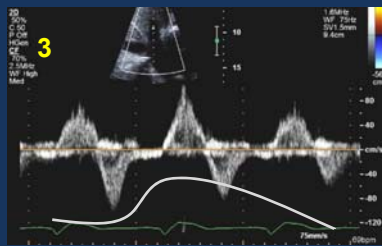
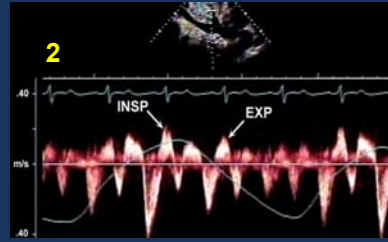
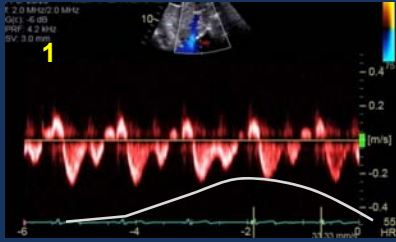


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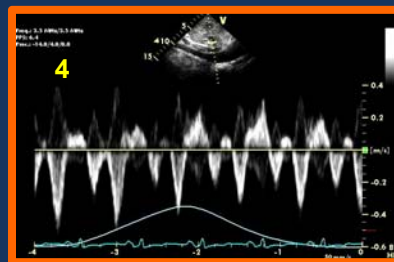
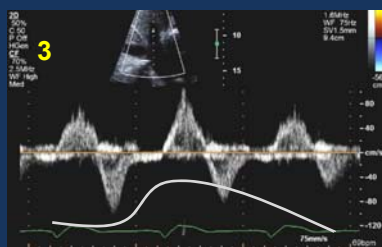
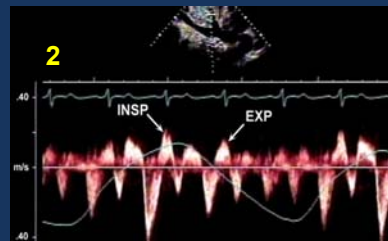
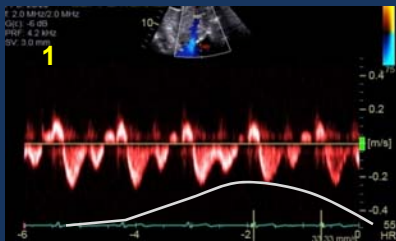
Echocardiographic Evaluation of Pericardial Disease: Constriction vs. Restriction

Jae K. Oh, MD, FASE

Q1 Which of following hepatic vein PW Doppler indicates constrictive pericarditis?



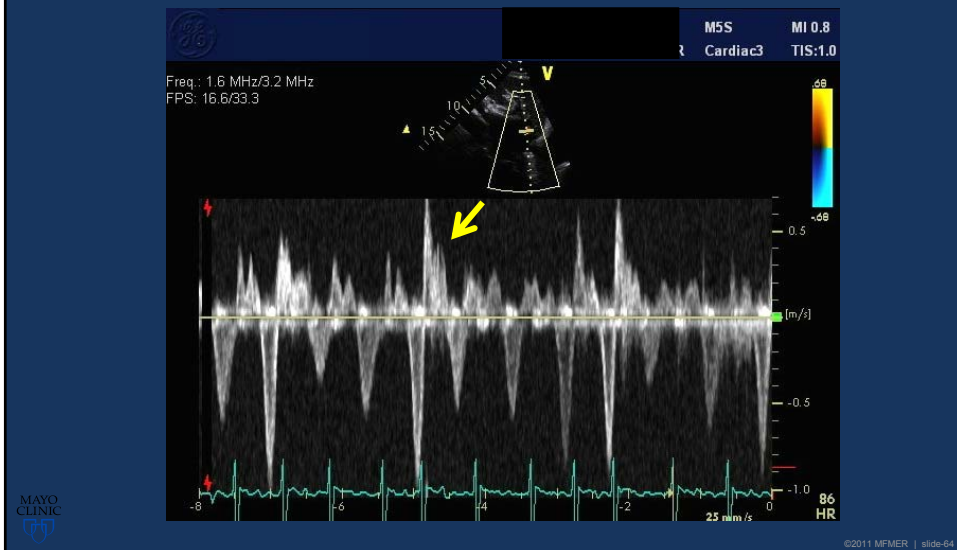
Which of following hepatic vein PW Doppler indicates constrictive pericarditis?



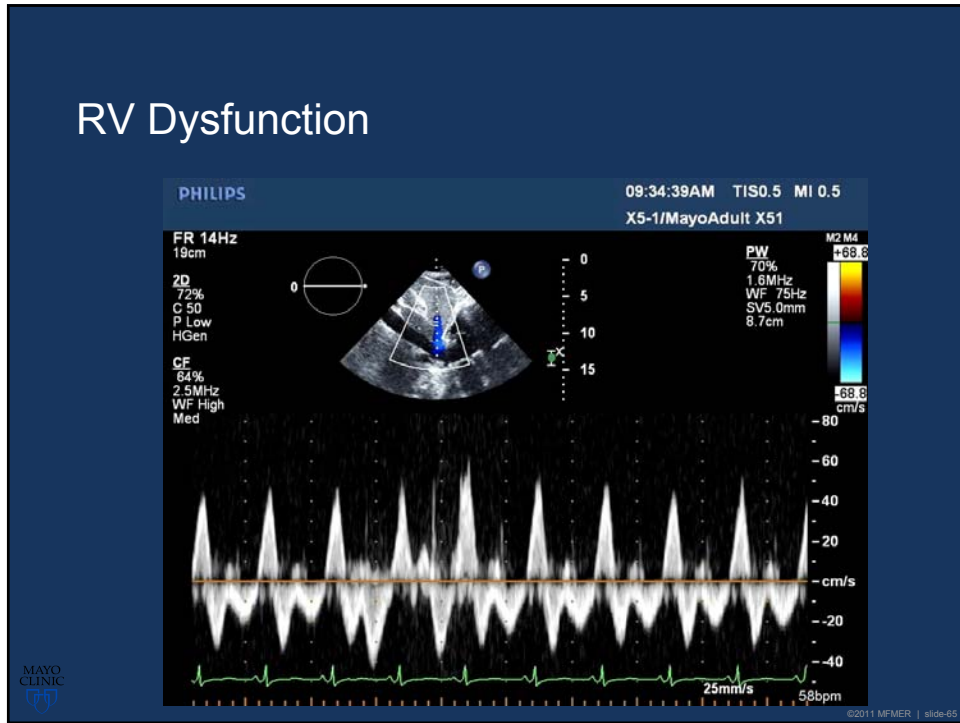
Severe TR



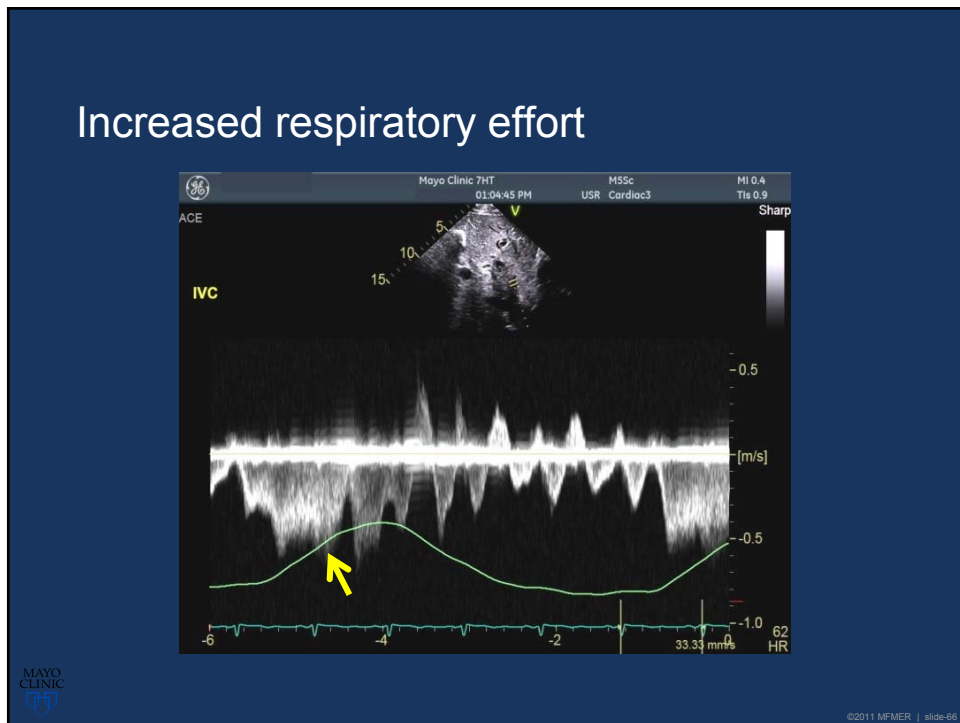
Pulmonary Hypertension



RV Dysfunction

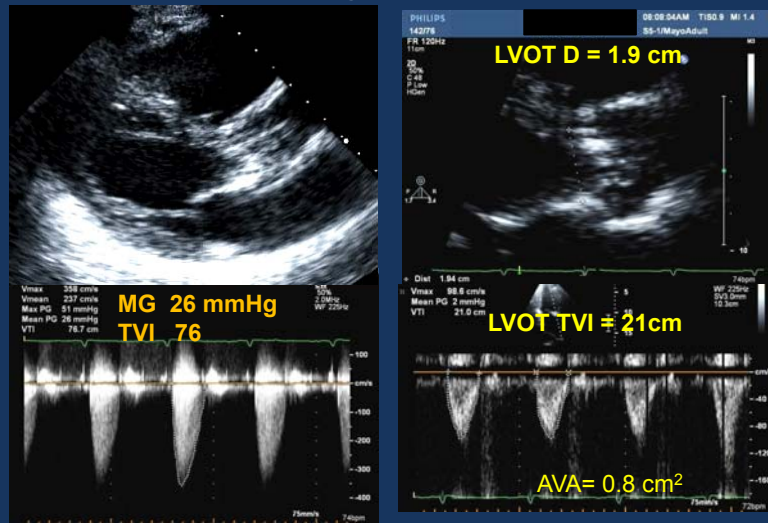


Increased respiratory effort



Q2A

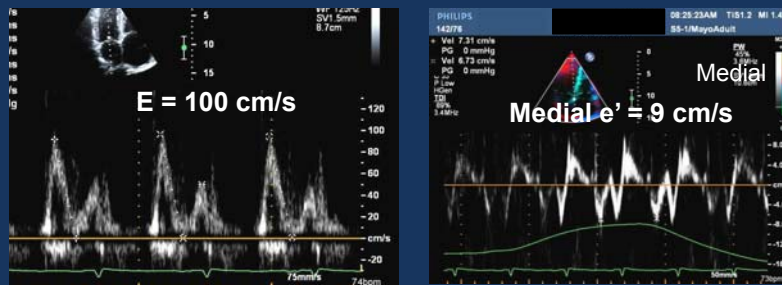
67 year old man presented with dyspnea. Examination showed increased JVP , systolic murmur, and mild pitting edema. Echocardiogram was obtained



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Q2A

67 year old man with AS and dyspnea
What is his diastolic function?



1. Normal diastolic function
2. Grade 2 dysfunction
3. Grade 3 dysfunction
4. Constriction

Q2B

Which is the most likely etiology?

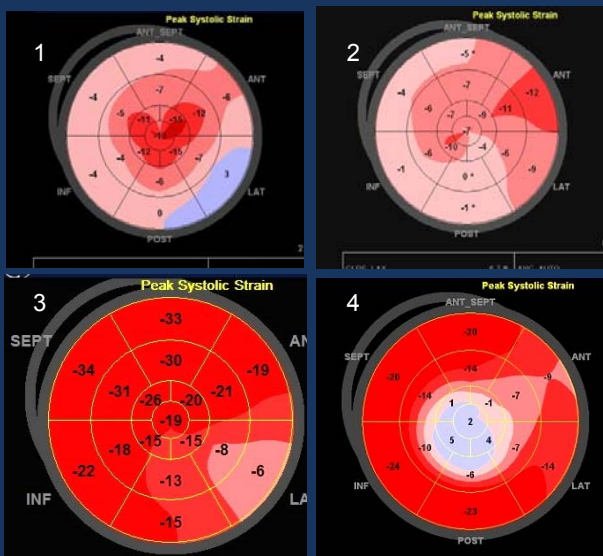
1. SLE
2. Radiation
3. Ochronosis
4. Tuberculosis



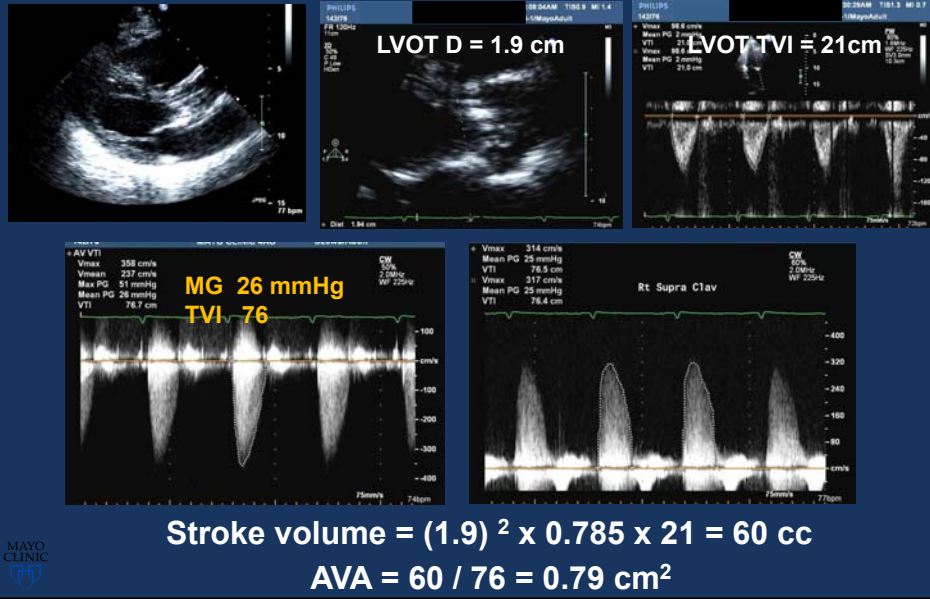
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Q2C

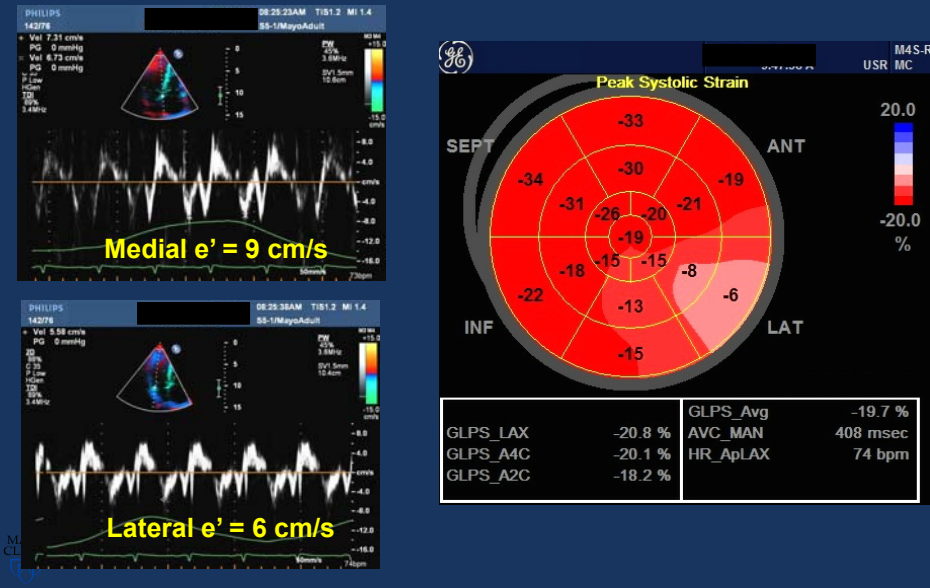
Which of following strain imaging is expected in this patient



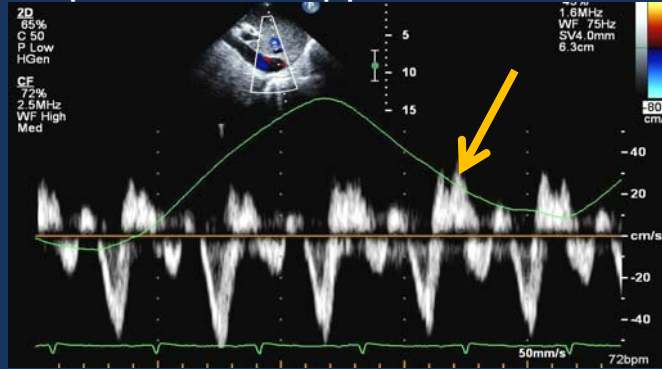
67 yo man with severe aortic stenosis and HF Came to Valve Clinic for AVR (LFLG Severe AS)



Tissue Doppler and Strain Imaging in Constriction (Annulus Reversus)



67 year old man with AS and Constriction Hepatic Vein Doppler c/w constriction



Radiation Heart Disease

Valvular Heart Disease

Circulation CV Imaging 2015

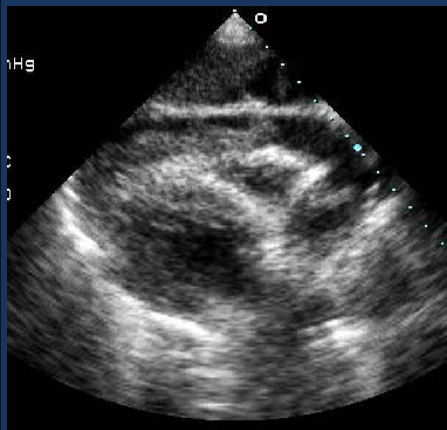
Low-Flow, Low-Gradient Severe Aortic Stenosis in the Setting of Constrictive Pericarditis

Clinical Characteristics, Echocardiographic Features, and Outcomes

Michael Y.C. Tsang, MD; Jin-Oh Choi, MD, PhD; Barry A. Borlaug, MD;
Kevin L. Greason, MD; Stephen S. Cha, MSc; Rick A. Nishimura, MD; Jae K. Oh, MD

MAYO CLINIC


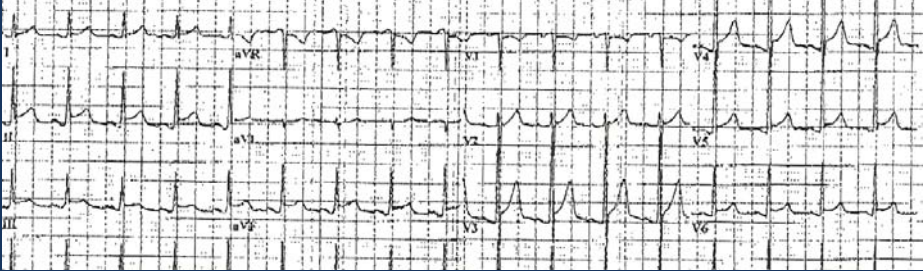
Q3 Which of following conditions is most likely responsible for the echocardiogram shown?



- 1. Aortic dissection
- 2. Mesothelioma
- 3. Gastro-pericardial fistula
- 4. Bacterial pericarditis

MAYO CLINIC

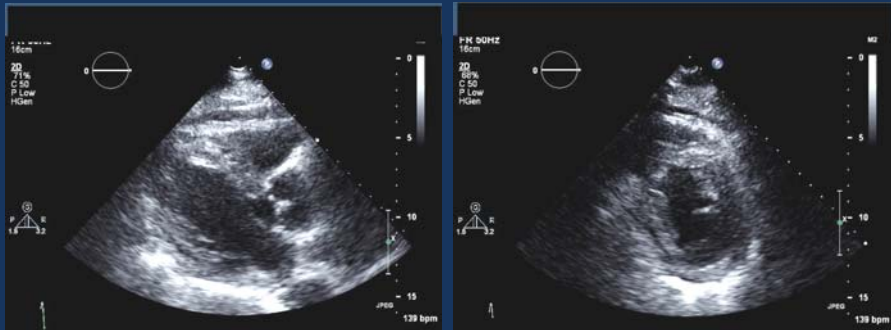
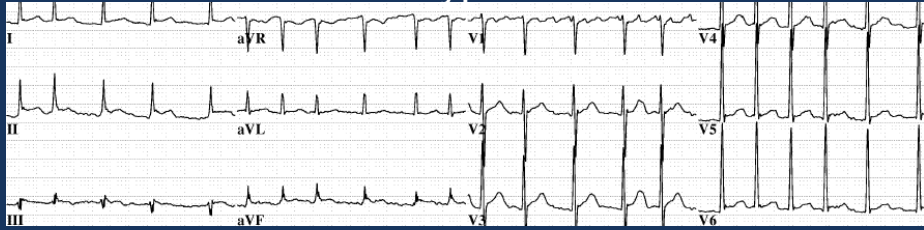
74 year old man with chest pain for several days



- Normal LV
- Small pericardial effusion
- What to do?

MAYO CLINIC

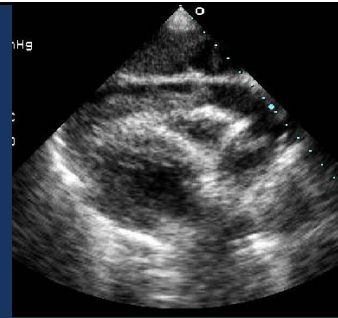
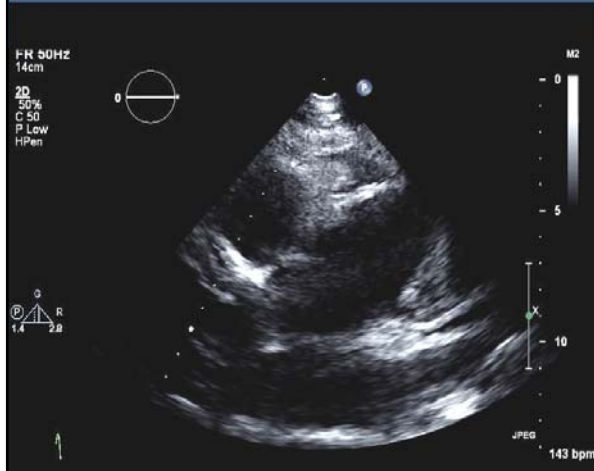
Persistent pain and not feeling well Atrial fibrillation and hypotension



MAYO CLINIC

1= Rate control 2= Steroid 3= Pericardiocentesis 4=More imaging

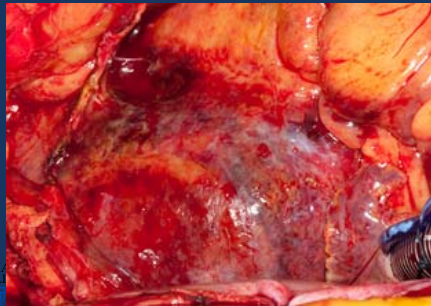
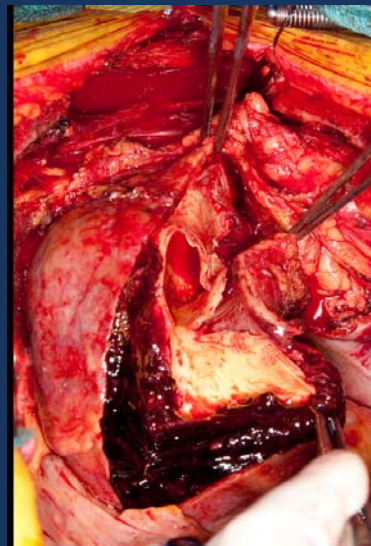
What do you do now?



- 1. Steroid Therapy
- 2. TEE
- 3. CT
- 4. Surgery



Intraoperative TEE



47 year old woman presents with abnormal Q4 chest X-ray. An echocardiogram is ordered. What is the most appropriate next step?

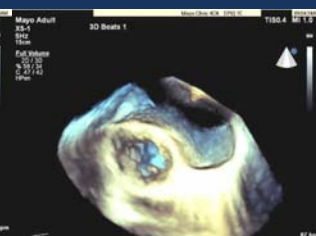
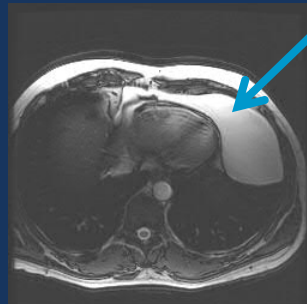


1. Pericardiocentesis
2. Pericardial window
3. Chest CT
4. Observation



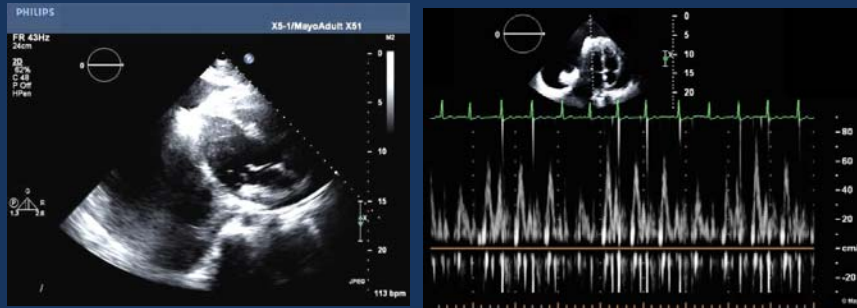
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A large pericardial cyst



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Q5 Following 2-D and MV Doppler echocardiograms were obtained from a patient with marked dyspnea. What is your next step?



1. Pericardiocentesis
2. Pericardiectomy
3. Thoracentesis
4. NSAID and Colchicine



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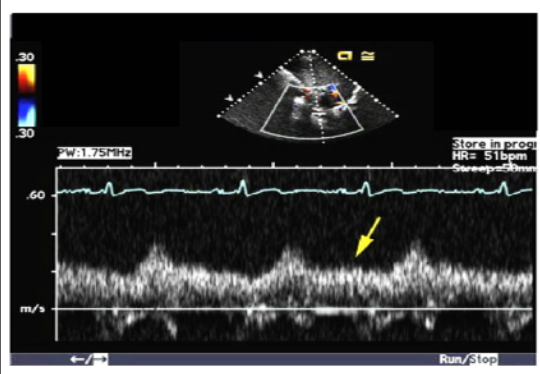


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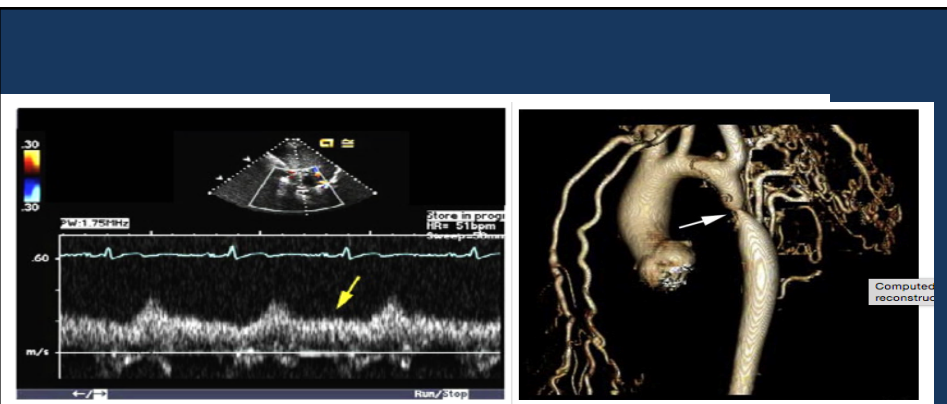
Contrast Echocardiography

Roberto M. Lang, MD, FASE

This aortic pulsed-wave Doppler examination was performed in a patient with generalized weakness. What is the most likely diagnosis?



1. Ductus Arteriosus
2. Takayasu's arteritis
3. Severe aortic regurgitation
4. Coarctation of the Aorta



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Reduced and delayed systolic forward flow with persistent Forward flow during diastole(diastolic tail)

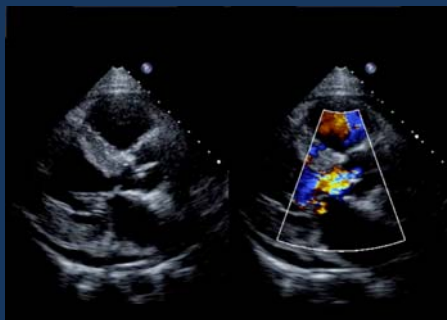
Case Study

42 year old woman with shortness of breath with exertion

What is the most likely diagnosis?

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1. Bicuspid aortic valve
2. HOCM
3. Corrected transposition of the great vessels
4. Membranous sub-aortic stenosis
5. Tetralogy of Fallot

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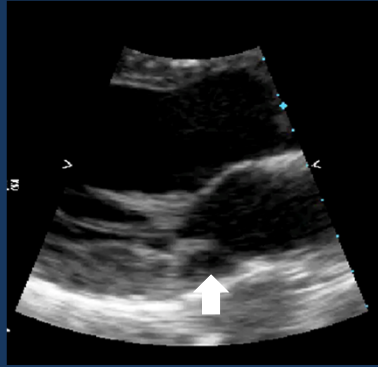


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Discrete Subaortic Stenosis

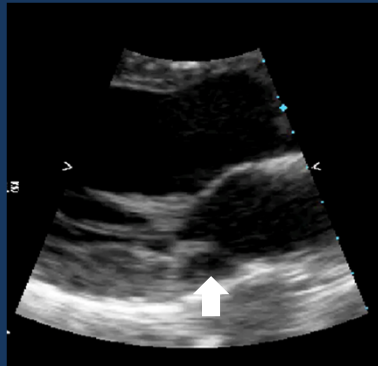
- 10% of all childhood types of AS
- Three types
 - Type 1 = Thin discrete fibrous membrane
 - Type 2 = Fibromuscular rings
 - Type 3 = Subvalvular tunnels (6 to 20%)
- Associated defects (10 – 57%)
 - VSD
 - Bicuspid AV, Coarctation of the AO

Identify this structure



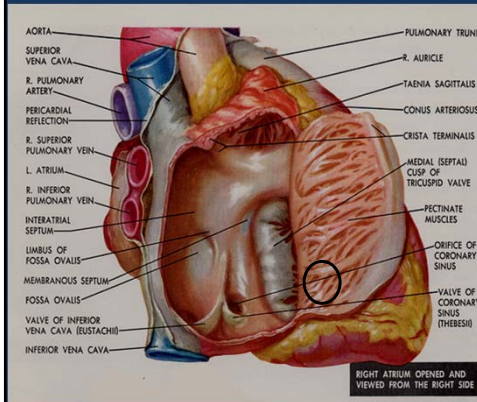
1. Foramen Ovale
2. Chiari Network
3. Thebesian Veins
4. Coronary Sinus
5. Anomalous left internal jugular vein

Identify this structure



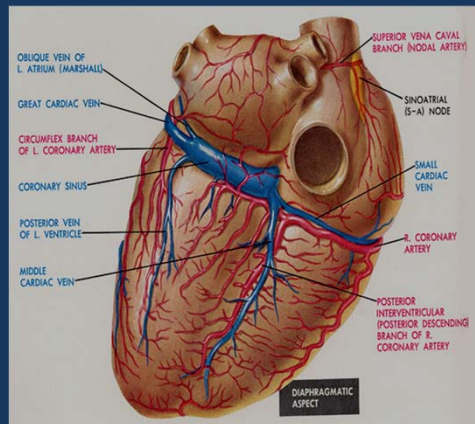
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Coronary Sinus: Anatomy



- Opens into the lower posterior aspect of RA (near mouth of IVC)
- Small fold of endocardium, the Thebesian valve situated at the CS orifice
- Chiari network may attach to CS orifice

Coronary Sinus: Anatomy



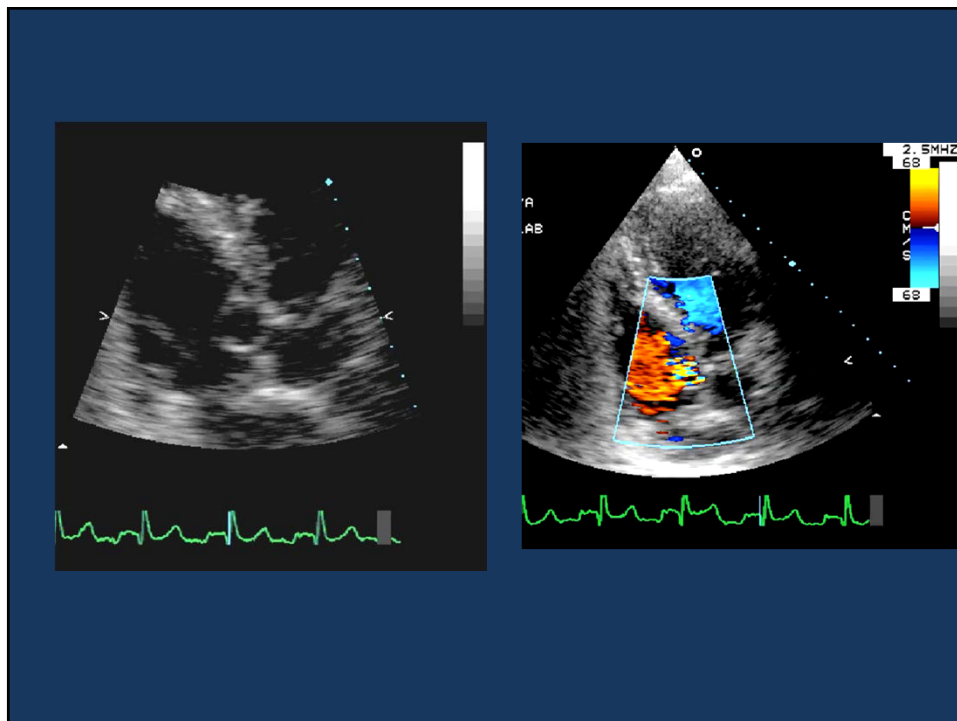
- 2-3 cm long, runs parallel to and just above the AV groove
- Receives blood from the great cardiac vein and other veins draining the posterior and lateral aspects of the heart

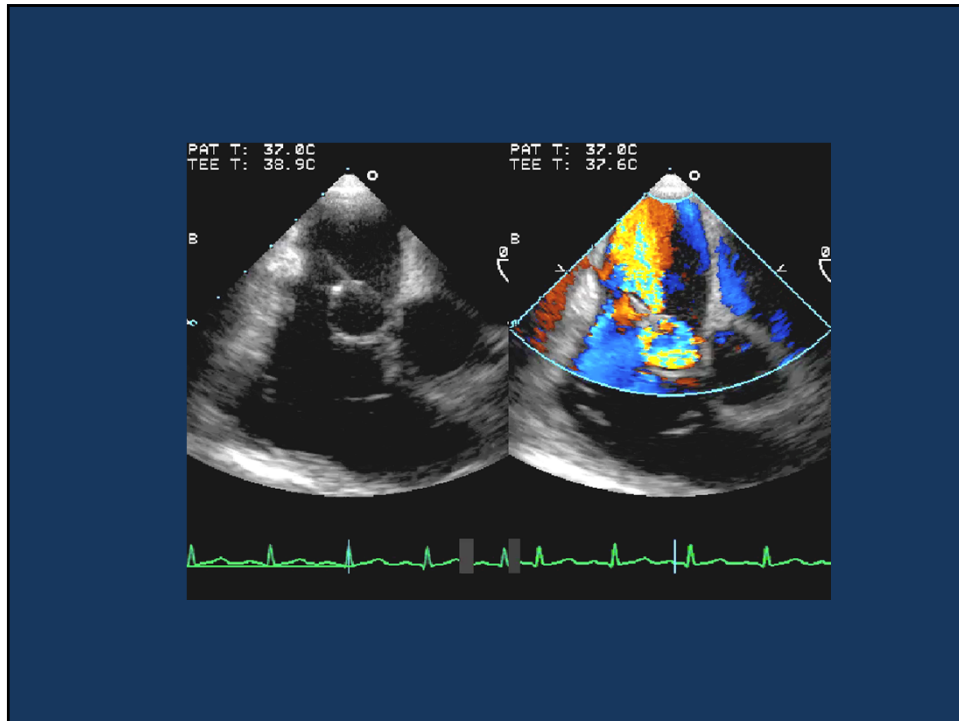
Case

54 year old obese Asian male with sudden onset of severe shortness of breath and bounding pulses. A machinery murmur is auscultated at the LSB, which did not radiate to the back or neck

A TTE and TEE were obtained

Which is the most likely diagnosis?





1. Patent Ductus Arteriosus
2. Coronary Artery Fistula
3. Ruptured Aortic Sinus Aneurysm
4. Persistent Left Superior Vena Cava
5. Coronary Sinus Fistula

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What portion of the thoracic aorta is not well visualized by TEE?

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The best view to evaluate the aortic cannulation site is:

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2. Upper esophageal long-axis view.
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4. Epiaortic short-axis view.
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A 72 male patients presents with abdominal pain. A TTE is performed
What is the most likely diagnosis?



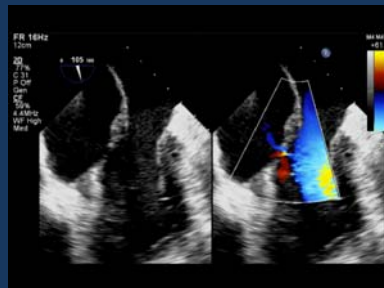
1. Aortic thrombus
2. Intra-aortic balloon pump
3. Aortic Dissection
4. Aortic reverberation artifact
5. Liver cyst (longitudinal view)

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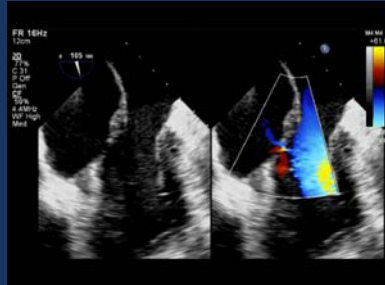
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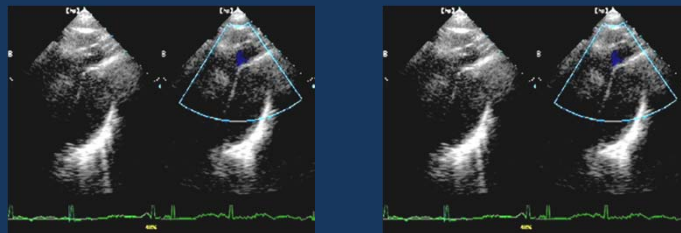
1. Aneurysm of the mitral valve
2. Aneurysm of the inter-valvular fibrosa
3. LV pseudoaneurysm
4. Gerbode ventricular septal defect
5. ASD

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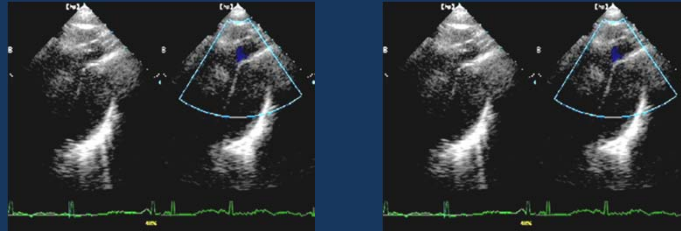
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