Royal Brompton & Harefield NHS Foundation Trust

Pericardial disease and other acquired heart diseases

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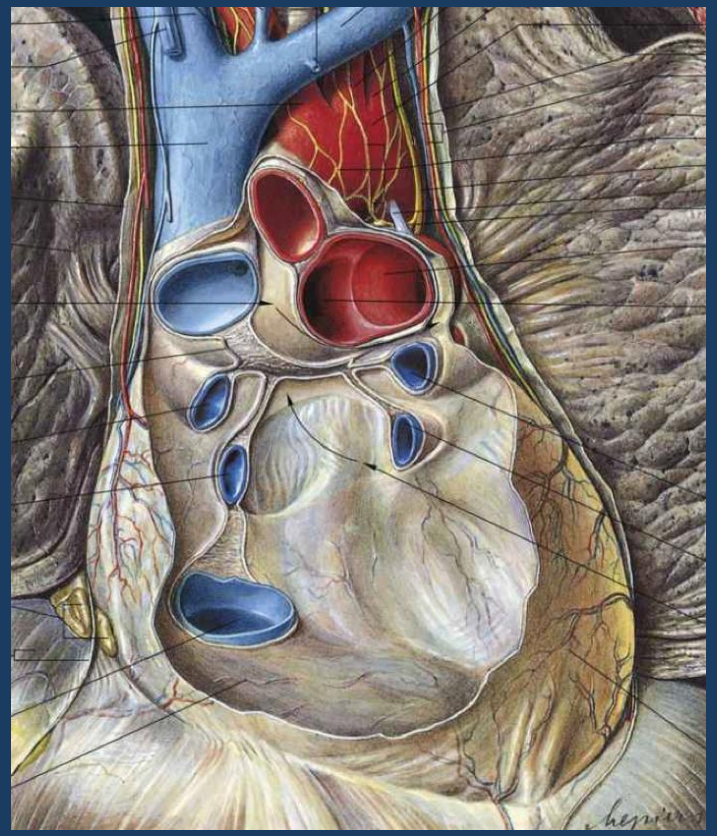
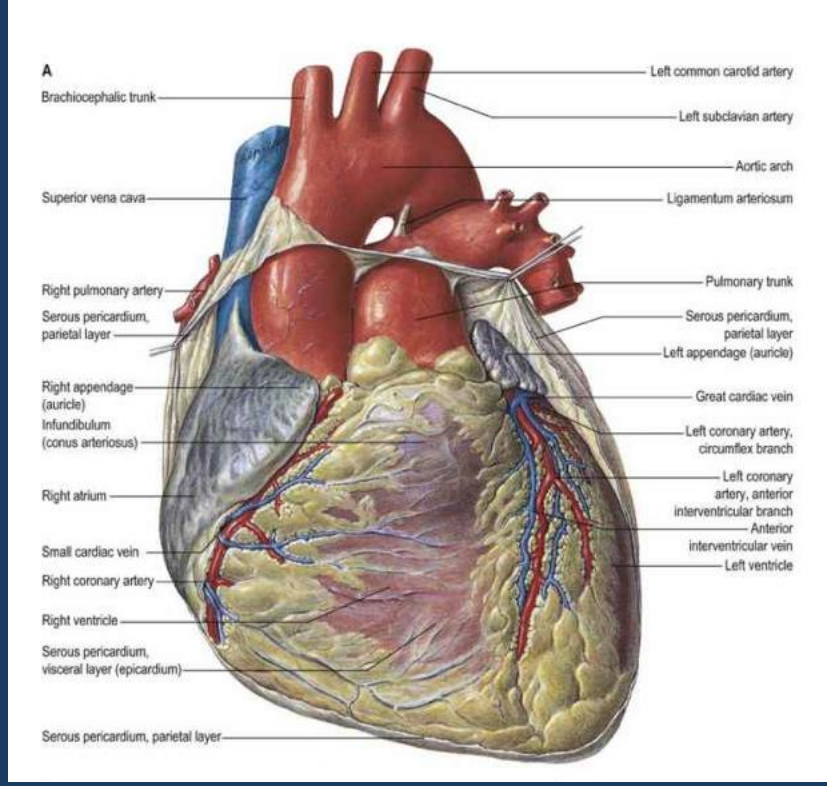
Exam oriented Echocardiography course, 8th November 2018

Normal Pericardium:

2 layers – fibrous

- serous – visceral and parietal layer





2 pericardial sinuses –
(not continuous with one another):

- **Transverse sinus** – between in front aorta and pulmonary artery and posterior vena cava superior
- **Oblique sinus** - posterior to the heart, with the vena cava inferior on the right side and left pulmonary veins on the left side

Normal pericardium is not seen usually on normal echocardiogram, neither the pericardial fluid

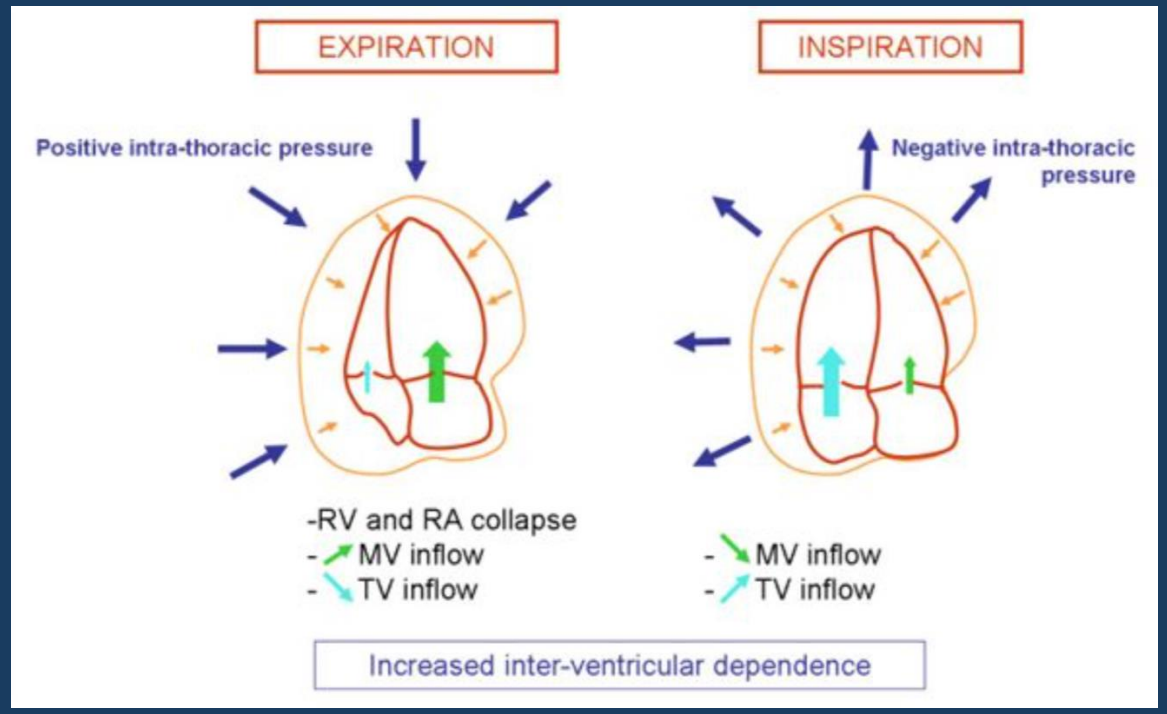
Acute Pericarditis:

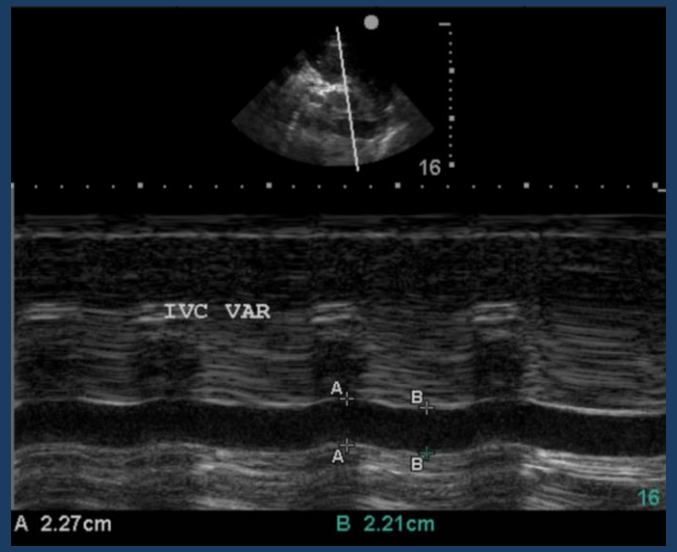
- How big is the effusion? (always measure in diastole)
- Where is it? (appears first behind the LV)
- Is it causing haemodynamic compromise?

Small effusion – <10mm, black space posterior to the heart in parasternal short and long axis views, seen only in systole

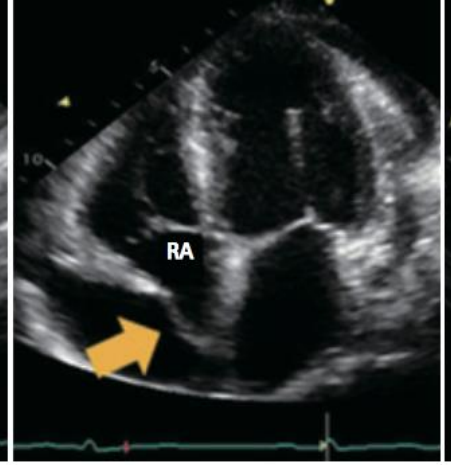
Moderate – 10-20 mm, more than 25 ml in adult, echo free space is all around the heart throughout the cardiac cycle

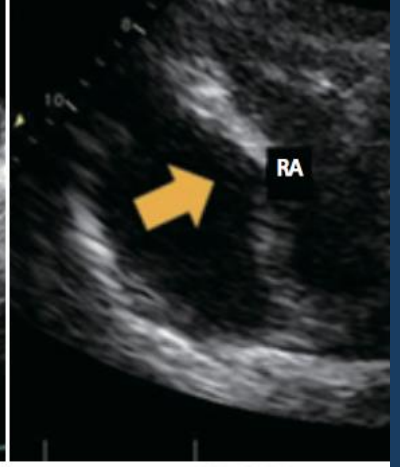
Large – >20 mm, swinging motion of the heart in the pericardial cavity

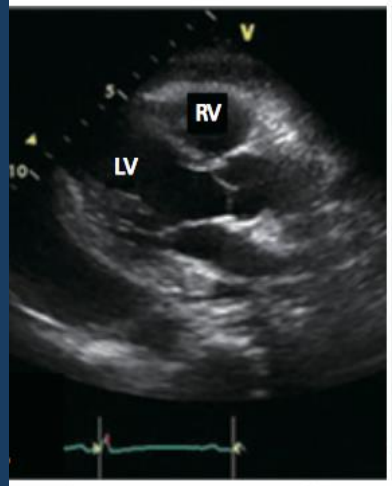

EXPIRATION
INSPIRATION
Positive intra-thoracic pressure
Negative intra-thoracic pressure
-RV and RA collapse
- MV inflow
- TV inflow
- MV inflow
- TV inflow
Increased inter-ventricular dependence

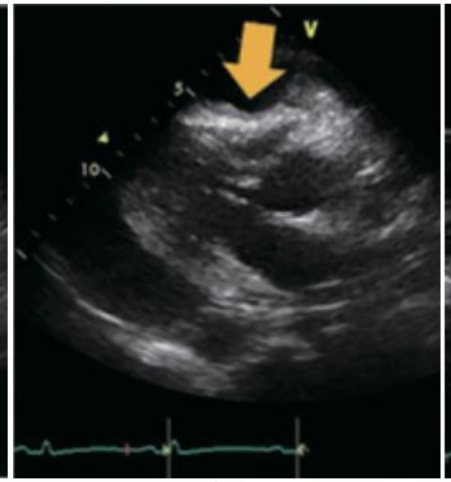

16
IVC VAR
A
B
A
B
16
A 2.27cm
B 2.21cm

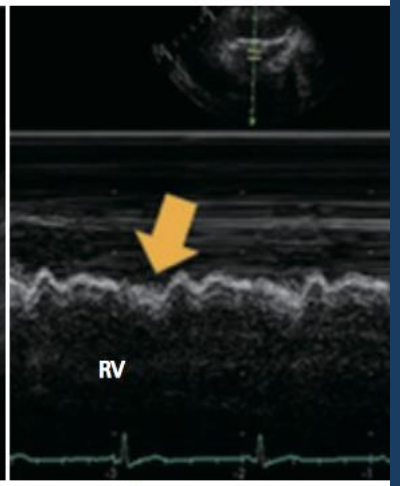

RA

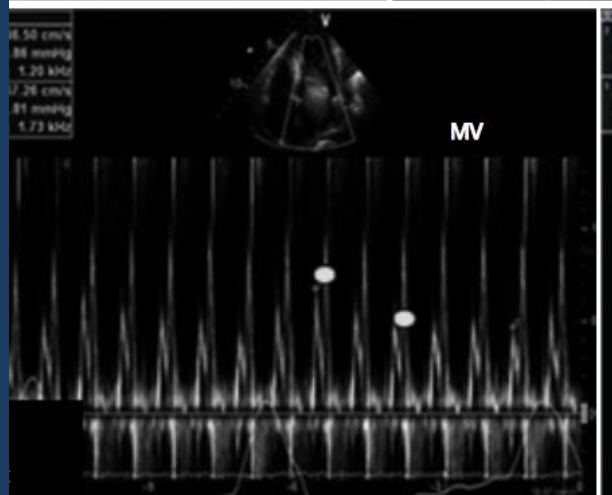

RA

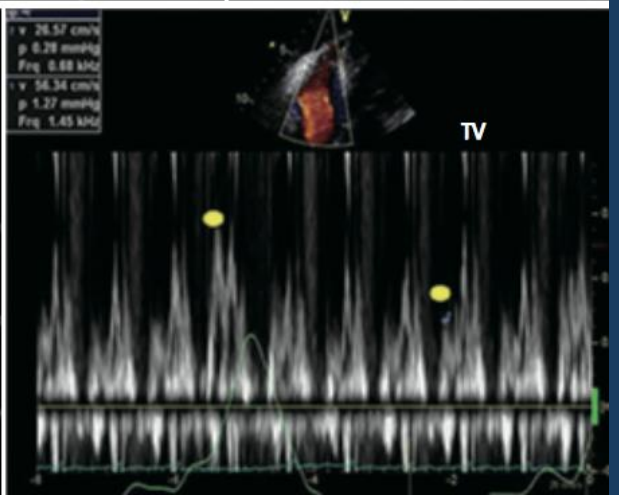

RA


RV
LV

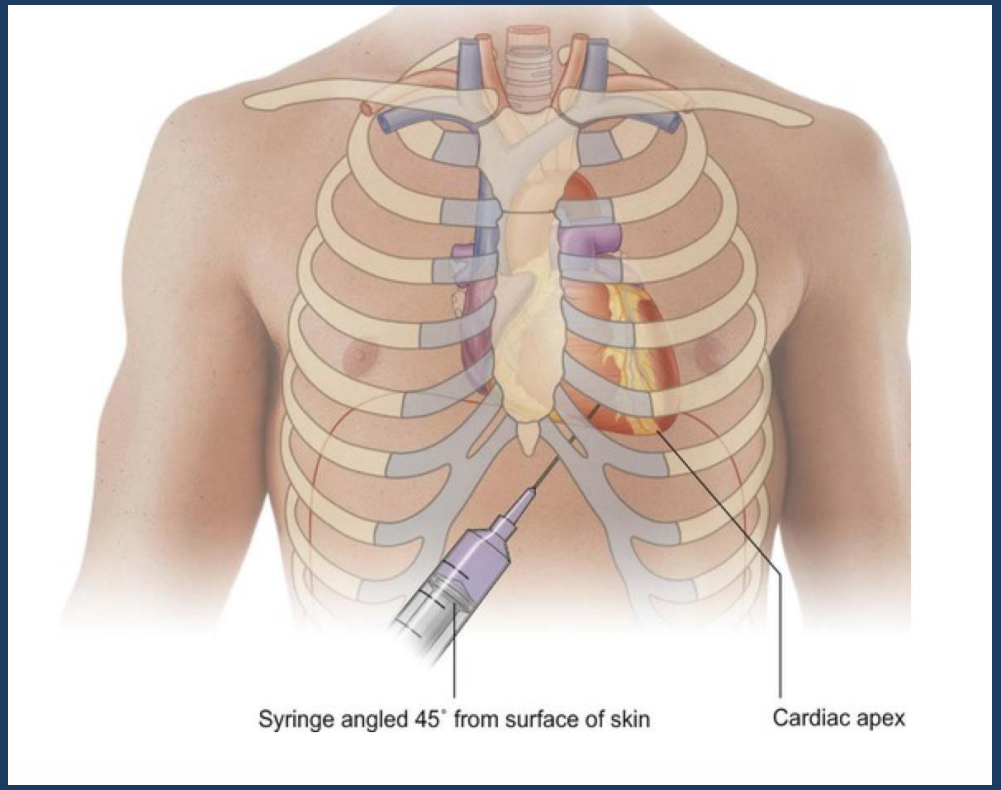


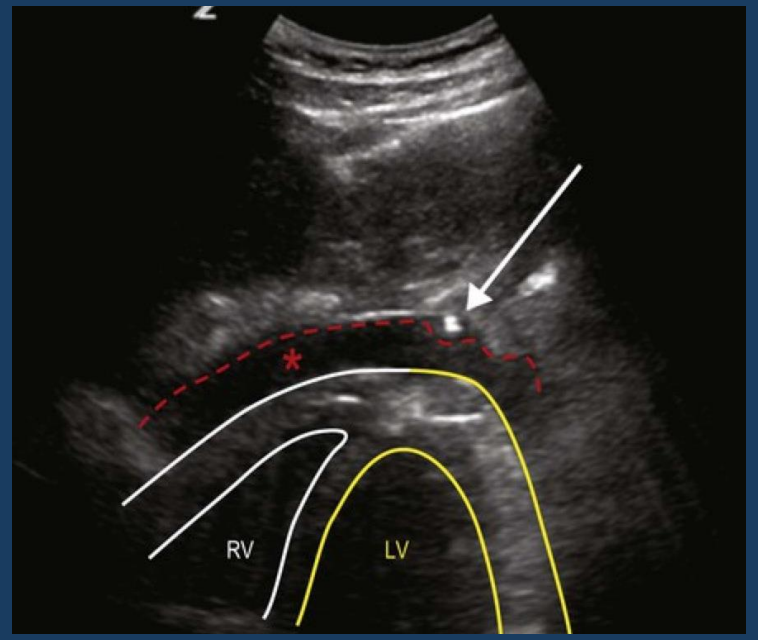

RV


MV


TV

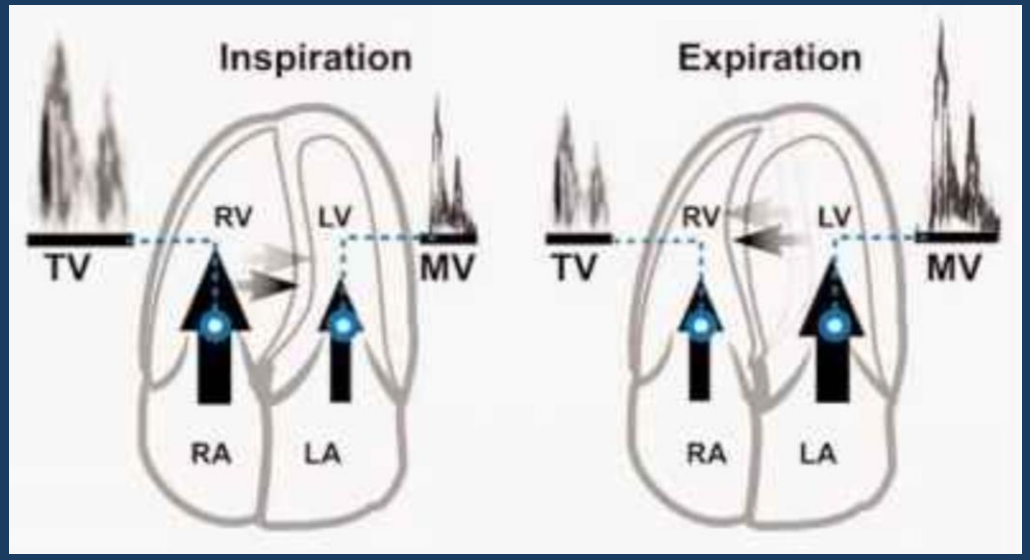
Pericardiocentesis

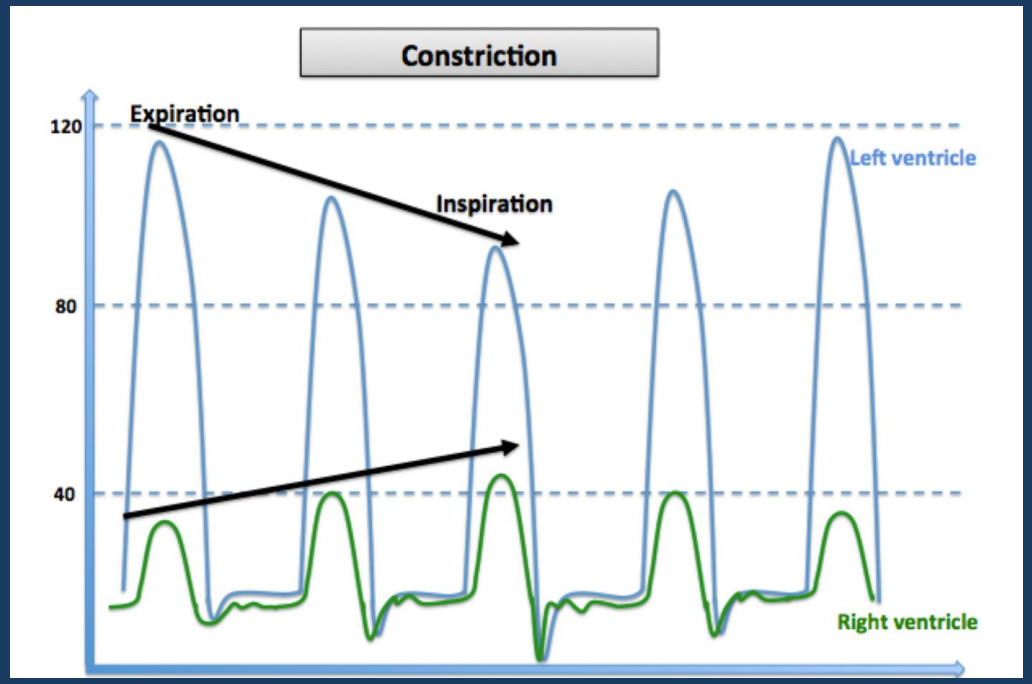




Constrictive pericarditis

Constriction of LV filling by pericardium

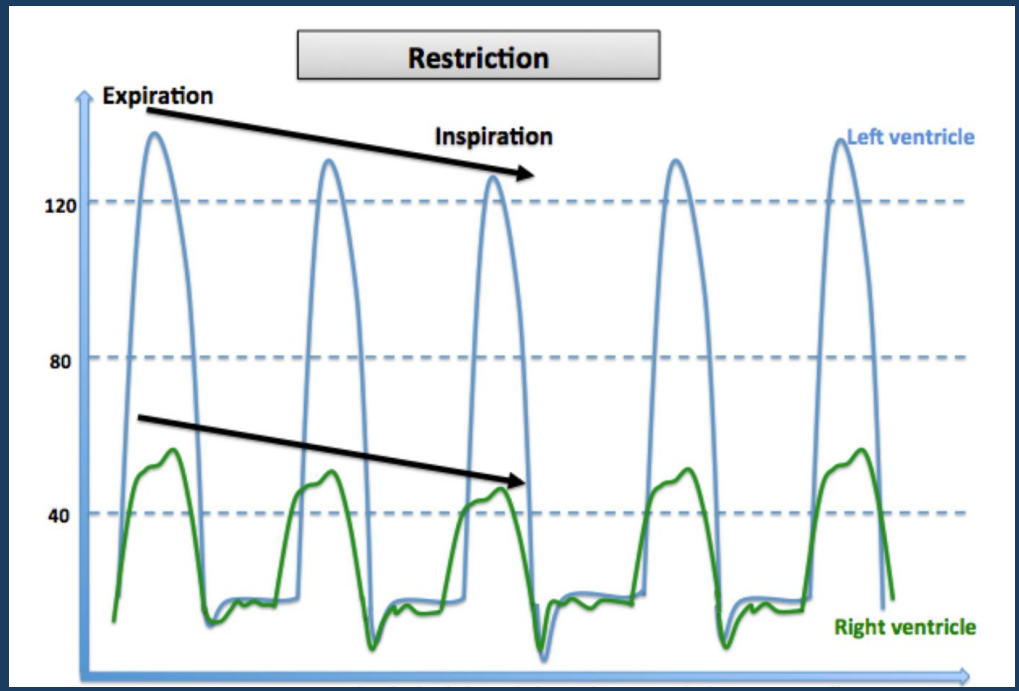




Restriction versus Constriction:

Restrictive cardiomyopathy

Impaired relaxation of LV



Constriction versus Restriction

Both have affected left ventricular filling

Constriction

E´ velocity is normal as there is no impediment to relaxation of the left ventricle.

Restriction

E´ velocity is low (less than 5 cm/s) due to impaired filling of the ventricle (impaired relaxation)

Infective Endocarditis:

Pathophysiology:

- Endocardial lesion
- Activation of prothrombic cascade - sterile platelet-fibrin deposition
- Bacterial colonisation

The highest risk of IE:

- Prosthetic cardiac valve
- CHD – unrepaired, with previous palliation, after corrective surgery (residual findings, pacemaker)
- Catheters in newborn – structurally normal heart

Echocardiography Imaging of Infective Endocarditis:

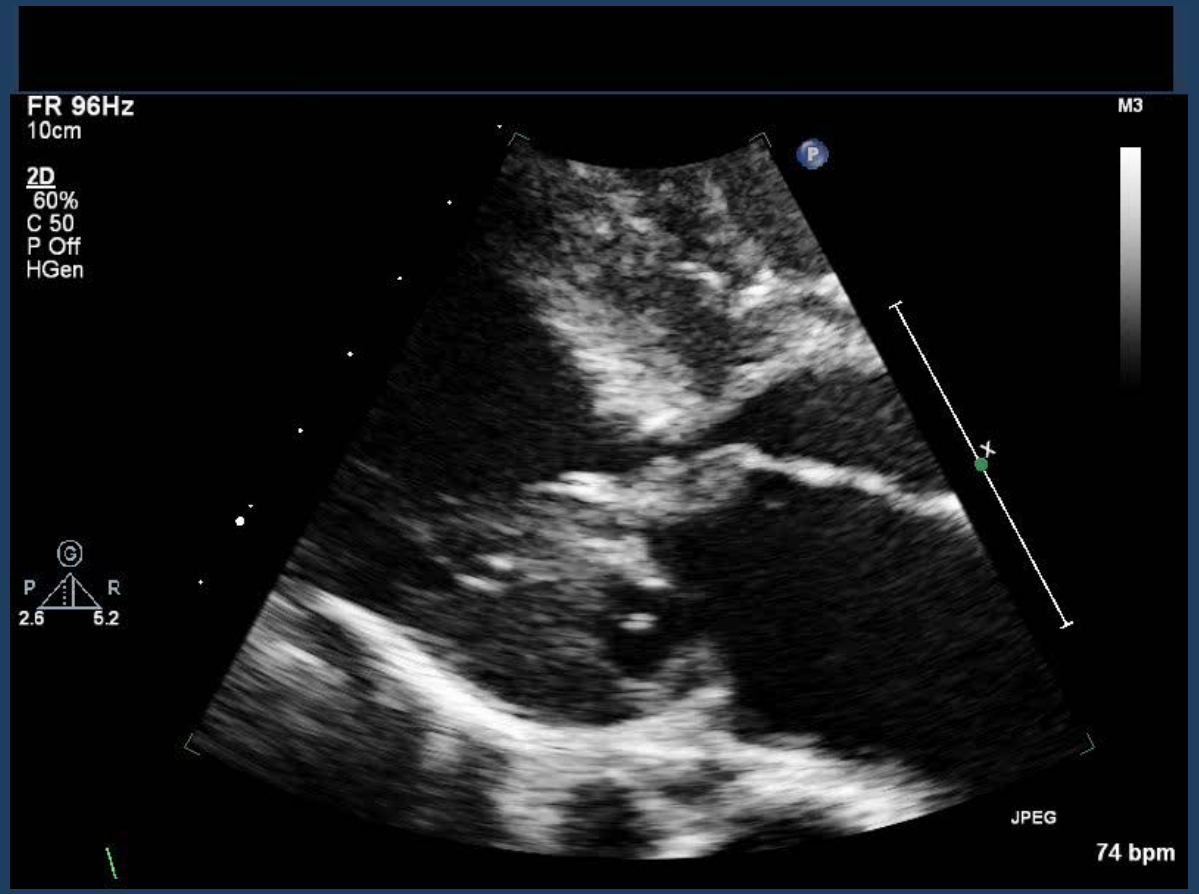
Echocardiography Guidelines:

- Determine the location, size, extent, mobility and number of IE lesions

- Assess the severity of intracardiac damage:
  - Severity of valvular regurgitation
  - Perforation of valve leaflets
  - Development of paravalvular abscess
  - Dehiscence of prosthetic valves

- Assess the haemodynamic sequelae:
  - Valvular function
  - Myocardial function
  - Pericardial effusion

Infective Endocarditis in Hypertrophic Cardiomyopathy:



Kawasaki Disease
Mucocutaneous Lymphnode Syndrome

Fever persisting 5 or more days
+ at least 4 clinical features:

- Changes on extremities (erytema, edema, desquamation)
- Polymorphous exanthema
- Nonexsudative conjunctivitis
- Changes in the lips and oral mucosa
- Cervical lymphadenopathy

Kawasaki Disease

Acute febrile phase

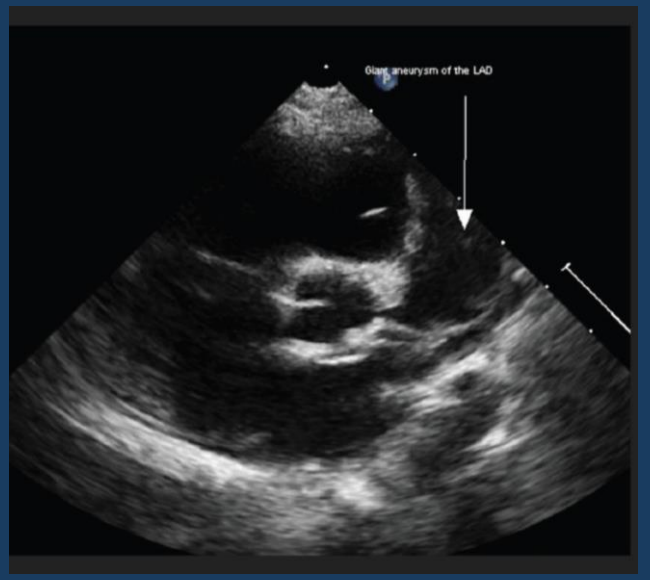
- diffuse microvascular angiitis - coronary arteries
- pericarditis - pericardial effusion
- myocarditis – myocardial dysfunction
- endocarditis – valvular regurgitation

Subacute phase – pancarditis, ectasia, aneurysm, thrombosis of the coronary arteries

Chronic phase – intimal thickening of the coronary arteries
– stenosis, calcification, thrombosis

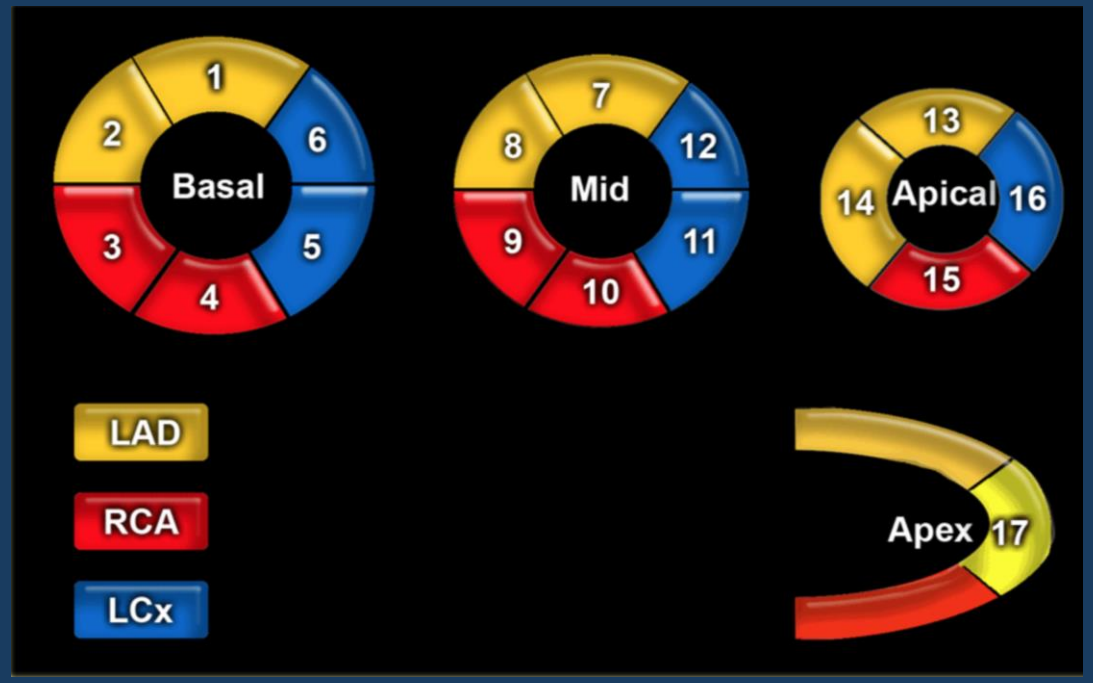
Kawasaki Disease

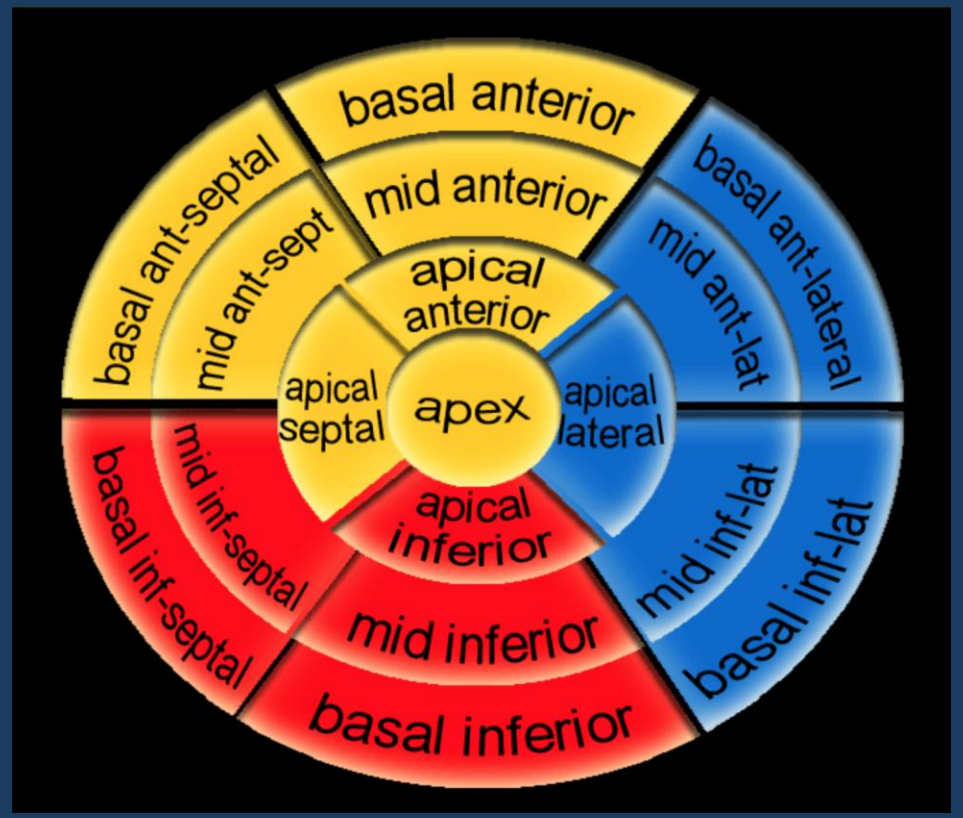
Coronary arteries – ectasia, aneurysm, thrombus
Location – frequently LAD and RCA affected



Ectasia – diffuse dilation of coronary artery
Aneurysm – localised dilation – saccular - rounded
- fusiform – larger in one direction

Coronary arteries supplying myocardial segments





Rheumatic Heart Disease

- Acute inflammatory illness that occurs following an upper respiratory infection with group A beta hemolytic streptococci
- Affects joints, central nervous system, skin, musculoskeletal system and heart
- **Acute rheumatic fever** – mitral regurgitation, aortic regurgitation
- **Chronic rheumatic fever** – mitral regurgitation and/or stenosis, aortic regurgitation and/or stenosis

Rheumatic Heart Disease
Mitral valve regurgitation

The most common manifestation of rheumatic heart disease in young

Echocardiography criteria:

- Pathologic mitral regurgitation: Seen in two views, jet length at least 2cm, pan-systolic jet in at least one view

- Combination of morphological changes (thickening and restricted motion of the anterior MV leaflet)

Mitral valve regurgitation

Normal MV

Rheumatic MV with abnormal coaptation and regurgitation

Prolapse with billowing

Rheumatic Heart Disease
Mitral stenosis

Rheumatic fever is the most common cause of the mitral stenosis worldwide.

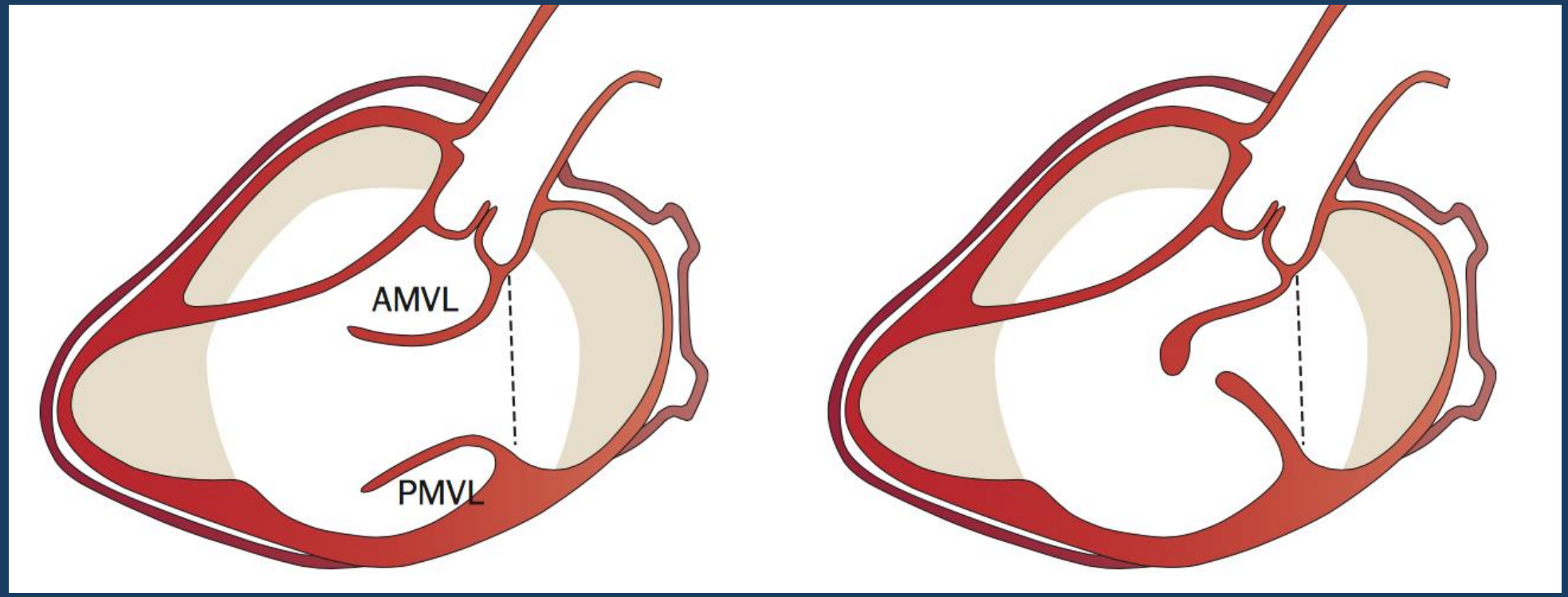
Echocardiography criteria:

- Mean gradient at least 4 mmHg
- At least 2 morphological changes (thickened leaflets and relatively immobile posterior leaflet, chordal shortening or fusion)

Differential diagnosis:

Congenital mitral valve stenosis – frequently associated with abnormal papillary muscles

Mitral valve stenosis



Normal MV in diastole

Rheumatic MV in with thickened anterior and posterior leaflets

Rheumatic Heart Disease
Aortic regurgitation

Less frequently affected

Echocardiography criteria:

- Pathologic aortic regurgitation: seen in two views,

jet length at least 1 cm, pan-diastolic jet in at least 1 view

- Pathologic features: thickened leaflets, coaptation defect, prolapse

Differential diagnosis: Bicuspid aortic valve and aortic root dilation

MCQ 1

Pericardial Effusion:

A. Should be measured always in systole

B. Should be measured always in diastole

C. Not only the size of effusion, also the rate of accumulation is very important

D. A small or moderate effusion may cause haemodynamic compromise, if accumulated rapidly

E. Appears usually first behind the left ventricle

MCQ 2

Cardiac Tamponade:

A. Diastolic collapse of the free walls of right atrium and right ventricle

B. Typical finding is increased ventricular interdependence

C. Typical finding is decreased ventricular interdependence

D. Inspiratory increase in tricuspid velocity

E. Inspiratory decrease in tricuspid velocity

MCQ 3

Pericardiocentesis – everything is right, EXCEPT:

A. May be used for diagnosis of neoplastic effusions or purulent pericarditis

B. Ultrasound plays a crutial role for guidance of the needle

C. The most common approach is subxiphoid

D. Is life-saving procedure in case of cardiac tamponade

E. There has to be effusion behind left atrium, otherwise the pericardiocentes cannot be performed

MCQ 4

Ventricular Interdependence

A. Septal bounce is sign of ventricular interdependence

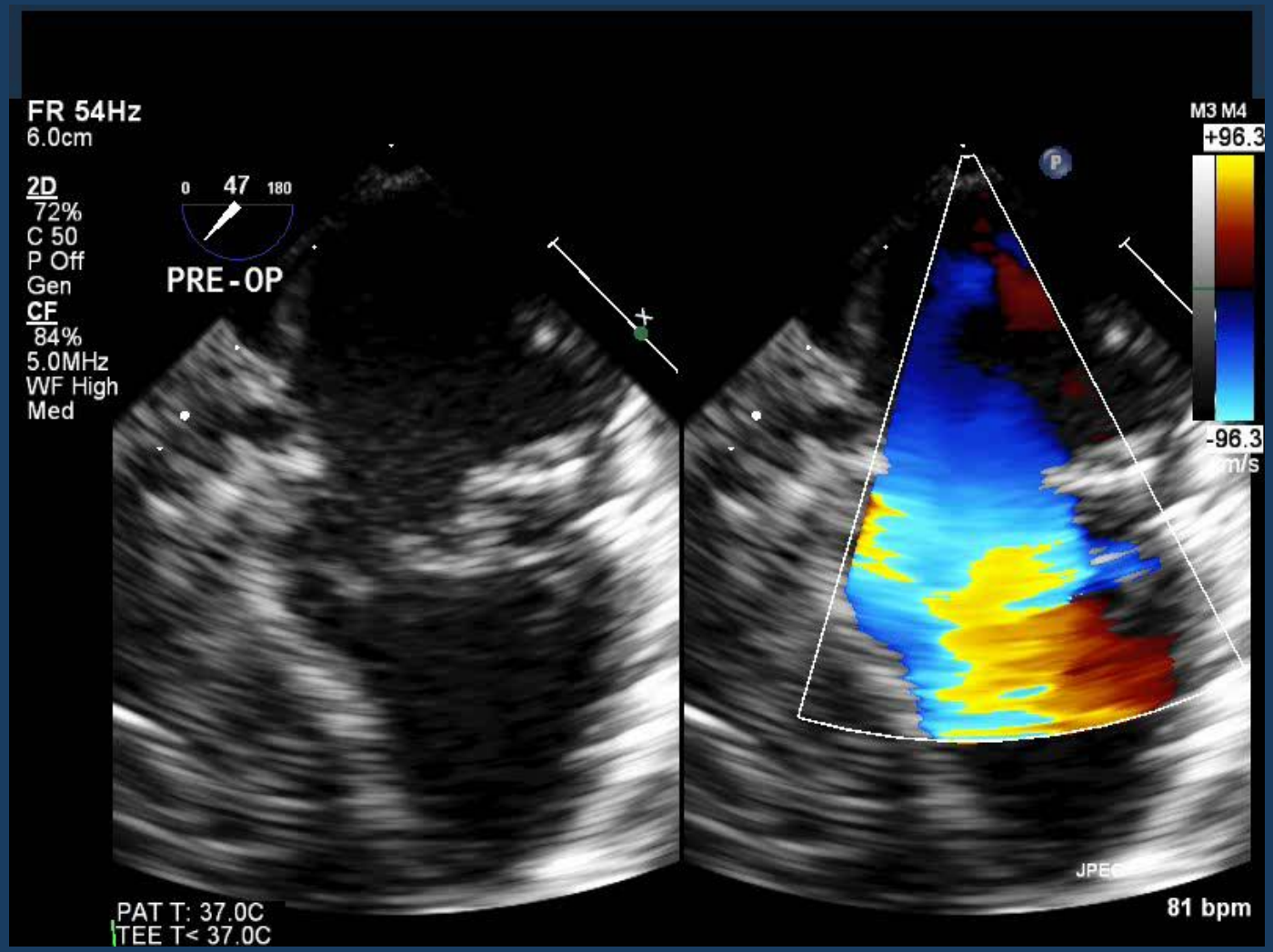
B. The effect of the size, shape and compliance of one ventricle on the size, shape and compliance of the other ventricle

C. Is pronounced in constrictive pericarditis

D. Is pronounced in restrictive cardiomyopathy

E. Is pronounced in dilated cardiomyopathy

MCQ 5


FR 54Hz
6.0cm
2D
72%
C 50
P Off
Gen
CF
84%
5.0MHz
WF High
Med
0 47 180
PRE-OP
M3 M4
+96.3
-96.3
m/s
PAT T: 37.0C
TEE T< 37.0C
81 bpm

This patient has history of fever and high CRP.
The most probable diagnosis is:

A. Most probably infective endocarditis of mitral valve

B. Severe mitral stenosis

C. Congenital dysplastic mitral valve

D. Thrombus of MV

E. Tumor of MV – most probably rhabdomyoma or myxoma of MV

MCQ 6

Infective Endocarditis in Hypertrophic Cardiomyopathy:

A. The major role in pathogenesis plays chronic endocardial trauma of the interventricular septum by the anterior septal leaflet - common finding in the obstructive form

B. The same incidence is in obstructive and non-obstructive form

C. Patients with obstructive form are affected much more often than non-obstructive

D. Patients with HCM are not at higher risk of IE than healthy patients

E. Aortic valve is the most often affected valve in hypertrophic cardiomyopathy

MCQ 7

Role of TOE in suspected IE:

A. TOE has the same sensitivity and specificity for detecting IE as TTE

B. TOE is especially important in diagnosis of IE affecting prosthetic valves and should be always considered when clinical suspicion of IE

C. If TOE is negative, IE is excluded

D. Dehiscence of the prosthetic valve appears very often with IE and can be seen easier on TTE than TOE

E. TOE can diagnose paravalvular abscess easier than TTE

MCQ 8

Kawasaki Disease:

A. The most common sites for coronary artery aneurysms are LAD and RCA

B. Pericardium is never affected

C. Myocardium is never affected

D. Valvar involvement is never present

E. Thrombosis of the coronary arteries can be present in all phases

MCQ 9

Kawasaki Disease:

A. Multiple aneurysms are quite common

B. Systolic function of the LV may be impaired due to myocarditis

C. It is crucial to assess regional wall motion abnormalities

D. Coronary artery imaging should be performed at high transducer frequency

E. Apical windows are the best for coronary arteries imaging

MCQ 10

What si the rounded structure in 4-chamber:

A. Dilated coronary sinus indicating left SVC entering the CS

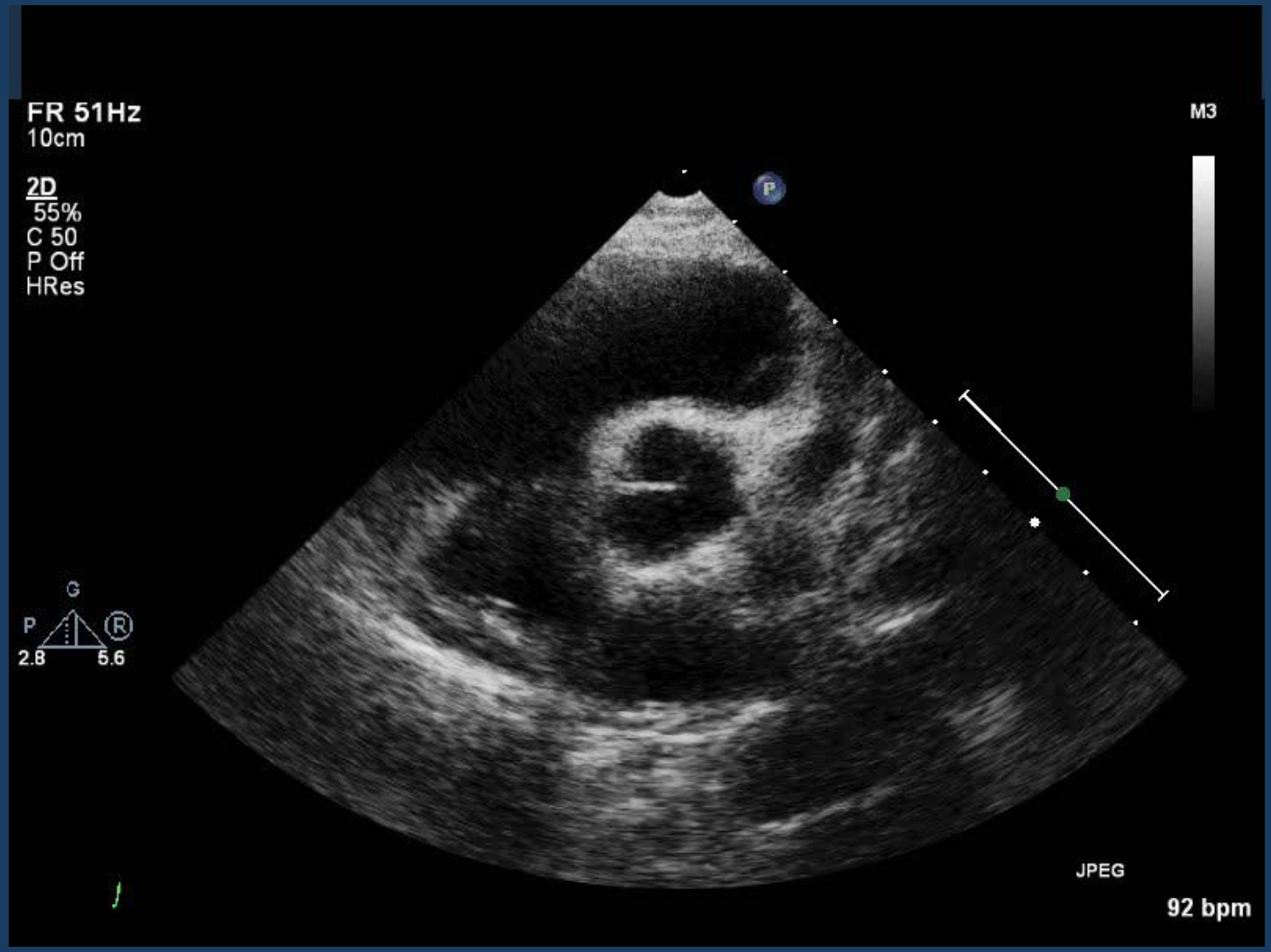
B. Dilated left coronary artery suggestive of Kawasaki disease

C. The best view for showing left coronary artery

D. Dilated right coronary artery

E. Coronary sinus defect

MCQ 11



Everything is right EXCEPT:

A. Ectasia of left LCA, LAD, LCX and RCA

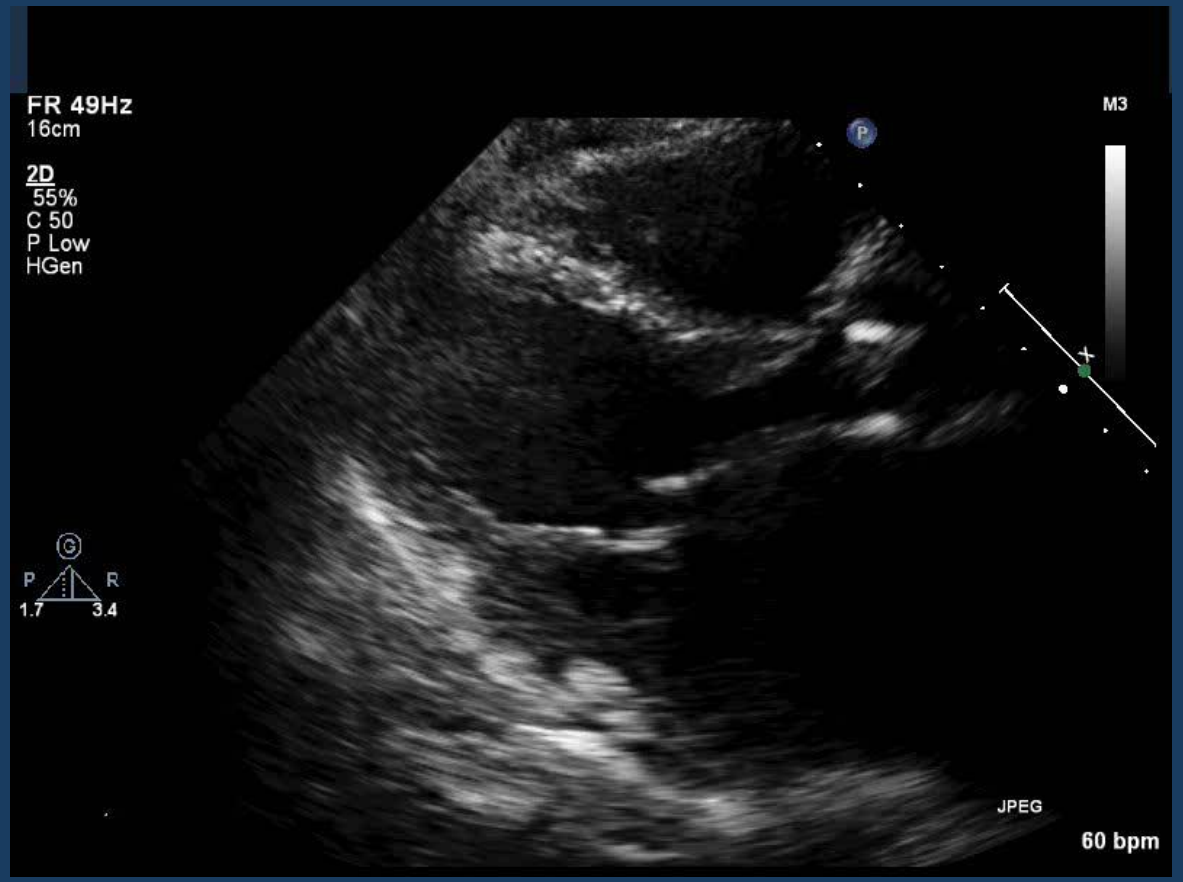
B. Kawasaki disease is the most probable diagnosis

C. A thrombus is seen in the LCA

D. These findings can be see in any phase of Kawasaki disease

E. Myocardial involvement cannot be excluded

MCQ12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55%
C 50
P Low
HGen
M3
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G
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R
1.7
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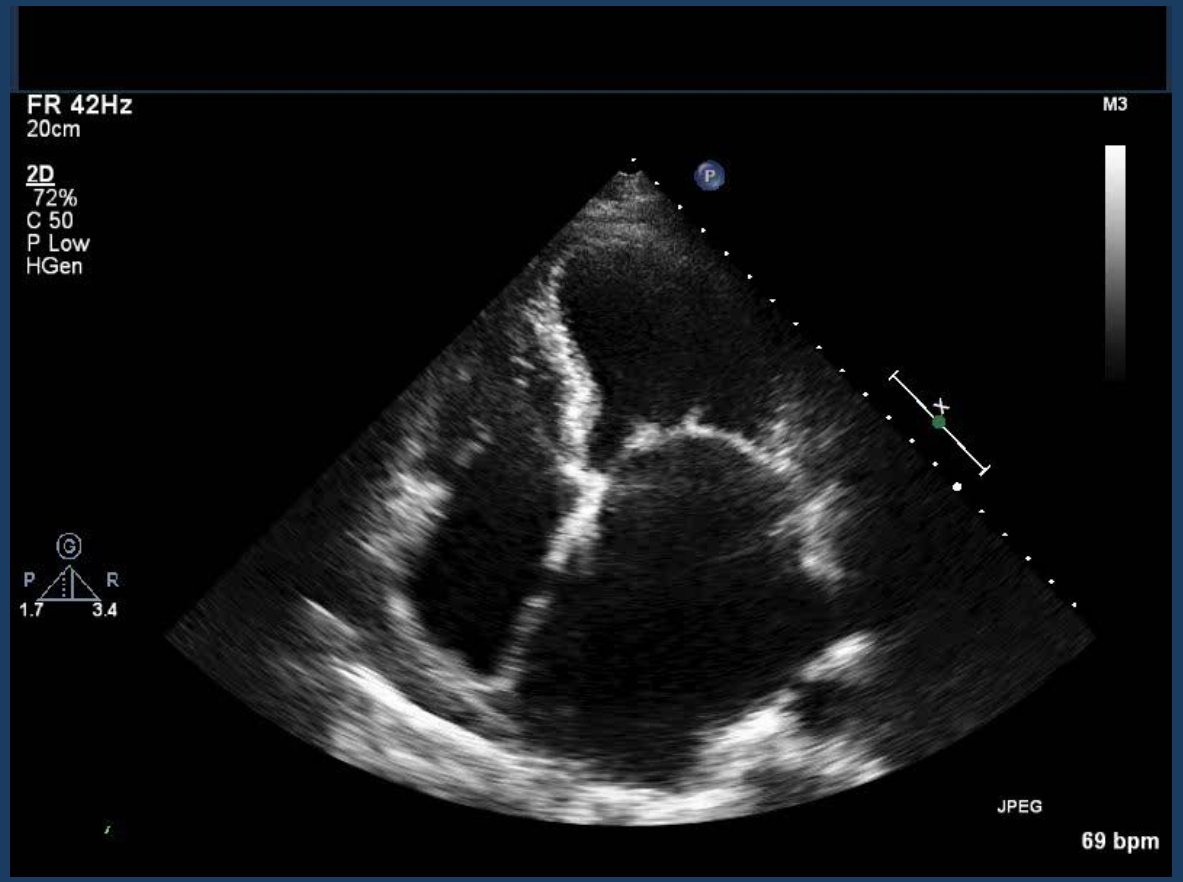
JPEG
60 bpm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HGen
M3
P
G
P
R
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3.4
JPEG
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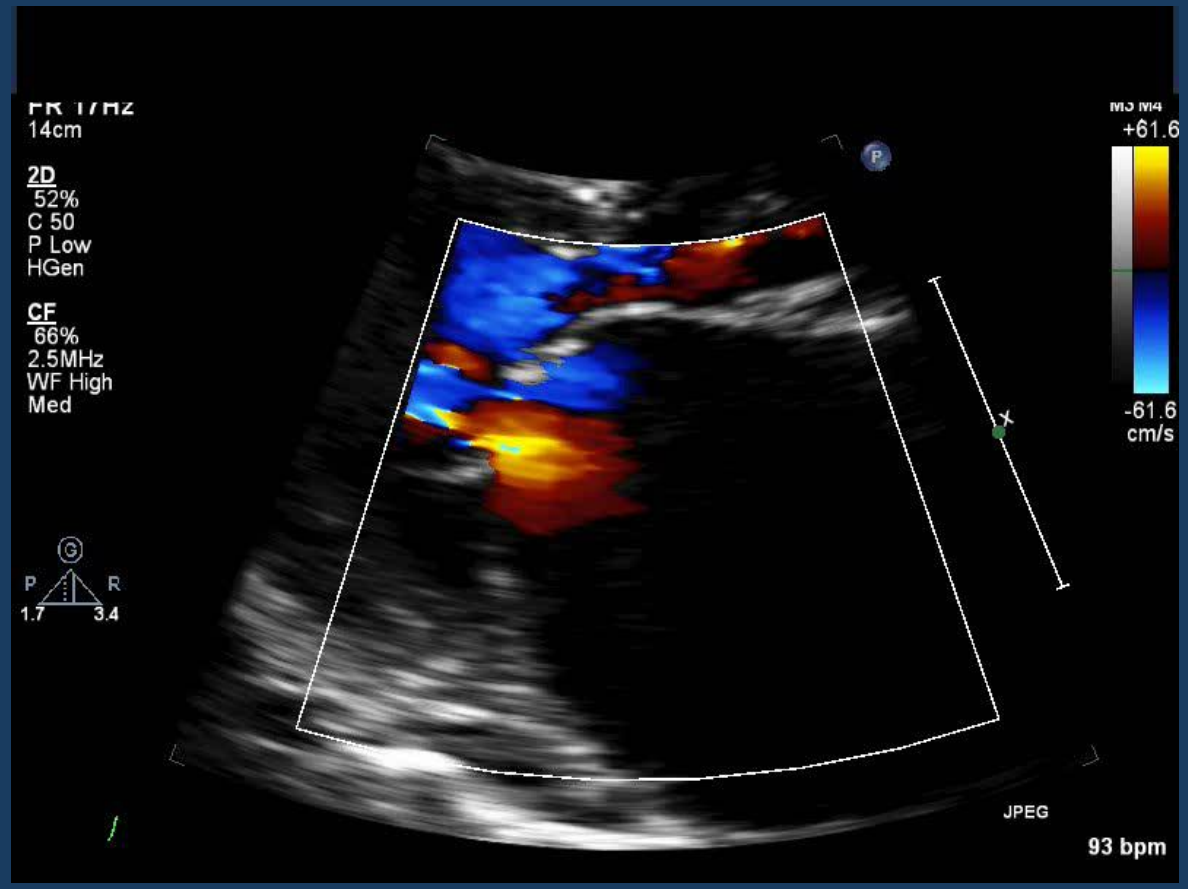
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2D
52%
C 50
P Low
HGen
CF
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WF High
Med
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-61.6
cm/s
P
R
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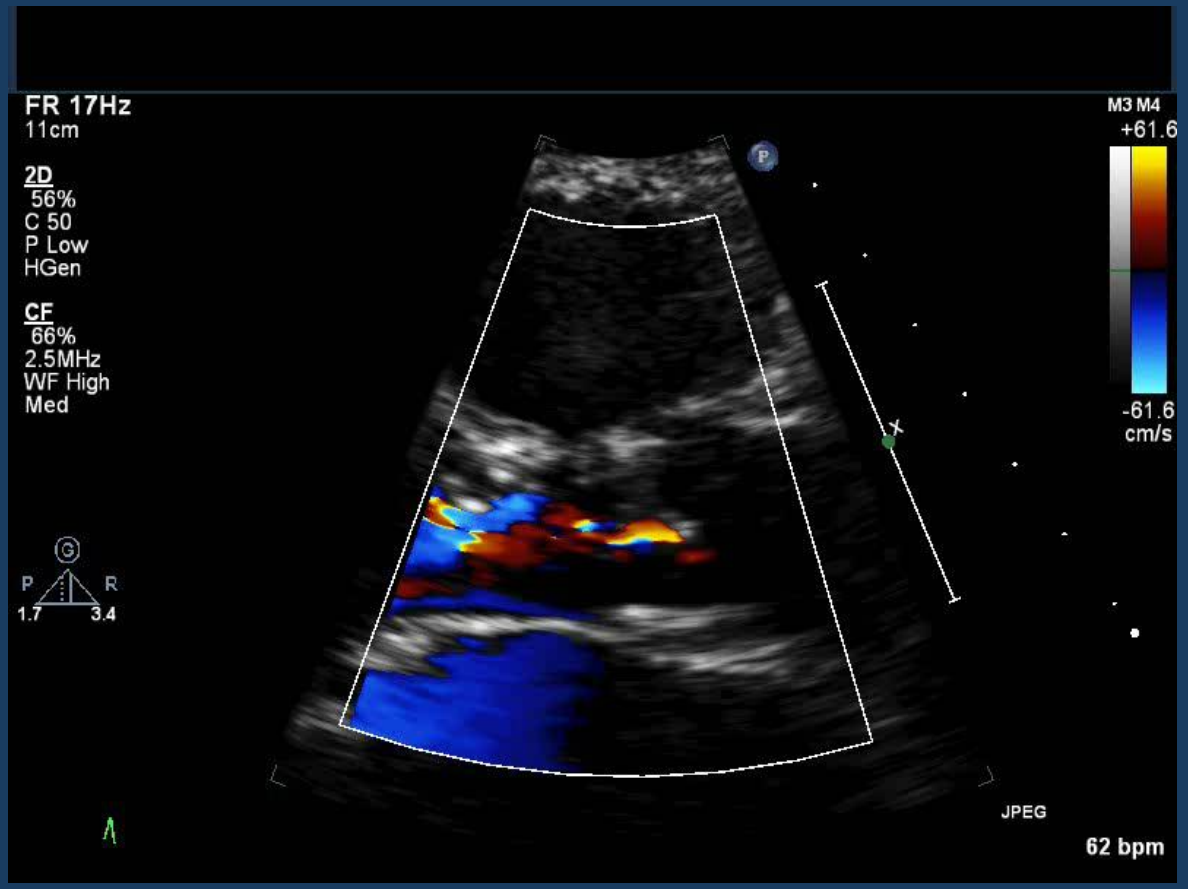
3.4
JPEG
93 bpm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HGen
CF
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2.5MHz
WF High
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M3 M4
+61.6
-61.6
cm/s
P
R
1.7
3.4
JPEG
62 bpm

Which statements are true:

A. This patient's diagnosis is most probably rheumatic heart disease

B. This patient has mixed mitral and aortic valve disease

C. There is prosthetic valve seen in the mitral valve position

D. Tricuspid valve is not affected

E. This is most probably chronic rheumatic disease

Thank you!

Mitral valve inflow