

MULTIPLE CHOICE

ECHO - MIXED EXAM

PROPOSED FOR REVIEW - questions are the author's verbatim Q&A; distractors are auto-selected from other answers in the same bank and must be checked by a subject-matter reviewer (a distractor could coincidentally be correct). Not authoritative assessment content.

1. From the parasternal short-axis view at the level of the papillary muscles, which two papillary muscles are normally visualized?

- A. Anteromedial and posterolateral
- B. Anterior and inferior
- C. Anterolateral and posteromedial
- D. Septal and lateral

2. Which of the following is the approximate upper limit of normal end-diastolic interventricular septal thickness in an adult male by 2D echocardiography?

- A. 0.6 cm
- B. 1.0 cm
- C. 2.0 cm
- D. 1.5 cm

3. Foreshortening of the left ventricle during apical imaging most commonly produces which of the following errors?

- A. Underestimation of LV volumes and overestimation of ejection fraction
- B. Overestimation of LV mass with normal ejection fraction
- C. Overestimation of LV volumes and underestimation of ejection fraction
- D. No effect on volumes when contrast is used

4. At what level is the parasternal short-axis view used to obtain the standard M-mode measurement of left ventricular internal dimensions?

- A. Just below the tips of the mitral valve leaflets (mid-ventricular level)
- B. At the level of the LV apex
- C. At the level of the aortic valve
- D. At the level of the papillary muscles tips

5. During which phase of the cardiac cycle are all four cardiac valves closed and ventricular volume remains constant while pressure rises sharply?

- A. Isovolumic contraction
- B. Isovolumic relaxation
- C. Rapid ventricular filling
- D. Rapid ventricular ejection

6. Which structure connects the main pulmonary artery to the aorta during fetal life and normally closes shortly after birth?

- A. Ductus arteriosus
- B. Ductus venosus
- C. Ligamentum teres
- D. Foramen ovale

7. Which vessel returns oxygenated blood from the lungs to the left atrium?

- A. Pulmonary veins
- B. Pulmonary arteries
- C. Superior vena cava
- D. Inferior vena cava

8. Pressure half-time is most commonly used to estimate the severity of which valvular lesion?

- A. Mitral stenosis

- B. Tricuspid regurgitation
- C. Aortic stenosis
- D. Pulmonary stenosis

9. Adding anterior angulation to the apical four-chamber view to bring the left ventricular outflow tract and aortic valve into the image creates which view?

- A. Apical three-chamber (apical long-axis) view
- B. Apical five-chamber view
- C. Apical two-chamber view
- D. Subcostal four-chamber view

10. Which echocardiographic finding is most suggestive of a hemodynamically significant atrial septal defect?

- A. Left atrial enlargement with concentric LV hypertrophy
- B. Right atrial and right ventricular enlargement with paradoxical septal motion
- C. Aortic root dilation with eccentric LV hypertrophy
- D. Isolated left ventricular dilation

11. A peak tricuspid regurgitation velocity of 3.5 m/s in a patient with no significant RV outflow obstruction predicts an estimated right ventricular systolic pressure of approximately which value, assuming an RA pressure of 10 mmHg?

- A. 59 mmHg
- B. 79 mmHg
- C. 19 mmHg
- D. 39 mmHg

12. Which artifact most commonly produces apparent prosthetic valve regurgitation when none is truly present?

- A. Reverberation artifact from the prosthetic material projecting beyond the valve
- B. Refraction artifact between the LV and the lung
- C. Slice thickness artifact in M-mode
- D. Range ambiguity from a deep target

13. Pressure recovery distal to a stenotic aortic valve causes Doppler to do which of the following?

- A. Underestimate the true transvalvular gradient
- B. Overestimate the true transvalvular gradient compared with cardiac catheterization
- C. Eliminate the transvalvular pressure gradient entirely
- D. Have no effect on the measured gradient

14. On a standard M-mode through the left ventricle, the LV internal diameter in diastole (LVIDd) is measured at which point of the cardiac cycle?

- A. At the onset of the QRS complex
- B. At the peak of the T wave
- C. At the end of the P wave
- D. At the nadir of the septal motion

15. Which of the following is the BEST single best initial echocardiographic indicator of right ventricular systolic function in adults?

- A. Left ventricular ejection fraction by Simpson biplane
- B. Left atrial volume index
- C. Mitral annular plane systolic excursion (MAPSE)
- D. Tricuspid annular plane systolic excursion (TAPSE)

16. Which echocardiographic finding suggests elevated pulmonary artery systolic pressure?

- A. Increased early diastolic flow propagation velocity by color M-mode
- B. Increased peak tricuspid regurgitation velocity used to estimate RV systolic pressure
- C. Decreased aortic valve area on continuity equation
- D. Increased mitral regurgitation velocity used to estimate LA pressure

17. Pulsus paradoxus, defined as an exaggerated inspiratory drop in systemic systolic pressure, is most closely associated with which condition?

- A. Constrictive pericarditis
- B. Hypertrophic cardiomyopathy
- C. Restrictive cardiomyopathy
- D. Cardiac tamponade

18. Coarctation of the aorta classically occurs at which anatomic location?

- A. At the aortic root just above the sinotubular junction
- B. Just distal to the origin of the left subclavian artery, near the ductal insertion
- C. Just proximal to the bifurcation into the common iliac arteries
- D. At the level of the diaphragmatic hiatus

19. An increased M-mode mitral E-point to septal separation (EPSS) greater than 1 cm most often indicates which of the following?

- A. Mitral stenosis
- B. Normal hyperdynamic LV
- C. Aortic regurgitation jet impingement
- D. Reduced left ventricular systolic function

20. Which structure is the most common embryologic remnant of the sinus venosus seen in the right atrium?

- A. Chiari network
- B. Trabecula septomarginalis
- C. Crista terminalis
- D. Moderator band

21. Which tissue Doppler finding favors constrictive pericarditis over restrictive cardiomyopathy?

- A. Reversed E to A ratio at the mitral valve
- B. Increased isovolumic relaxation time
- C. Markedly reduced medial mitral annular e prime velocity
- D. Preserved or increased medial mitral annular e prime velocity

22. Which finding on echocardiography is most specific for severe chronic aortic regurgitation?

- A. Mildly dilated aortic root
- B. Increased left atrial volume
- C. Mild fluttering of the anterior mitral leaflet in diastole
- D. Holodiastolic flow reversal in the proximal descending thoracic aorta

23. Which type of atrial septal defect is the most common?

- A. Coronary sinus
- B. Sinus venosus
- C. Ostium secundum
- D. Ostium primum

24. A mosaic, multicolored pattern in a color Doppler jet most commonly indicates which finding?

- A. Laminar flow at normal velocity
- B. Absence of flow
- C. Tissue motion artifact
- D. Turbulent, high-velocity flow with aliasing

25. Right ventricular infarction is most commonly associated with infarction of which left ventricular wall?

- A. Anterior wall
- B. Lateral wall
- C. Apical wall
- D. Inferior wall

26. The E/e prime ratio is used to estimate which hemodynamic parameter?

- A. Aortic valve area
- B. Left ventricular filling pressure
- C. Right atrial pressure
- D. Mean pulmonary artery pressure

27. A normally functioning bileaflet mechanical aortic prosthesis is expected to have what type of forward flow pattern by spectral Doppler?

- A. A continuous diastolic flow pattern with no systolic peak
- B. Slightly elevated peak velocity, typically 2 to 3 m/s, with a brief acceleration
- C. Peak velocity greater than 5 m/s indicating obstruction in all patients
- D. Peak velocity less than 1 m/s identical to a normal native aortic valve

28. Which PISA-derived effective regurgitant orifice area is most consistent with severe primary mitral regurgitation?

- A. 0.10 to 0.19 cm squared
- B. 0.20 to 0.39 cm squared
- C. Less than 0.10 cm squared
- D. Greater than or equal to 0.40 cm squared

29. Which technical maneuver most effectively differentiates a true LV apical thrombus from near-field clutter on the apical four-chamber view?

- A. Image only in the subcostal window
- B. Switch to continuous-wave Doppler at the apex
- C. Use a high-frequency transducer or ultrasound-enhancing contrast agent and image in multiple planes
- D. Increase overall gain and depth

30. Which mitral inflow pattern is most consistent with restrictive cardiomyopathy?

- A. Equal E and A waves with normal deceleration time
- B. Mid-diastolic and presystolic flow with no discrete A wave
- C. Reduced E wave with prominent A wave
- D. Tall E wave, small A wave, and shortened deceleration time

31. Which clinical condition can make the pressure half-time method UNRELIABLE for estimating mitral valve area?

- A. Significant aortic regurgitation
- B. Trace tricuspid regurgitation
- C. Bradycardia with sinus rhythm
- D. Mild mitral regurgitation

32. Which sonographic feature best differentiates an apical thrombus from a near-field artifact?

- A. The thrombus is only visible with color Doppler and not on 2D
- B. The thrombus crosses anatomic boundaries and changes with gain
- C. The thrombus moves with the transducer and disappears with depth changes
- D. The thrombus has distinct borders, is visible in multiple views, and is adjacent to an abnormally contracting wall

33. A 60-degree Doppler angle of insonation will cause the measured velocity to be:

- A. Approximately one-quarter of the true velocity
- B. Approximately twice the true velocity
- C. Equal to the true velocity
- D. Approximately one-half of the true velocity

34. A patient with hypertrophic cardiomyopathy demonstrates a dynamic left ventricular outflow tract gradient. The continuous-wave Doppler signal across the LVOT typically shows which waveform shape?

- A. Holodiastolic decelerating envelope
- B. Late-peaking dagger-shaped systolic envelope
- C. Symmetric V-shaped systolic envelope
- D. Early-peaking rounded systolic envelope

35. Which condition makes the Teichholz (M-mode) method of estimating left ventricular ejection fraction unreliable?

- A. Mild mitral annular calcification
- B. Mild concentric LV hypertrophy with normal wall motion
- C. Sinus tachycardia at 110 beats per minute
- D. Regional wall motion abnormalities such as those after a myocardial infarction

36. Which apical view best visualizes the anteroseptal and inferolateral (posterior) LV walls together with the LVOT and aortic valve?

- A. Apical two-chamber view
- B. Apical four-chamber view
- C. Apical five-chamber view
- D. Apical three-chamber (apical long-axis) view

37. The left anterior descending coronary artery primarily supplies which region of the left ventricle?

- A. Anterior wall and anterior interventricular septum
- B. Right ventricular free wall
- C. Lateral wall

D. Inferior wall and posterior septum

38. Mitral valve area by the Hatle pressure half-time method is calculated using which formula?

- A. MVA equals 220 divided by pressure half-time
- B. MVA equals pressure half-time divided by 220
- C. MVA equals 759 divided by pressure half-time
- D. MVA equals 220 times pressure half-time

39. In severe aortic regurgitation, which Doppler finding is expected on continuous-wave interrogation of the regurgitant jet?

- A. Short pressure half-time of the regurgitant signal
- B. Late-peaking systolic envelope
- C. Absent diastolic Doppler signal
- D. Prolonged pressure half-time of the regurgitant signal

40. Which Doppler modality is limited by aliasing when interrogating high velocities?

- A. Pulsed-wave Doppler
- B. Continuous-wave Doppler
- C. B-mode
- D. M-mode

41. Which mitral inflow pattern is most consistent with impaired LV relaxation (grade I diastolic dysfunction)?

- A. E/A ratio greater than 2 with short deceleration time
- B. Fused E and A waves at fast heart rates
- C. E/A ratio between 0.8 and 1.5 with normal deceleration time
- D. E/A ratio less than 0.8 with prolonged deceleration time

42. Color Doppler displays moving blood by which property?

- A. Signal amplitude without directional information
- B. Tissue motion velocity within each pixel
- C. Peak velocity along the entire beam, encoded as a spectral trace
- D. Mean velocity and direction within each pixel, encoded as color

43. Which term best describes a segment of myocardium that shows no inward motion and no wall thickening during systole?

- A. Hyperkinetic
- B. Dyskinetic
- C. Akinetic
- D. Hypokinetic

44. A sinus venosus atrial septal defect is most often associated with which anomaly?

- A. Bicuspid aortic valve
- B. Patent ductus arteriosus
- C. Cleft mitral valve
- D. Partial anomalous pulmonary venous return

45. In the parasternal long-axis view, which feature distinguishes a pericardial effusion from a pleural effusion?

- A. The pleural effusion is anterior to the right ventricle
- B. The pericardial effusion is always larger than the pleural effusion
- C. The pleural effusion shows respirophasic variation while the pericardial does not
- D. The pericardial effusion tapers anterior to the descending thoracic aorta

46. What is the most common location of a ventricular septal defect?

- A. Inlet septum
- B. Muscular septum
- C. Perimembranous (membranous) septum
- D. Outlet (infundibular) septum

47. Which echocardiographic finding best distinguishes a true left ventricular thrombus from an artifact or near-field clutter?

- A. A linear echo that moves with the mitral valve apparatus
- B. An echogenic focus that disappears with harmonic imaging
- C. A mobile echo seen only in one apical view

D. Discrete echo-density visible in two orthogonal views, adjacent to an akinetic or aneurysmal wall segment

48. Where do left atrial thrombi most commonly form, especially in patients with atrial fibrillation?

- A. Left atrial appendage
- B. Roof of the left atrium between the pulmonary veins
- C. Fossa ovalis region of the interatrial septum
- D. Posterior mitral annulus

49. In most patients, the posterior descending artery (PDA) arises from which vessel, defining right coronary dominance?

- A. Left circumflex artery
- B. Right coronary artery
- C. Left main coronary artery
- D. Left anterior descending artery

50. Which finding distinguishes rheumatic mitral stenosis from degenerative (calcific) mitral annular disease with severe annular calcification?

- A. Restricted posterior leaflet without commissural involvement in rheumatic disease
- B. Calcification limited to the chordae tendineae in rheumatic disease
- C. Commissural fusion with leaflet tip thickening and doming in rheumatic disease
- D. Annular calcification only, with normal leaflet motion in rheumatic disease