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MCC-002

POST GRADUATE DIPLOMA IN CLINICAL CARDIOLOGY (PGDCC)

Term-End Examination

June, 2015

MCC-002 : FUNDAMENTALS OF CARDIOVASCULAR SYSTEMS – II

Time : 2 hours *Maximum Marks : 60*

Note :

(i) *There will be multiple choice type of questions in this examination which are to be answered in* ***OMR Answer Sheets.***

(ii) *All questions are* ***compulsory.***

(iii) *Each question will have four options and only one of them is correct. Answers have to be marked in figures in the appropriate rectangular boxes corresponding to what is the correct answer and then blacken the circle for the same number in that column by using HB or lead pencil and not by ball pen in* ***OMR Answer Sheets.***

(iv) *If any candidate marks more than one option, it will be taken as the wrong answer and no marks will be awarded for this.*

(v) *There will be 90 questions in this paper and each question carries equal marks.*

(vi) *There will be no negative marking for wrong answers.*

(vii) *No candidate shall leave the examination hall at least for one hour after the commencement of the examination.*

1. Which of the following echocardiographic features of rheumatic mitral stenosis is ***wrong*** ?

(1) Systolic bowing of anterior mitral leaflet

(2) Decreased EF slope

(3) Subvalvular apparatus thickening

(4) Calcific mitral leaflets

2. Mitral valve area by pressure half time (PHT) is calculated by which of the following formulae ?

(1) 120/PHT in cm^2

(2) 220/PHT in cm^2

(3) PHT/220 in cm^2

(4) PHT/120 in cm^2

3. All of the following ECHO features of severe mitral stenosis are correct *except* one :

(1) MVA by planimetry (< 1 cm^2)

(2) Calcification of mitral valve

(3) Resting mean gradient (10 mmHg)

(4) PHT (> 220 ms)

4. Which of the following echocardiographic features of severe mitral regurgitation is ***wrong*** ?

(1) Effective regurgitant orifice area (> 4 cm.sq)

(2) Mitral regurgitant volume (> 60 ml)

(3) Vena contracta (< 5 mm)

(4) LA dimension (> 5·5 cm)

5. In pericardial effusion, all of the following features are seen by echo *except* one :

(1) Swinging of the whole heart

(2) Ends anterior to descending aorta

(3) Never between RV and diaphragm in subcostal view

(4) Never overlaps left atrium

6. In constrictive pericarditis, all of the following ECHO features are seen *except* one :

(1) Increased systolic flow reversal in hepatic veins

(2) 40% or greater in tricuspid inflow E velocity

(3) 25% or greater in mitral inflow E velocity

(4) Dilated IVC

7. 58 year old male has come for evaluation for his shortness of breath. His left ventricular isovolumetric relaxation is 50 ms., E/A – 1·5, E deceleration time 140 ms. This is suggestive of which of the following ?

(1) Abnormal LV relaxation

(2) High LA pressure

(3) Normal LA pressure

(4) Mitral stenosis

8. Which of the following echo signs is seen in early cardiac tamponade ?

(1) Right ventricular free wall diastolic collapse

(2) RVOT collapse

(3) Exaggerated respiratory variation of tricuspid inflow velocities

(4) Exaggerated respiratory variation of mitral inflow velocities

9. Which is the commonest cause of aortic stenosis in India ?

(1) Degenerative aortic valve disease

(2) Congenital bicuspid aortic valve disease

(3) Rheumatic heart disease

(4) Syphilictic aortic valve disease

10. In severe aortic regurgitation, all of the following ECHO features are seen *except*

(1) Hollow diastolic flow reversal in the descending aorta

(2) Regurgitant fraction/LVOT area ratio > 60%

(3) Regurgitant fraction > 25%

(4) Regurgitant volume > 60 ml

11. RA pressure waveform has the following characteristics *except*

(1) 'a' wave due to atrial systole

(2) 'x' descent due to downward pulling of tricuspid valve annulus

(3) 'c' wave due to protrusion of the closed tricuspid valve into RA

(4) 'v' wave due to ventricular systole which is higher than the 'a' wave

12. O_2 step-up at ventricular level is seen in which of the following conditions ?

(1) Aberrant coronary artery origin

(2) AP window

(3) PDA with pulmonary regurgitation

(4) Atrial septal defect

13. To perform an oximetry run, the catheter used is

(1) PIGTAIL catheter

(2) Judkins right coronary catheter

(3) Sones' catheter

(4) Swan-Ganz balloon flotation catheter

14. All of the following criteria are absolute indications for termination of exercise test *except* one :

(1) Moderate to severe angina

(2) Subject desire to stop

(3) Dizziness or near syncope

(4) Atrial ectopics

15. Components of an angioplasty include the following *except* one :

(1) Wire coils

(2) Indiflator

(3) Balloons

(4) Guiding catheters

16. Balloon mitral valvotomy is indicated in all of the following *except*

(1) Severe non-calcific mitral stenosis

(2) Mitral stenosis in patients with shock and pulmonary oedema

(3) Mitral restenosis after closed mitral valvotomy

(4) Mitral stenosis with moderate mitral regurgitation

17. Wilkins scoring system in echocardiography is used in which valve stenosis grading ?

(1) Aortic regurgitation

(2) Pulmonary stenosis

(3) Coronary artery disease

(4) Mitral stenosis

18. Myocardial metabolism can be studied by which of the following ?

(1) Coronary angiography

(2) 99 mTc sestamibi scan

(3) Positron emitting tomography

(4) Cardiac MRI

19. Pharmacological stress agents include all of the following *except*

(1) Dobutamine

(2) Adenosine

(3) Noradrenaline

(4) Dipyridamole

20. The major diameter of the mitral annulus is best imaged from which view by echocardiogram ?

(1) Apical two chamber view

(2) Apical long axis view

(3) Apical five chamber view

(4) Parasternal long axis view

21. Which of the following catheters is ***not*** used in coronary angiogram ?

(1) Judkins catheter

(2) Amplatz catheter

(3) Swan-Ganz catheter

(4) Multipurpose catheter

22. The transducer of echocardiogram has which of the following ?

(1) 2 magnets emits ultrasound waves

(2) Electric generator emits ultrasonic waves

(3) Piezoelectric crystal emits ultrasound waves

(4) Nuclear material emits ultrasonic waves

23. Which of the following imaging methods has a clinically acceptable sensitivity in the diagnosis of proximal pulmonary embolism ?

(1) Contrast trans-thoracic echocardiogram (TTE)

(2) Radionuclide angiography

(3) CT angiogram

(4) TEE (trans-esophageal echocardiogram)

24. What is the range of frequency of ultrasonic waves in echocardiographic transducer ?

(1) 10 – 13 MHz (2) 1 – 10 MHz

(3) 13 – 15 MHz (4) 15 – 17 MHz

25. What frequency of transducer is used in children below 5 years ?

(1) 1 – 5 MHz (2) 5 – 7·5 MHz

(3) 7·5 – 10 MHz (4) 10 – 15 MHz

26. In apical 2-chamber view, all of the following structures of heart are seen *except* one :

(1) Left ventricle (2) Right ventricle

(3) Left atrium (4) Mitral valve

27. Which of the following drugs is used for stress thallium test ?

(1) Disopiramide (2) Adenosine

(3) Digitalis (4) Diltiazem

28. Which of the following tests is the gold standard test for detection of pulmonary embolism ?

(1) Ventilation/perfusion scintigraphy

(2) Trans-esophageal echocardiography

(3) CT pulmonary angiogram

(4) D-Dimer test

29. What is the probability of pulmonary embolism with positive ventilation/perfusion scan ?

(1) 75% (2) 95%

(3) 100% (4) 85%

30. In bicuspid aortic valve, all of the following echo features are seen *except* one :

(1) Systolic bowing of valve cusps

(2) Ascending aorta dilatation

(3) Cusp closure line is central

(4) May be associated with coarctation of aorta

31. All of the following criteria are echo features of severe aortic stenosis *except* one :

(1) Mean gradient > 50 mmHg

(2) Peak gradient 40 – 60 mmHg

(3) Aortic V_{max} > 4 m/sec

(4) Effective orifice area < 0·6 cm^2

32. All of the following criteria are echo features of severe aortic regurgitation *except* one :

(1) Effective regurgitant area > 0·30 cm^2

(2) Left ventricular dimension > 5·5 cm

(3) AR pressure half time < 250 msec

(4) Holodiastolic flow reversal in descending aorta

33. Reduction of restenosis by bare metal stents when compared to coronory balloon angioplasty results from all of the following mechanisms *except*

(1) Reduced residual stenosis

(2) Reduced neointimal proliferation

(3) Reduced elastic recoil

(4) Sealing the dissection flap

34. Calculation of right ventricular systolic pressure from the tricuspid regurgitation velocity signal is an example of

(1) Law of conservation of energy

(2) Law of conservation of mass

(3) Law of conservation of momentum

(4) Starling's law

35. Which is the best view to visualise patent ductus arteriosus by echocardiogram ?

(1) High parasternal view

(2) Short axis view

(3) Apical 5-chamber view

(4) Subcostal view

36. Which is the best view to visualise atrial septal defect by echocardiogram ?

(1) Apical 4-chamber view

(2) Subcostal view

(3) Right parasternal view

(4) Left parasternal view

37. Ventricular septal defect is visualised in all of the following views by ECHO *except* one :

(1) Apical 4-chamber view

(2) Left parasternal view

(3) Suprasternal view

(4) Apical 5-chamber view

38. Sinus venosus defect is best visualised in which of the following views by ECHO ?

(1) Suprasternal view

(2) Subcostal short axis view

(3) Apical 4-chamber view

(4) Right parasternal view

39. All of the following defects are closed by device *except* one :

(1) Fossa ovalis defects

(2) Ostium primum defects

(3) Muscular VSDs

(4) Permembranous ventricular defects

40. In PET scan which tracer is usually used ?

(1) FDG (2-Fluoro-2 deoxy-D glucose)

(2) 99 tetrofosmin

(3) 99 sestamibi

(4) Thallium

41. Gorlin formula in cath lab is used for calculation of which of the following ?

(1) Cardiac Index

(2) Measurement of mitral regurgitant volume

(3) Measurement of mitral valve area

(4) Measurement of cardiac output

42. Mullins' dilator sheath is used for which of the following procedures ?

(1) Coronary angiogram

(2) Percutaneous renal angioplasty

(3) Transatrial septal puncture

(4) Carotid Angioplasty

43. 54 year old male, known case of diabetes mellitus, coronary artery disease, triple vessel disease, has class III-IV dyspnea. His ejection fraction was 32%. His rest thallium test showed fixed perfusion defect. Cardiac surgeon was sceptical that his LV function would improve after CABG. Which of the following studies is best to identify the viable myocardium ?

(1) PET with 18f FDG

(2) Low dose dobutamine echocardiography

(3) PET with FDG and nitrogen 13 labelled ammonia

(4) PET with carbon 11 palmitate

44. What is the normal pulmonary capillary wedge pressure ?

(1) 15 – 30 mmHg (2) 4 – 12 mmHg

(3) 0 – 4 mmHg (4) 30 – 40 mmHg

45. Amplatz Catheter is used for which of the following procedures ?

(1) Renal angiogram (2) Coronary angiogram

(3) Carotid angiogram (4) Peripheral angiogram

46. All of the following drugs are used in drug coated stent *except*

(1) Sirolimus (2) Everolimus

(3) Zatrolimus (4) Cyclosporin

47. Inoue balloon is used in which of the following procedures ?

(1) Pulmonary balloon valvuloplasty

(2) Aortic balloon valvuloplasty

(3) Peripheral arterial balloon plasty

(4) Mitral balloon valvuloplasty

48. Gadolinium is used in which of the following imaging studies ?

(1) Conventional coronary angiogram

(2) PET Scan

(3) Magnetic resonance coronary imaging

(4) Contrast echocardiogram

49. Which of the following pharmocological agents is routinely used in stress echocardiogram ?

(1) Amyl nitrate

(2) Dobutamine

(3) Sodium nitroprusside

(4) Hydralazine

50. By tissue velocity imaging the mitral annular Sm wave is produced by

(1) LV relaxation

(2) Atrial contraction

(3) Annular ascent during systole

(4) Annular descent during systole

51. Which of the following statements is ***wrong*** about 2D ECHO imaging ?

(1) Parasternal, apical, subcostal and suprasternal views are usually used.

(2) Subcostal transducer position is effective in patients with aortic disease.

(3) Right parasternal view can be used to measure aortic gradient in patients with aortic stenosis.

(4) Apical window is used for 4-chamber, 2-chamber and 5-chamber views.

52. Which of the following statements is correct about Cardiac Doppler ?

(1) Blood flow away from the transducer shows a positive Doppler trace

(2) Helps measure LV ejection fraction

(3) Uses the principle of Doppler effect described by Austrian physicist Christian Doppler

(4) Shows structure of heart muscle

53. Doppler calculations involve all of the following *except*

(1) Simplified Bernoulli equation

(2) Velocity time intervals

(3) Pressure half time

(4) Planimetry

54. Which of the following factors is the most important, in terms of reducing the incidence of subacute stent thrombosis with drug eluting stents ?

(1) Aggressive anticoagulation with warfarin and aspirin

(2) Pre-treatment with Abciximab

(3) Giving more potent antiplatelet drugs – Clopidogrel or Prasugrel

(4) Optimal stent deployment (complete apposition of stent with vessel wall)

55. 77 year old male was admitted to the hospital with chest pain. His ECG showed ST depression in anterio-lateral area. His cardiac enzymes CK MB, trop-I was mildly elevated. He was taken to catheterization lab in view of continuous angina. Which of the following agents would be least beneficial to the patient in terms of short-term clinical outcome ?

(1) Tissue plasminogen activator (2) Clopidogrel

(3) Tirofiban (4) Heparin

56. Physiological significance of coronary artery lesion can be assessed in the cardiac catheterization lab by which method ?

(1) Quantitative coronary angiography

(2) Intravascular ultrasound

(3) Coronary flow reserve with intravenous adenosine

(4) Response to IV dobutamine

57. Oxygen saturation step-up at atrial level > 7% is seen in all of the following conditions *except*

(1) Coronary fistula to right atrium

(2) Ventricular septal defect with tricuspid regurgitation

(3) Patent ductus arteriosus

(4) Partial anamolous pulmonary venous drainage

58. 48 year old female brought to cardiac catheterization lab for the assessment of LV and RV pressures for her leg swelling. The RV and LV pressure curve have shown dip and plateau pattern with end diastolic equalization of pressures in LV and RV. She probably has which of the following conditions?

(1) Severe tricuspid regurgitation

(2) RV infarction

(3) Amyloid heart disease

(4) Constrictive pericarditis

59. 82 year old male, known case of COPD, presented to you with H/O precordial chest pain. His blood pressure was 130/70 mmHg. His pulse volume was normal. On auscultation S1 and S2 are normally heard. 2/6 ejection systolic murmur at 2nd right intercostal space. His echocardiogram showed normal LV function. Aortic valve was calcified. Gradient across aortic valve was 22 mmHg. Mild aortic regurgitation. Mitral annulus was calcified. What is your recommendation for this patient ?

(1) Aortic valve balloon valvuloplasty

(2) Aortic valve replacement

(3) Early coronary angiogram

(4) Repeat echocardiogram after 1 year

60. Differential diagnosis of constrictive pericarditis by Doppler respiratory findings include all of the following *except*

(1) Pulmonary embolism

(2) RV infarct

(3) COPD

(4) SVC obstruction

61. 77 year old male, known case of hypertension, euglycemic, underwent hernioraphy on left side. 3 days after surgery, before discharge, he developed sudden chest discomfort. He was cyanosed and restless. His blood pressure was 90/60 mmHg. His ECG showed sinus tachycardia and ST depression in V1-V3. His echo showed normal LV function and dilated RA and RV. Calculated PA pressure is 56/26 mmHg. This patient has which of the following problems?

(1) Unstable angina

(2) Non ST elevation myocardial infarction

(3) Acute pulmonary embolism

(4) Restrictive cardiomyopathy

62. 23 year old female was referred for shortness of breath and heart murmur. She was taken for oximetry study in cath lab. Her O_2% saturation step-up at ventricular level was 6·5. All the likely possibilities given below are correct *except* one :

(1) Partial anomalous pulmonary venous drainage

(2) Ventricular septal defect

(3) Ostium primum defect

(4) PDA with pulmonary regurgitation

63. Which of the following statements is ***wrong***, regarding a patient, who had anaphylactic reaction in the past to a contrast agent in cath lab ?

(1) The patient is at increased risk for anaphylactic risk, if exposed again to a contrast agent.

(2) By using low osmolar contrast, the second anaphylactic reaction can be reduced.

(3) The likelihood of second anaphylactic reaction can be reduced by giving injection prednisolone.

(4) The likelihood of second anaphylactic reaction can be reduced by giving steroid inhalers.

64. Which of the following mitral annular velocities suggest constrictive pericarditis ?

(1) 5 cm/sec (2) 7 cm/sec

(3) 15 cm/sec (4) 50 cm/sec

65. Which of the following modalities is a reasonable method for assessing left ventricular ejection fraction in a patient with atrial fibrillation ?

(1) Cardiac CT (2) MUGA

(3) Left ventriculography (4) Cardiac MRI

66. False positive wall motion abnormalities are most commonly seen in which of the following myocardial segments ?

(1) Apex (2) Lateral wall

(3) Posterior basal wall (4) Anterior septum

67. Diagnostic sensitivity of stress echocardiogram is highest in which of the following ?

(1) One-vessel disease (2) Two-vessel disease

(3) Three-vessel disease (4) Hypertrophic cardiomyopathy

68. Morphololological features of right ventricle include all of the following *except*

(1) Coarse trabeculations

(2) Moderator band

(3) High attachment of AV valve

(4) Coronary sinus opens in RV

69. Device closure is possible for all of the following congenital defects *except* one :

(1) Perimembranous VSD

(2) Patent ductus arteriosus

(3) Sinus venosus type of ASD

(4) Patent foramen ovale

70. 52 year old gentleman has been referred to you as an out-patient for evaluation of his pricking chest pain. He has hypertension and dyslipidemia. He walks regularly without discomfort. His ECG shows 1 mm ST depression in multiple leads. Which of the following tests would you recommend to exclude coronary artery disease ?

(1) Treadmill test

(2) Exercise SPECT

(3) Adenosine SPECT

(4) Dipyridamole SPECT

71. A biphasic response of a segment or segments to dobutamine during stress echocardiogram is interpreted to mean which of the following ?

(1) Ischemic in the territory supported by the artery

(2) Infarction in the territory supported by the artery

(3) Ischemia and viability of the territory supported by the artery

(4) Normal response to dobutamine

72. Which of the following echocardiographic parameters does ***not*** predict adverse outcome in a patient with pulmonary artery hypertension ?

(1) IVC dilatation

(2) Diastolic septal shift

(3) Maximum TR velocity

(4) Presence of pericardial effusion

73. Which of the following factors does ***not*** deter for the selection of pharmacologically stress agents like adenosine or dobutamine ?

(1) Bronchial asthma

(2) 2nd degree AV block

(3) Left axis deviation

(4) Chronic Theophylline therapy

74. All of the following tests are recommended for viability in the myocardium for revascularization in a patient with left ventricular systolic dysfunction, *except*

(1) PET scan

(2) MRI with gadolinium

(3) Fractional flow reserve

(4) Rest thallium

75. Which of the following structures is ***not*** visualized in apical 4-chamber view of echocardiogram ?

(1) Left atrium

(2) Ascending aorta

(3) Right ventricle

(4) Left ventricle

76. In suprasternal notch view of echocardiogram, which of the following structures is ***not*** seen ?

(1) Right pulmonary artery

(2) Ascending aorta

(3) Right atrium

(4) Great vessels

77. 38 year old female was referred to cardiology OP with symptoms of leg swelling and tiredness since 7 months. Her echocardiogram diastolic Doppler velocities : deceleration time < 160 m sec, isovolumetric relaxation time < 70 m sec, E/A > 1·5, Mitral A duration < PVa duration. Which type of diastolic dysfunction does she have ?

(1) Normal diastolic filling function

(2) Restrictive diastolic filling

(3) Pseudo normal diastolic filling

(4) Impaired relaxation pattern

78. Which is the most commonly used method to assess the left ventricular function by echocardiogram ?

(1) Bernoulli equation method

(2) Pressure half time

(3) Modified Simpson's method

(4) Gorlin's formula

79. Which of the following features is ***not*** seen in right ventricle on transthoracic echocardiogram ?

(1) Smooth septal surface

(2) Infundibulum

(3) Moderator band

(4) Large apical trabeculations

80. A 64 year old male, is undergoing coronary angiography. All of the following factors would predispose contrast induced nephropathy *except*

(1) Congestive heart failure

(2) Chronic kidney disease

(3) Diabetes mellitus

(4) Use of low osmolar iodinated contrast agent

81. 43 year old female was brought to emergency department with fainting. On examination she was found to have hypotension. Her pulse rate was 110/minute. Her echocardiogram showed fluid collection around her heart. Which of the following echo features is most specific of cardiac tamponade ?

(1) Abnormal ventricular septal motion

(2) Respiratory variation in chamber size

(3) Late diastolic RA collapse

(4) Early diastolic collapse of the RV

82. All of the following conditions are etio-pathogenitic causes of aortic stenosis *except*

(1) Rheumatoid arthritis

(2) Congenital bicuspid aortic valve

(3) Rheumatic heart disease

(4) Degenerative aortic valve disease

83. 22 year old male, pilot trainer was referred to you for the cardiac evaluation. His blood pressure was 120/80 mmHg. He has dyslipidemia. His father has hypertension. His echocardiogram Doppler findings are – deceleration time – 160 msec, isovolumetric relaxation time – 74 msec, E/A – 1·5, Mitral A duration > PVa duration. These readings are suggestive of

(1) Restrictive diastolic filling

(2) Normal diastolic filling

(3) Abnormal relaxation filling

(4) Pseudo normal pattern

84. In pseudo aneurysm of left ventricle, all of the following statements are correct *except*

(1) Most common in inferior wall myocardial infarction

(2) Pseudo aneurysm has wide neck

(3) Lead to cardiac rupture

(4) Breach in continuity of myocardium with an out-pouching lined by pericardium

85. All of the following conditions are indications for valvuloplasty for aortic stenosis *except*

(1) Low cardiac output regardless of the gradient

(2) Peak systolic pressure gradient at rest of > 65 mmHg

(3) Peak systolic pressure gradient at rest of 50 – 64 mmHg with symptoms

(4) Repeated respiratory tract infections

86. 33 year old female, known case of rheumatic heart disease since 4 years presented to you with H/O class III dyspnea since few weeks. Her pulse rate was 75/minute. Her blood pressure was 110/70 mmHg. Her echocardiogram shows marked thickening of the margins of the mitral leaflet with mid leaflet thickening, mid portion and base of mitral leaflet have reduced mobility, minimal thickening of chordal structures just below the valve, a single area of increased echo brightness. What is the Wilkinson's score of this patient ?

(1) 8 (2) 1

(3) 6 (4) 9

87. 54 year old female, mother of 2 sons, known diabetes mellitus, presented with H/O of class III-IV dyspnea since 3 weeks. She was found to have rheumatic mitral valve disease. Which of the following is ***not*** a contradiction for mitral valvuloplasty ?

(1) Concomitant severe coronary artery disease

(2) Moderate mitral regurgitation

(3) Left atrial thrombus

(4) Atrial fibrillation

88. The first percutaneous coronary angioplasty was performed in a conscious patient in 1977 by whom ?

(1) Judkins

(2) Dotter

(3) Andreas Gruentzig

(4) Amplatz

89. Which of the following statements regarding coronary circulation is ***wrong*** ?

(1) The SA nodal artery arises RCA in 95% of population.

(2) In 85% of population, right coronary artery gives on to AV nodal artery, posterior descending artery and posterior left ventricular branch.

(3) In 8% of population, the left circumflex artery is dominant.

(4) In 40% of population, left circumflex artery supplies SA nodal artery.

90. Which are the most important cardiac properties to determine when assessing left ventricular (LV) diastolic function ?

(1) LV and LA compliance

(2) LV contractility and LV relaxation

(3) LV compliance and LV viscoelastic properties

(4) LV relaxation and LA compliance

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