

**POST GRADUATE DIPLOMA IN CLINICAL
CARDIOLOGY (PGDCC)**

Term-End Examination

June, 2010

MCC-002 : FUNDAMENTALS OF CARDIOVASCULAR SYSTEM - 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) *Erase completely any error or unintended marks.*
- (vi) *There will be 90 questions in this paper and each question carries equal marks.*
- (vii) *There will be no negative marking for wrong answers.*
- (viii) *No candidate shall leave the examination hall at least for one hour after the commencement of the examination.*

1. What is the objective in transeptal catheterization :
 - (1) Confirm diagnosis of atrial septal defect
 - (2) Confirm diagnosis of ventricular septal defect
 - (3) Part of balloon mitral valvotomy
 - (4) Part of balloon pulmonary valvotomy

2. A 12 year old active boy presents with a systolic thrill and pansystolic murmur in the lower left sternal border found on a routine school health check up.

What evaluation is least likely to confirm the most likely diagnosis

 - (1) Blood sampling for O₂ saturation in the SVC, IVC and right side chambers and pulmonary artery
 - (2) Left ventricular angiogram
 - (3) Pulmonary angiogram
 - (4) Aortogram

3. A 50 year old patient presents with effort angina and a systolic thrill and ejection systolic murmur best heard in the aortic area. Which of the following data will help you best in the diagnosis and to assess the severity of the lesion.
 - (1) Pull back pressure tracing from the left ventricle to the aorta
 - (2) Aortic pressure tracing
 - (3) Aortogram
 - (4) Right and left coronary angiography

4. A chronic smoker, 38 years old presents with cyanosis and clubbing only in both lower extremities. Which one of the following is least likely to be correct ?
 - (1) Burgers disease
 - (2) Normal O₂ saturation in brachial artery
 - (3) Low O₂ saturation in the femoral artery
 - (4) Congenital heart disease

5. Which of the following routes is least likely to be used for coronary angiography ?
 - (1) Right groin
 - (2) Left groin
 - (3) Right radial
 - (4) Left radial

6. In which condition is left ventriculography not useful :

- (1) Assessment of mitral regurgitation
- (2) Assessment of left ventricular function
- (3) Assessment of left ventricular aneurysm
- (4) Assessment of mitral stenosis

7. The following pressures were recorded at cardiac catheterization

Left ventricle	120/8
Pulmonary wedge	mean 18
Pulmonary artery	50/20
Right ventricle	50/5
Right atrium	mean 5

What is the diagnosis ?

- (1) Mitral regurgitation
- (2) Mitral stenosis
- (3) Dilated cardiomyopathy
- (4) Hypertrophic cardiomyopathy

8. The following pressures were recorded at cardiac catheterization :

Left ventricle	120/8
Pulmonary wedge	mean 6
Pulmonary artery	80/55
Right ventricle	80/10
Right atrium	mean 8

What is the diagnosis ?

- (1) Mitral regurgitation
- (2) Mitral stenosis
- (3) Primary pulmonary hypertension
- (4) Pulmonary stenosis

9. The following pressures were recorded at cardiac catheterization :

Left ventricle	120/8
Pulmonary wedge	mean 5
Pulmonary artery	20/12
Right ventricle	80/10
Right atrium	mean 8

What is the diagnosis ?

- (1) Mitral regurgitation
- (2) Mitral stenosis
- (3) Pulmonary hypertension
- (4) Pulmonary stenosis

10. The following pressures were recorded at cardiac catheterization :

Aorta	110/80
Left ventricle	170/12
Pulmonary wedge	mean 8
Pulmonary artery	25/14
Right ventricle	25/6
Right atrium	mean 4

What is the diagnosis ?

- | | |
|------------------------------|-------------------------------|
| (1) Aortic regurgitation | (2) Aortic stenosis |
| (3) Left ventricular failure | (4) Right ventricular failure |

11. The following pressures were recorded at cardiac catheterization :

Aorta	170/40
Left ventricle	170/25
Pulmonary wedge	mean 20
Pulmonary artery	40/25
Right ventricle	40/8
Right atrium	mean 5

What is the diagnosis ?

- (1) Aortic regurgitation
- (2) Aortic stenosis
- (3) Aortic regurgitation with left ventricular failure
- (4) Aortic stenosis with left ventricular failure

12. The following pressures were recorded at cardiac catheterization :

Aorta	110/80
Left ventricle	110/9
Pulmonary wedge	mean 2
Pulmonary artery	12/8
Right ventricle	110/8
Right atrium	mean 5

What is the most likely diagnosis in this **cyanotic** child ?

- (1) Tetralogy of Fallot
- (2) Pulmonary stenosis with atrial right to left shunt
- (3) Truncus arteriosus
- (4) Eisenmenger ventricular septal defect

13. The following oxygen saturations were found at cardiac catheterization :

Aorta	98%
Left ventricle	98%
SVC	55%
Right atrium	70%
Right ventricle	71%
Pulmonary artery	71%

What is the most likely diagnosis ?

- | | |
|------------------------------|-------------------------------------|
| (1) Atrial septal defect | (2) Ventricular septal defect |
| (3) Patent ductus arteriosus | (4) Total anomalous venous drainage |

14. The following oxygen saturations were found at cardiac catheterization :

Aorta	98%
Left ventricle	98%
SVC	55%
Right atrium	57%
Right ventricle	69%
Pulmonary artery	70%

What is the most likely diagnosis ?

- | | |
|------------------------------|-------------------------------------|
| (1) Atrial septal defect | (2) Ventricular septal defect |
| (3) Patent ductus arteriosus | (4) Total anomalous venous drainage |

15. The following oxygen saturations were found at cardiac catheterization :

Aorta	97%
Left ventricle	98%
SVC	56%
Right atrium	58%
Right ventricle	60%
Pulmonary artery	72%

What is the most likely diagnosis ?

- | | |
|------------------------------|-------------------------------------|
| (1) Atrial septal defect | (2) Ventricular septal defect |
| (3) Patent ductus arteriosus | (4) Total anomalous venous drainage |

16. The following oxygen saturations were found at cardiac catheterization :

Aorta	78%
Left ventricle	80%
SVC	50%
Right atrium	50%
Right ventricle	56%
Pulmonary artery	56%

What is the most likely diagnosis ?

- (1) Atrial septal defect with bidirectional shunt
- (2) Ventricular septal defect with bidirectional shunt
- (3) Tetralogy of Fallot
- (4) Total anomalous venous drainage

17. The following oxygen saturations were found at cardiac catheterization :

Aorta	70%
Left ventricle	71%
SVC	50%
Right atrium	62%
Right ventricle	60%
Pulmonary artery	61%

What is the most likely diagnosis ?

- (1) Atrial septal defect with bidirectional shunt
- (2) Ventricular septal defect with bidirectional shunt
- (3) Tetralogy of Fallot
- (4) Total anomalous venous drainage

18. The following oxygen saturations were found at cardiac catheterization :

Aorta	70%
Left ventricle	78%
SVC	50%
Right atrium	52%
Right ventricle	66%
Pulmonary artery	65%

What is the most likely diagnosis ?

- (1) Atrial septal defect with bidirectional shunt
- (2) Ventricular septal defect with bidirectional shunt
- (3) Tetralogy of Fallot
- (4) Total anomalous venous drainage

19. The following oxygen saturations were found at cardiac catheterization :

Aorta	80%
Left ventricle	81%
SVC	83%
Right atrium	82%
Right ventricle	81%
Pulmonary artery	80%

What is the most likely diagnosis ?

- (1) Atrial septal defect with bidirectional shunt
- (2) Ventricular septal defect with bidirectional shunt
- (3) Tetralogy of Fallot
- (4) Total anomalous venous drainage

20. Judkins catheter is used for coronary angiography. What is its character ?

- (1) Has only end hole
- (2) Has end and side holes
- (3) Has only side holes
- (4) Has side holes and a closed tip

21. What grade onwards of coronary diameter stenosis is regarded as flow limiting :

- (1) 50%
- (2) 60%
- (3) 70%
- (4) 90%

22. In what percentage of patients is the coronary circulation left dominant :

- (1) 7%
- (2) 14%
- (3) 21%
- (4) 85%

23. What is the range of caliber (size) of the normal left main coronary artery ?

- (1) 2.8 ± 0.5 mm
- (2) 3.2 ± 0.5 mm
- (3) 3.5 ± 0.5 mm
- (4) 4.5 ± 0.5 mm

24. What is the Gorlin formula not be used for calculation ?

- (1) Degree of aortic stenosis
- (2) Degree of mitral stenosis
- (3) Pulmonary vascular resistance
- (4) Derived from blood flow and gradient

25. Thallium radioisotope used in cardiac studies :
- (1) Is biologically analogous to potassium
 - (2) Has high myocardial affinity
 - (3) Extraction by myocytes is about 85%
 - (4) Peak uptake is in about 45 minutes after injection
26. ^{99m}Tc Technetium labeled tracers are used in nuclear cardiology. They have :
- (1) Produce higher quality images than Thallium
 - (2) Longer half life than Thallium
 - (3) Need a cyclotron for generation
 - (4) Technetium Sestamibi is mainly excreted by kidneys
27. A patient is admitted with aortic regurgitation.
Which of the following criteria does not indicate severe aortic regurgitation ?
- (1) Effective regurgitant orifice $\geq 0.3 \text{ cm}^2$
 - (2) Regurgitant jet width/left ventricular outflow diameter $\geq 60\%$
 - (3) Holodiastolic flow reversal in ascending aorta
 - (4) Regurgitant fraction $\geq 55\%$
28. A patient undergoes an ultrasound evaluation to assess severity of aortic stenosis.
Which data does not suggest severe stenosis ?
- (1) Maximum Doppler velocity 4.5 m/sec
 - (2) Maximum Doppler velocity 2 m/sec
 - (3) Aortic valve gradient 80 mm Hg
 - (4) Effective orifice area 0.5 cm^2
29. Examine the following mitral flow velocities.
Which is an incorrect statement ?
- (1) Normal e wave due to early rapid filling
 - (2) Normal a wave due to atrial contraction
 - (3) Normal e/a ratio is > 1
 - (4) Normal e/a ratio is < 1

30. A patient with tricuspid regurgitation has the following data :
 Mean Right atrial pressure 10 mm Hg
 Peak Tricuspid regurgitation velocity 4 m/sec
 What is the assumed right ventricular pressure ?
 (1) 37 mm Hg (2) 74 mm Hg
 (3) 32 mm Hg (4) 64 mm Hg
31. A patient undergoes a parasternal long axis echo study.
 In this view which of the following structures is not included.
 (1) Left ventricle (2) Right ventricle
 (3) Aorta (4) Left atrium
32. In Doppler evaluation of the heart one of the following statements is not correct.
 (1) Pulse wave Doppler gives information at the level of the sample volume
 (2) Continuous wave Doppler records all along the ultrasound beam.
 (3) Colour Doppler is based on the principle of continuous wave Doppler
 (4) Blood flowing towards the transducer is encoded in red colour
33. A 10 year old with ventricular septal defect has the following data.
 Arm blood pressure 120/70
 Velocity across the VSD 3m/sec
 What is the right ventricular pressure
 (1) 84 mm Hg (2) 42 mm Hg (3) 120 mm Hg (4) 60 mm Hg
34. A 35 year old female with mitral regurgitation has a regurgitant jet area of 10 cm² on Colour Doppler study. What is the severity of her mitral regurgitation ?
 (1) Minimal (2) Mild (3) Moderate (4) Severe
35. A patient is admitted with pericardial effusion and cardiac tamponade is suspected.
 Which of the following is incorrect ?
 (1) Early diastolic collapse of the right ventricle is the most sensitive
 (2) Late diastolic collapse of right atrium is most sensitive
 (3) There will be ventricular volume size variations with respiration
 (4) There will be abnormal ventricular septal movement

36. Examine the following statements about M mode echocardiography. Which one is correct ?
- (1) In M mode the amplitude of the structures is shown in vertical axis and time on horizontal axis
 - (2) Provides a one dimensional view
 - (3) Used for measurement of left ventricle dimensions
 - (4) Provides information on anatomical details
37. A 35 year old female is admitted with the diagnosis of mitral regurgitation. Which of the following features does not suggest severe mitral regurgitation ?
- (1) Effective regurgitant orifice of 4 cm^2
 - (2) Regurgitant volume of 60 ml
 - (3) Vena Contracta of 2 mm of the MR jet
 - (4) Pulmonary vein systolic flow reversal
38. A 50 year old with an anterior Q wave infarct presents with angina and dyspnea. The left anterior descending artery has a 80% proximal narrowing. How would you assess the myocardial viability.
- (1) Use a PET scan
 - (2) Check for perfusion
 - (3) Check for metabolic activity
 - (4) A perfusion/metabolic match suggests viability
39. Which one of the following structures can be studied at the papillary muscle level in the parasternal short axis view.
- (1) Ventricular septum
 - (2) Left ventricular Anterior wall
 - (3) Mitral valve
 - (4) Left ventricular Inferior wall
40. Apply the Bernoulli equation on the following data.
Peak velocity in aorta 3 m/sec
Peak velocity in left ventricular outflow 2 m/sec
What is the gradient across the aortic valve ?
- (1) 20 mm Hg
 - (2) 30 mm Hg
 - (3) 40 mm Hg
 - (4) 60 mm Hg
41. What are the features of Pulse wave Doppler echocardiography ?
- (1) Can measure mitral inflow velocity
 - (2) Able to measure values usually $< 2 \text{ m/sec}$
 - (3) Used to measure valvar pressure gradient
 - (4) Used to measure pressure half time across valves

42. A patient is suspected to have pulmonary embolism and undergoes ventilation perfusion scanning. (V/Q)
- (1) This involves injection of macro aggregates of albumin
 - (2) Ventilation study with radionuclide aerosol
 - (3) Normal V/Q study virtually excludes pulmonary embolism
 - (4) Matched ventilation perfusion defects are diagnostic of pulmonary embolism
43. A patient with a knee problem who is unable to exercise needs to have a cardiac stress study. Which of the compounds is not likely to be used ?
- (1) Adenosine
 - (2) Dobutamine
 - (3) Dipyridamole
 - (4) Dopamine
44. A patient is suspected to have diastolic dysfunction and mitral flow velocities were recorded. Which of the following observations is not correct ?
- (1) E/A ratio is greater than 1 in normals
 - (2) In pseudo normal pattern iso volumic relaxation time (IVRT) is < 90 m-sec
 - (3) In restrictive pattern the IVRT is > 70 m-sec
 - (4) In restrictive pattern E/A is > 1.5
45. Which of the following structures is not visualized in the apical 4 chamber view ?
- (1) Tricuspid valve
 - (2) Left ventricular lateral wall
 - (3) Left ventricular anterior wall
 - (4) Mitral valve
46. Parasternal short axis view at the level of aorta is used to study all except :
- (1) Right ventricle
 - (2) Main pulmonary artery
 - (3) Right pulmonary artery
 - (4) Left pulmonary artery
47. What is the structure not evaluated in the apical 2 chamber view.
- (1) Left ventricular posterior wall
 - (2) Left ventricular anterior wall
 - (3) Left ventricular inferior wall
 - (4) Mitral valve
48. Structures seen in subcostal 4 chamber view :
- (1) Spleen
 - (2) Aortic valve
 - (3) Pulmonary valve
 - (4) Tricuspid valve
49. The probe which has the best resolution is :
- (1) 2 MHz
 - (2) 5 MHz
 - (3) 7.5 MHz
 - (4) 10 MHz

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59. 2D Echo Wilkin's score in the following case of CRHD in MS is case description : Mid portion and base of leaflets have reduced mobility; Thickening extends through entire leaflets; Thickening of chordae extending upto 1/3 chordal length scattered areas of brightness confined to leaflet margins :
- (1) 6 (2) 9 (3) 10 (4) 12
60. Indications for Balloon aortic valvuloplasty are :
- (1) Peak systolic pressure gradient at rest ≥ 65 mm Hg
 (2) Peak systolic pressure gradient at rest of 50 - 64 mm Hg with symptoms
 (3) Low cardiac output regardless of symptoms
 (4) All of the above
61. False statement in assessing severity of 1 HD :
- (1) Higher the wall motion score index, severe the disease
 (2) In ischemia the earliest change occurs in LV systolic function
 (3) RWMA of apical segment can occur in Left coronary artery disease
 (4) Infarct expansion occurs in a kinetic segment
62. False statement with regard to intracardiac pressures and wave forms :
- (1) Measured by fluid filled systems or micromanometer catheters
 (2) Normally LA pressure is higher than RA pressure
 (3) RA pressure wave has two positive deflections
 (4) The 'v' wave is higher than 'a' wave in LA pressure
63. Radiopharmaceutical tracer used for myocardial tracing metabolism studies is :
- (1) 18 fluorodeoxyglucose (2) Thallium (^{201}Tl)
 (3) 99 m Tc sestamibi (4) 99 Tc Tetrofosmin
64. Radiopharmaceutical tracer used for myocardial perfusion studies is :
- (1) 18 fluoro deoxyglucose (2) 11 C fatty acids
 (3) 99 m Tc sestamibi (4) all of the above
65. Doppler echocardiographic indices of diastolic function :
- (1) Mitral inflow velocity
 (2) Isovolumic relaxation time
 (3) Pulmonary vein atrial systolic reversal
 (4) All
66. Calculate PASP when TR jet velocity is 4 m/s and RA pressure is 10 mm Hg :
- (1) 54 mm Hg (2) 64 mm Hg (3) 74 mm Hg (4) 84 mm Hg

67. The most specific sign of cardiac tamponade is :
- (1) Early diastolic collapse of RV
 - (2) Late diastolic collapse of RV
 - (3) Abnormal ventricular septal motion
 - (4) Respiratory variation in chamber size
68. True statement about pericardial effusion :
- (1) ends posterior to descending aorta
 - (2) almost always overlaps left atrium
 - (3) should be measured in diastolic phase of cardiac cycle
 - (4) all of the above
69. True statement about MVP.
- (1) MVP is diastolic displacement of one or both leaflets into LA below the plane of mitral annulus
 - (2) Holosystolic bowing of mitral leaflets 2mm or more above the mitral annulus in **play** view.
 - (3) MVP is best assessed in apical 4C view
 - (4) All of the above
70. Pressure gradients across 2 chambers can be measured echocardiographically with the help of :
- (1) Bernoulli's equation
 - (2) Continuity equation
 - (3) Simpson's method
 - (4) Corlin's formula
71. In a case of MS, CW doppler across mitral valve shows pressure half time of 160 ms. Estimate valve area :
- (1) 0.8 cm²
 - (2) 1.2 cm²
 - (3) 1.6 cm²
 - (4) 2.0 cm²
72. CW doppler across mitral valve was done in a case of MR indicator for increased LA pressure is :
- (1) Early descent of doppler signal
 - (2) MR jet velocity < 5 m/s
 - (3) Both
 - (4) None
73. Doppler evaluation of aortic valve - V_{max} - 3.6 m/sec peak gradient 64 mm Hg, mean gradient 36 mm Hg - indicates.
- (1) Normal valve
 - (2) Mild AS
 - (3) Moderate AS
 - (4) Severe AS
74. PW across descending aorta shows diastolic retrograde flow. This indicates :
- (1) Mild Aortic Stenosis
 - (2) Mild Aortic Regurgitation
 - (3) Severe Aortic Stenosis
 - (4) Severe Aortic Regurgitation

75. In the presence of severe TR, mean PG 4 mm Hg suggests :
- (1) No TS
 - (2) Mild TS
 - (3) Moderate TS
 - (4) Severe TS
76. Morphological features of mitral valve are all except :
- (1) High septal leaflet
 - (2) Septal chordal attachment
 - (3) Elliptical orifice
 - (4) Two papillary muscles
77. Features of Right atria are all except :
- (1) Flap of fossa ovalis
 - (2) Wedge shaped RA appendage
 - (3) Attachment with caval veins
 - (4) Coronary sinus opening
78. Visceral situs is decided by :
- (1) Suprasternal view
 - (2) Parasternal long axis view
 - (3) Subcostal sagittal view
 - (4) Subcostal coronal view
79. A large perimembranous VSD can get restricted by :
- (1) Aortic valve prolapse
 - (2) Tricuspid valve leaflet (septal) aneurysm
 - (3) Both
 - (4) None
80. Which of the following is **true** ?
- (1) ASD is best seen in subcostal view
 - (2) ASD is of 2 types
 - (3) Ostium primum is a fossa ovalis defect
 - (4) Ostium secundum is part of endocardial cushion defect
81. Best echocardiographic parameter for assessment of severity of VSD shunt is :
- (1) LVEF
 - (2) LV end diastolic dimension
 - (3) LV end systolic dimension
 - (4) LA size
82. **False** statement in the following :
- (1) Smaller VSDs are hemodynamically insignificant
 - (2) Smaller VSDs are less prone for bacterial endocarditis
 - (3) Serial echo studies in infants are required to determine time of intervention
 - (4) In non-restrictive VSDPA pressures are elevated

83. A PDA of 17 mm size should be considered for :
(1) Spontaneous closure (2) Device closure
(3) Surgical closure (4) Medical management
84. A large sodium iodide crystal, photomultiplier collimator are parts of :
(1) 2 D Echo probe (2) 3 D Echo probe
(3) Sones catheter (4) gamma camera
85. Commonest cause for flail mitral valve is :
(1) Ruptured chordae tendinae
(2) Ruptured papillary muscle
(3) Myxomatous degeneration of valve
(4) Idiopathic
86. In 2 D Echo evaluation of a case of HDCM, the term SAM-systolic anterior motion refers to the motion of :
(1) IVS (2) Mitral valve leaflet
(3) Aortic valve leaflet (4) Mitral valve annulus
87. A E/A ratio of less than 1 suggests :
(1) Normal filling (2) Impaired relaxation
(3) Pseudonormal pattern (4) Restrictive filling
88. A wall motion score index of 1.7 indicates :
(1) Normally contracting LV (2) Small infarct
(3) Large infarct (4) Perfusion defect > 20%
89. Mural thrombi are best seen with :
(1) 2.5 MHz transducer (2) 5 MHz
(3) 10 MHz (4) None of the above
90. Which of the following is used as contrast agent in aortography ?
(1) High osmolar agents (2) CO₂
(3) Nitric oxide (4) Saline
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