Section 1 – MCQs

Cardiovascular System Questions

Q 1. Concerning the post-operative cardiac surgical patient:

A. Ventricular tachycardia (VT) is common
B. Temporary pacing is the treatment of choice for persisting bradyarrhythmias
C. A loop diuretic (e.g. furosemide) is the next line of treatment following an adequate fluid load in a patient with low urine output
D. The incidence of discrete central nervous system (CNS) damage is about 2%
E. Slow recovery of central temperature is suggestive of poor cardiac output (CO)

Q 2. Concerning cardiopulmonary bypass (CPB):

A. The optimal perfusion pressure is 120 mmHg
B. Venous cannulation is normally into the inferior vena cava for closed procedures
C. The arterial cannula is usually inserted in the descending aorta
D. The femoral artery is a recognised site for inserting the arterial cannula
E. The patient is cooled to 25°C if circulatory arrest is necessary

Q 3. The following are commonly seen after coronary artery bypass grafting (CABG):

A. Atrial arrhythmias
B. Basal lung collapse
C. Blood loss of approximately 250 ml in the first hour after surgery
D. New Q waves on electrocardiogram (ECG)
E. Diffuse cerebral injury resulting in an alteration in short term memory

Q 4. Causes of poor cardiac output following cardiac surgery include:

A. Poor myocardial function
B. Cardiac tamponade
C. Bleeding
D. Hypocapnia
E. Alkalosis

Q 5. The following are indicators of poor peripheral perfusion:

A. Hyperthermia
B. Oliguria
C. Confusion
D. Metabolic alkalosis
E. Central cyanosis

Q 6. Heparin:

A. Increases formation of Antithrombin III – Thrombin complex
B. Has a high lipid solubility
C. Is metabolised in the liver
D. May be used in the treatment of disseminated intravascular coagulation (DIC)
E. May lead to hypotension

Q 7. Pulmonary artery catheterisation:

A. Placement can be confirmed by a characteristic waveform
B. Sepsis following catheterisation may lead to endocarditis
C. Is useful in septic shock
D. Wedging of the catheter is necessary in pulmonary infarction
E. Cannot be done via peripheral veins

Q 8. Norepinephrine (noradrenaline):

A. Acts mainly by α-1 adrenoceptors
B. Is excreted in the urine
C. Has a half life of approximately 2 minutes

D. Reduces renal blood flow
E. May increase pulmonary vascular resistance

Q 9. Dopamine:

A. At lower doses (<10 mcg/kg/min) increases contractility and heart rate (HR)
B. Can increase cyclic AMP
C. Has predominantly β-1 effects at higher doses (>10 mcg/kg/min)
D. Is more arrhythmogenic than epinephrine (adrenaline)
E. Vasodilates mesenteric vessels

Q 10. Concerning shock:

A. Pulmonary artery occlusion pressure (PAOP) is usually increased in septic shock
B. Cardiac output is often decreased in hypovolaemic shock
C. Effective management of shock necessitates measurements of both cardiac output and systemic vascular resistance
D. Blood pressure falls in septic shock
E. A urine output of 15 ml/hr is characteristic of class 1 shock

Q 11. Concerning emboli:

A. 80% of systemic arterial emboli originate from the heart
B. 10 ml of gas injected is usually sufficient to cause significant problems
C. Small pulmonary emboli can lead to right heart failure
D. Hypoxia 24 hours after a long bone fracture is likely to be due to pulmonary embolus
E. Aortic thromboemboli usually have an impact in the cerebral arterial system

Q 12. Concerning vascular trauma:

A. Haemodynamic instability is an indication for urgent angiography
B. Contrast computed tomography (CT) is useful for assessing great vessel injury
C. Intimal injuries are the most common vascular injuries

D. Shunting may be necessary for damage control
E. Packing is useful in controlling major arterial bleeds

Q 13. Transfusion:

A. Transfusion related acute lung injury (TRALI) manifests itself classically by severe dyspnoea
B. Graft versus host disease usually occurs within 24 hours
C. Management of WBC mediated transfusion reactions include the immediate cessation of the transfusion
D. Leucodepletion reduces the risk of febrile reactions
E. Massive transfusion is defined as the transfusion of more than half the blood volume in 24 hours

Q 14. Haemorrhagic shock:

A. In class II shock the systolic BP is low
B. Class III shock is associated with a urine output of approximately 10 ml per hour
C. Pulse pressure is decreased in class I shock
D. Class III shock is a loss of approximately 25% of the blood volume
E. Confusion is indicative of class III shock

Q 15. The following are causes of peri-operative arrhythmias:

A. Hypocapnia
B. Hypoxaemia
C. Pain
D. Myocardial infarction (MI)
E. Local anaesthetics

Q 16. The following ECG changes are supportive for the diagnosis of post-operative pulmonary embolus:

A. Right bundle branch block
B. T wave inversion in the anterior chest leads
C. Left axis deviation
D. Atrial fibrillation (AF)
E. Right ventricular strain

Q 17. The following haematological parameters would raise the suspicion of DIC:

A. Decreased platelets
B. Increased fibrinogen
C. Prolonged thrombin time
D. Decreased fibrin degradation products (FDP)
E. Profuse bleeding

Q 18. Concerning intravenous fluids in the critically ill:

A. Approximately 20% of infused normal saline (0.9% NaCl) remains intravascular
B. Hartmann's solution (Ringer's lactate) contains approximately 20 mmol/l potassium
C. Normal saline has a pH of 7.4
D. Hartmann's solution is isotonic
E. Approximately 30% of infused 5% dextrose remains intravascular

Q 19. Concerning the post-operative cardiac surgical patient:

A. VT is common
B. Temporary pacing is generally the treatment of choice for persisting bradyarrhythmias
C. A loop diuretic (e.g. Furosemide) is the second line of treatment, after ensuring adequate fluid load, for low urine output
D. The incidence of discrete CNS damage is approximately 2%
E. Slow recovery of central temperature is suggestive of poor cardiac output

Q 20. The following are commonly seen after CABG:

A. Atrial arrhythmias
B. Basal lung collapse
C. Blood loss of 250 ml in the first post-operative hour
D. New Q waves on ECG
E. Diffuse cerebral injury leading to short term memory alteration

Q 21. Causes of poor cardiac output following cardiac surgery include:

A. Poor myocardial function
B. Cardiac tamponade
C. Bleeding
D. Hypocapnia
E. Alkalosis

Q 22. Insertion of a pulmonary artery floatation catheter (PAFC) enables the following:

A. Measurement of right side cardiac filling pressure
B. Measurement of left side cardiac filling pressure
C. Measurement of pulmonary artery pressure
D. Measurement of cardiac output
E. Measurement of core blood temperature

Q 23. The following may cause pulseless electrical activity (PEA):

A. Hypokalaemia
B. Hypocalcaemia
C. Open pneumothorax
D. Cardiac rupture
E. β-blockers

Q 24. Dopamine:

A. Stimulates cardiac β-1 receptors
B. Has a most common complication of tachycardia
C. When it extravasates causes profound tissue damage
D. In low doses reduces serum prolactin
E. May worsen mesenteric perfusion at low doses

Q 25. In septic shock:

A. Treatment should be with fluid therapy initially
B. Pulmonary artery floatation catheter is contra-indicated
C. Vasoactive agents can be useful

D. Norepinephrine does not improve renal function
E. 10% of patients present with myocardial dysfunction

Q 26. Cardiac output:

A. Is the volume of blood ejected from the left ventricle per minute
B. Is proportional to stroke volume (SV)
C. Is inversely related to heart rate
D. Decreases as the filling pressure (preload) increases
E. Decreases as the systemic vascular resistance (afterload) increases

Q 27. The following statements regarding the circulation are correct:

A. The total blood volume is about 5 litres
B. Only about 50% of the intravascular volume is distributed in the systemic arterial circulation
C. Blood pressure = cardiac output × total peripheral resistance
D. In the normal heart, the blood volume is the main determinant of central venous pressure (CVP)
E. A drop in blood pressure results in a reflex increase in heart rate and vasoconstriction mediated by baroceptors in the aorta and carotid sinus

Q 28. Preload (filling pressure):

A. Is dependent upon volume status
B. Is reduced by venodilators
C. Is reduced by diuretics
D. Of the right heart can be measured by the CVP
E. Of the left heart can be measured by the PAOP

Q 29. Afterload:

A. Is the myocardial wall tension developed during systole
B. Is inversely proportional to peripheral vascular resistance
C. Reduction decreases myocardial oxygen requirements
D. Reduction can increase the stroke volume
E. Reduction may increase coronary blood flow

Q 30. Tissue oxygen delivery increases with:

A. Cardiac output
B. Haemoglobin concentration
C. Haemoglobin saturation
D. Acidosis
E. Pyrexia

Q 31. Myocardial contractility is reduced by:

A. Epinephrine (adrenaline)
B. Hypoxia
C. Dobutamine
D. Nitrates
E. β-blockers

Q 32. Physiological responses to heart failure include:

A. An increase in heart rate due to activation of the parasympathetic nervous system
B. Activation of the renin-angiotensin-aldosterone (RAA) system
C. Increased erythropoietin secretion
D. Peripheral vasodilatation
E. Increased sodium and water excretion

Q 33. Cardiac failure:

A. May be defined as the failure of the heart to meet the metabolic demands of the body at normal filling pressures
B. Is initially partially compensated through increased myocardial muscle pre-stretching and myocardial contractility (Starling's law)
C. Is most commonly caused by ischaemic heart disease in Western societies
D. Is usually associated with a low systemic vascular resistance
E. Is usually associated with a low PAOP

Q 34. The CVP is typically elevated in:

A. Hypovolaemia
B. Congestive cardiac failure

C. The first 6 hours after a general anaesthetic
D. Sepsis
E. Cardiac tamponade

Q 35. CVP monitoring:

A. Allows assessment of the preload/filling pressure of the left heart
B. Carries a higher risk of pneumothorax by the subclavian compared with the internal jugular approach
C. Carries a higher risk of haemothorax by the subclavian compared with the internal jugular approach
D. Indicates hypovolaemia when the CVP is low
E. May not reflect the left heart filling pressure in patients with chronic obstructive pulmonary disease (COPD)

Q 36. PAOP:

A. Is a reflection of left atrial pressure
B. Is measured by temporary occlusion of a pulmonary vein by a flotation catheter
C. Must be measured in a cardiac catheter laboratory
D. Measurement may be complicated by haemoptysis
E. Measurement may be complicated by pulmonary infarction

Q 37. PAOP:

A. Can be derived from the CVP and haemoglobin concentration
B. Measurement involves passage of a pulmonary artery catheter across the interatrial septum
C. Measurement is appropriate when volume status is uncertain after clinical assessment and measurement of the CVP
D. Is typically raised in adult respiratory distress syndrome (ARDS)
E. Is typically raised in septic shock

Q 38. Quantitative measurement of cardiac output can be made using:

A. CVP and haemoglobin concentration
B. Thermodilution techniques