

## CARDIOVASCULAR DISCUSSION TOPICS

### 1. Cardiac physiology:

- a. Anatomy – normal structures and major vessels/branches.
- b. Cardiac cycle – synchronicity of pressure, flow, EKG, sounds, and valve action.
- c. Electrophysiology – cardiac action potential, impulse initiation/propagation, and ion channels.
- d. Cardiac conduction system – internal and external innervations.
- e. Heart rate control.
- f. Coronary circulation and perfusion. Determinants of myocardial oxygen supply, demand, and delivery.
- g. EKG – normal parameters including rate, rhythm, axis, and intervals. Recognize and interpret various types of heart blocks, bundle branch block, ventricular hypertrophy, arrhythmia (SVT, VT/VF, AF/Aflutter, PVC/PAC, WPW, aberration), ischemia, injury, and infarction patterns.
- h. Ventricular function – Frank-Starling law, preload, afterload, and intracardiac pressures. Myocardial contractility and measurement limitations. Cardiac output determinants and regulation. Myocardial oxygen utilization.
- i. Venous return – controlling factors, and affects of body position, intrathoracic pressure, and blood volume.
- j. Blood pressure – determination of systolic, diastolic, mean, and perfusion pressures. Systemic and pulmonary vascular resistance. Baroreceptor function.

### 2. Cardiovascular pharmacology including the mechanism of action, indications, contraindications, dosages, and adverse effects:

- a. Digitalis.
- b. Positive inotropes (ephedrine, dopamine, dobutamine, epinephrine, norepinephrine, milrinone).
- c. Antiarrhythmics (at least one example for each antiarrhythmic class)
- d. Antianginal drugs (nitroglycerine, isosorbide).

e. Antihypertensive agents (beta blockers, calcium channel blockers, ARB's, SNP, nitroglycerine, dobutamine, milrinone, nesiritide, fenoldopam, ACEI, alpha-2 agonist, hydralazine, phentolamine, NO, diuretics).

f. Vasoconstrictors (phenylephrine, epinephrine, norepinephrine, dopamine).

**3. Cardiac monitoring including measurement methods, interpretation for various clinical conditions, and limitations of:**

a. Arterial blood pressure

b. Central venous pressure

c. Pulmonary artery pressure

d. Left ventricular end-diastolic pressure

e. Cardiac output (Fick, dye dilution, thermodilution, Doppler)

f. Blood gases – electrode design, calibration, temperature corrections (Alpha STAT, pH STAT), and errors. Mixed venous oxygen saturation.

g. Transesophageal Echo – basic ASA/SCA practice guidelines

**4. Pre-operative evaluation of cardiac studies (exercise stress test, Persantine Thallium scan, stress Echo, cardiac catheterization) including the indications, contraindications, interpretation, and limitations.**

**5. Patients with ischemic heart disease: risk factors, manifestations, pre-operative assessment, diagnosis of MI (clinical, EKG, enzymes), anesthetic risks, management strategies, and postoperative ischemia/MI.**

**6. Valvular heart disease – classification, diagnosis, pre-operative assessment, and anesthetic considerations.**

**7. Cardiac tamponade and constrictive pericarditis – etiology, diagnosis, and anesthetic management.**

**8. Myocardial preservation – physiology, techniques, and complications.**

**9. Cardiopulmonary bypass – components (pump, oxygenator, heat exchanger, filters), mechanism of gas exchanges, priming solutions, anticoagulation and antagonism, ACT, heparin assays, antithrombin III, protamine reactions, and anesthetic considerations during bypass.**

- 10. Anesthetic considerations and management of patients undergo deep hypothermic circulatory arrest.**
- 11. Coagulation management before, during, and after cardiopulmonary bypass and circulatory arrest.**
- 12. Pathophysiology, diagnosis, and management of patients with heparin induced thrombocytopenia (HIT).**
- 13. Pathophysiology, diagnosis, and management of patients with heparin resistance.**
- 14. Intraaortic balloon pump – rationale, indications, control, and limitations.**
- 15. Artificial heart and ventricular assist devices – types, rationale, indications, control, limitations, and anesthetic considerations.**
- 16. Anesthetic considerations for off pump coronary revascularization.**
- 17. Etiology, diagnosis, anesthetic considerations, and management of patients with pulmonary hypertension.**
- 18. Etiology, diagnosis, anesthetic considerations, and management of patients for heart transplant.**
- 19. Etiology, diagnosis, anesthetic considerations, and management of patients for lung transplant.**
- 20. Etiology, diagnosis, anesthetic considerations, and management of patients for ascending aortic surgery.**
- 21. Etiology, diagnosis, anesthetic considerations, and management of patients for descending aortic surgery.**
- 22. Etiology, diagnosis, anesthetic considerations, and management of patients for carotid surgery**
- 23. Prophylactic antibiotics for valvular diseases – current guidelines.**
- 24. Pacemaker including standard nomenclature, types (temporary, permanent, transcutaneous), settings (fixed rate, synchronized, atrial, ventricular, A-V sequential), and reasons for failure or malfunction. Anesthetic considerations of patients with pacemaker. Indications, complications, and anesthetic considerations**

**of patients undergoing pacemaker placement. Bi-ventricular pacing in the treatment of heart failure.**

**25. Defibrillators – internal, external, implantable, energy, cardioversion, paddle size and position. Anesthetic considerations of patient with AICD. Indications, complications, and anesthetic considerations of patients undergoing AICD placement.**

**26. Cardioversion – indications, contraindications, and anesthetic considerations.**

**27. Management of peri-operative atrial fibrillation.**

**28. Cardiopulmonary resuscitation – recognition, management (new ACLS guidelines), and complications of therapy.**