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.
   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.
   i. Venous return – controlling factors, and affects of body position, intrathoracic pressure, and blood volume.

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.


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 thromocytopenia (HIT).

13. Pathophysiology, diagnosis, and management of patients with heparin resistance.


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.


22. Etiology, diagnosis, anesthetic considerations, and management of patients for carotid surgery


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.