

THE TAMIL NADU DR.M.G.R. MEDICAL UNIVERSITY,
CHENNAI.

SYLLABUS FOR
POST DOCTORAL FELLOWSHIP PROGRAMME OF
“CARDIAC ANAESTHESIA”

“CARDIAC ANAESTHESIA”

BASIC SCIENCES

CARDIAC ANATOMY:

1. Embryology and development of heart.
2. Pulmonary and vascular anatomy.
3. Coronary artery anatomy.

CARDIAC PHYSIOLOGY:

1. Cellular physiology.
2. Autonomic nervous system.
3. Cardiac functions.
4. Blood physiology.
5. Coagulation.
6. Action potential.
7. Cardiac arrhythmias.

PULMONARY PHYSIOLOGY:

1. Open and closed chest ventilation.
2. Ventilation / perfusion mismatch.
3. One lung ventilation.

OTHER SYSTEMS:

- Renal system.
- Hepatic system.
- CNS.
- Endocrinal system.

PATHOPHYSIOLOGY:

1. Heart failure.
2. Congenital defects.
3. COAD.
4. Acquired cardiac and pulmonary diseases.
5. Immunological response and metabolic response during CPB.
6. TCA.

PHARMACOLOGY:

1. Pharmacokinetics and pharmacodynamics of anesthetic and vasoactive drugs.
2. Cardiovascular drugs.
3. Current antibiotics for ICU use.
4. Bronchodilator.
5. Antiarrhythmic drugs.
6. Nitric oxide.

PHYSICS:

1. Basic concepts of monitoring devices.
2. Laser in cardiac surgery.
3. Robotic technique.
4. Maintenance of monitors.
5. Equipments in OT
6. Equipments for transport of patients.
7. ICU equipment.

MONITORING IN ANESTHESIA

Invasive and Non invasive monitoring techniques for pre-peri and post-operative period:

1. Basic concepts.
2. Indication, cost effectiveness, complications.
3. Equipment usage and knowledge of accessories.

Cardiac monitoring:

1. ECG
2. ABP.
3. PA pressure.
4. Cardiac output.
5. Calculation of cardiac output.
6. Echo
7. Doppler.

Pulmonary monitoring:

1. PFT
2. Blood gases.
3. Pulmonary airway mechanics.

Coagulation profile monitoring:

1. ACT.
2. Heparin and protamine regulation.
3. Thromboelastography.

Neuromuscular blockade monitoring:

CNS monitoring:

1. Cerebral oximetry.
2. Evoked potential monitoring.
3. CNS monitoring during CPB.
4. Recent advances in monitoring

CLINICAL SCIENCES:

PEDIATRIC:

1. History of pediatric cardiac anesthesia.
2. Pediatric heart disease in developing world.

Development issues:

1. Intrauterine development of cardiovascular system.
2. Extra uterine development of cardiovascular system.

Preoperative evaluation:

1. Preoperative evaluation and preparation of pediatric patient with cardiac disease.
2. For cardiac catheterization and other radiographic examinations.
3. For cardiac electrophysiology.
4. For pediatric echocardiography.

Principles of per operative management:

1. Monitoring of the pediatric cardiac patient.
2. Physiology and techniques of extracorporeal circulation in pediatric cardiac patients.
3. Profound hypothermia and circulatory arrest.
4. Vital organ preservation during surgery for congenital cardiac disease
5. Management of post bypass myocardial dysfunction.
6. Hemostasis, coagulation and transfusion in pediatric cardiac patients.
7. Management of post bypass pulmonary hypertension.

Anesthesia for cardiac surgical procedures:

1. Septal and endocardial cushion defects.
2. Tetralogy of fallot.
3. Transposition of great arteries.
4. Anomalies of aortic arch and valve.
5. Anomalies of pulmonary valve and right ventricular outflow tract.
6. Tricuspid atresia.
7. Hypoplastic left heart syndrome.
8. Double outlet right ventricle
9. Truncus arteriosus.
10. Anomalies of systemic and pulmonary venous return.
11. Abnormalities of atrioventricular valves.
12. Coronary artery anomalies.

13. Pulmonary hypertension.
14. Persistent fetal circulation and Eisenmenger's syndrome.
15. Pediatric cardiac and lung transplantation.
16. Anesthesia for non cardiac surgery in children and adults with congenital heart disease.
17. Cardiac pacing and electroversion.

Postoperative care:

1. General principles.
2. Cardiovascular dysfunction and pharmacological support.
3. Postoperative respiratory dysfunction and its management.
4. Renal, hepatic, gastro and neurological dysfunction.
5. Postoperative pain management in pediatric cardiac patient.
6. Anesthesia for cardiac procedures in pediatric ICU.
7. Postoperative cardiac recovery and outcomes, long term complications and management.

ADULT:

Preoperative assessment and management:

1. Preoperative assessment of cardiac risk.
2. Diagnostic and therapeutic procedures in the adult patient..
3. Anti-ischemic drug therapy.
4. Chronic treatment of congestive heart failure.
5. Antihypertensive therapy.
6. Etiology and treatment of preoperative cardiac arrhythmias.

Physiology and molecular biology:

1. Coronary physiology and atherosclerosis.
2. Pharmacology of anesthetic drugs.
3. Cardiovascular pharmacology.

Monitoring:

1. Hemodynamic monitoring.
2. Advances in electrocardiographic monitoring.
3. Intraoperative echocardiography.
4. Central nervous system monitoring.
5. Coagulation monitoring.

Electrophysiology studies in cath lab:

1. Electrophysiology of the heart.
2. Pacemakers
3. Rhythm management devices.
4. Anesthesia for EPS studies / procedures.

Anesthetic pharmacology:

1. Effects of inhalation anesthetics on systemic hemodynamics and the coronary circulation.
2. Opioids in cardiac anesthesia
3. Pharmacology of intravenous anesthetic induction drugs.
4. Muscle relaxants and cardiovascular system.
5. Pharmacokinetics and principles of drug infusions in cardiac patients.

Thoracic anesthesia and one lung ventilation:

1. Indications for thoracic surgery.
2. Preoperative assessment
3. Anesthetic assessment
4. Preoperative preparation.
5. Investigation, premedication, intraoperative management.
6. One lung ventilation: indications, contraindications and positioning of patient in thoracic surgery.
7. Physiology of one lung ventilation
8. Methods for separation of lungs
9. DLT: types, positioning, placement checking, possibilities of DLT malposition, checking with FOB
10. Management of OLV
11. Post operative management.

Miscellaneous:

1. Extracorporeal devices and related technologies.
2. Transfusion medicine and coagulation disorders
3. Pharmacologic management of perioperative left and right ventricular dysfunction
4. Techniques of Circulatory assistance.

Postoperative care:

1. Postoperative respiratory management
2. Postoperative cardiovascular management
3. Central nervous system dysfunction after cardiopulmonary bypass,
4. Critical care medicine for the cardiac patient.

CARDIOPULMONARY BYPASS:

1. Historical development
2. Blood pumps in CPB
3. Circuitry and cannulation techniques
4. Principles of oxygenator function
5. Ultrafiltration and dialysis
6. Mechanical circulatory support devices
7. Cardiopulmonary bypass for minimally invasive cardiac surgery
8. Temperature management in cardiac surgery
9. Embolic events
10. Endocrine, metabolic and electrolyte responses
11. Cardiopulmonary bypass and lung
12. Immune system and inflammatory response to CPB
13. Kidney function and cardiopulmonary bypass

14. Neurologic effects of CPB
15. Hemodilution and priming solutions
16. The blood surface interface
17. Hematologic effects and coagulopathy
18. Coagulation testing
19. Anticoagulation for CPB
20. Heparin neutralization
21. Pharmacologic prophylaxis for post CPB bleeding
22. Conduct of CPB
23. Patient safety in CPB
24. Unusual problems in CPB
25. Termination of CPB
26. ECMO for respiratory support in adults
27. Perfusion for thoracic aortic surgery in adults
28. Noncardiac surgical application of CPB
29. Pediatric cardiopulmonary bypass an overview- state of art and future
30. Myocardial protection and preservation for neonates and infants.
31. Brain injury following infant cardiac surgery and neuroprotective strategies
32. ECMO for infants and children
33. Circulatory assist devices for infants and children
34. Subsystem care - cerebral, Renal Hepatic protection, Cerebral protection, cerebral monitoring.
35. Total circulatory arrest, left heart bypass
36. Anaesthesia management during CPB
37. Pharmacokinetics & Pharmacodynamics of drugs during CPB
38. blood and fluid management
39. bypass management during cardiac surgery
40. discontinuing cardiopulmonary bypass.

INTENSIVE CARE MANAGEMENT:

1. Organizational aspects
2. Shock
3. Acute coronary care
4. Respiratory failure
5. Acute renal failure
6. Neurological disorders
7. Endocrine disorders
8. Infection and immune disorders
9. Pharmacological considerations
10. Metabolic hemostasis
11. Hematological management
12. Transplant
13. Pediatric intensive care

INTRAOPERATIVE TRANSESOPHAGEAL ECHOCARDIOGRAPHY :

Principles of echocardiography :

1. Physics,
2. digital echocardiography
3. imaging artifacts and pitfalls,
4. optimizing 2D echo

Intraoperative examination :

1. Surgical anatomy correlated with echocardiographic imaging planes,
2. assessment of global ventricular function,
3. right ventricular function,
4. regional ventricular function,
5. mitral valve,
6. aortic valve,
7. tricuspid and
8. pulmonic valves
9. thoracic aorta and
10. prosthetic valves.
11. Assessment of congenital heart disease in adults

Decision making in critical care :

TEE in critical care setting and assessment of perioperative hemodynamics

Surgical decision making in coronary artery disease:

1. Assessment of myocardial viability,
2. Assessment in higher risk myocardial revascularization,
3. Assessment of mitral valve in ischemic heart disease
4. Assessment in off pump myocardial revascularization.

Surgical decision making in valvular heart disease:

1. Surgical consideration in tricuspid valve surgery,
2. assessment in mitral valve surgery,
3. surgical consideration in aortic valve surgery

Surgical decision making in major vascular surgery:

Assessment of surgery of aorta.

Surgical decision making in Interventional Cardiovascular Medicine and Non cardiac surgery :

Assessment in cardiac intervention, assessment in noncardiac surgery.

BRONCHOSCOPY :

- 1. Anatomy of larynx trachea, bronchi and classification of lung segments
- 2. Indications for FOB
- 3. Anaesthesia for diagnostic and therapeutic bronchoscopy
- 4. Interventional bronchoscopy
- 5. Percutaneous dilatational tracheostomy and bronchoscopy
- 6. Technique and equipment care for FOB

RECENT ADVANCES:

ACLS and Cardiopulmonary Resuscitation:

- 1. CPR – BLS, ACLS
- 2. Guidelines for CPR

Knowledge of recent developments in field of Cardio thoracic & Vascular surgery

- 1. Heart - lung transplant - physiology, pharmacology (Anaesthetic consideration) - Donor – recipient selection
- 2. Immunosuppression etc.
- 3. Cardiac assisting devices – Artificial heart, IABP, LHAD
- 4. Advances Pulm. support - ECMO, H.F. Ventilation
- 5. Blood substitutes
- 6. Advanced Haemodynamic Monitoring.
- 7. 3D & 4D Perioperative Echocardiography.

PERIOD AND POSTING IN VARIOUS UNITS

The trainee will be posted in different specialties and during of this posting will be as following:

	PDCC
Cardiac Anaesthesia	8 months
Cath Lab	1 month
Echo Lab	1 month
Cardiac Surgery ICU	5 weeks
Cardiology ICU	2 weeks
Radiology	1 week

LIST OF PROCEDURES TO BE PERFORMED

PROCEDURE	PDCC UNDER SUPERVISION
FEMORAL CATHETERIZATION	5
SUBCLAVIAN AND INTERNAL JUGULAR CATHETERIZATION.	5
TEE	25
PA CATHETER INSERTION	3

LIBRARY:

The postgraduate students need to become familiar with the books, periodicals, and other publications pertaining to Cardiac Anaesthesia that are available in the Institution. A list of such books will be on record in the department. In addition to this, department will develop and maintain Departmental Library, which will contain highly specialized books and publications from which the postgraduate can benefit.

RESEARCH:

The component of research shall be promoted by encouraging candidates to undertake projects during their course. This objective may be achieved either through an intramural programme or by enrolling postgraduates in an extramural programme providing the necessary training.

MONITORING OF TEACHING / LEARNING ACTIVITIES:

ACTIVITY	PERIODICITY OF ASSESSMENT	METHOD
JOURNAL CLUBS	MONTHLY	FACULTY AND PEER VIEW
SEMINARS	MONTHLY	FACULTY AND PEER VIEW
THEORY KNOWLEDGE	SIX MONTHLY	WRITTEN TESTS
CLINICAL PERFORMANCE	SIX MONTHLY	CLINICAL EXAM
PROCEDURES	MONTHLY	LOG BOOK
RESEARCH AND PRESENTATION	THREE MONTHLY	LOGBOOK AND FACULTY PEER VIEW

Reference Books :-**1. Cardiac Anesthesia And Transesophageal Echocardiography**

Author: David Kramer

Publisher: Tata Mcgraw Hill

2. A Practical Approach to Cardiac Anesthesia

Frederick A. Hensley (Author), Glenn P. Gravlee (Author), Donald E. Martin (Author)

Publisher: Lippincott Williams and Wilkins;

3. Kaplan's Cardiac Anesthesia:

Joel A. Kaplan, David L. Reich, Steven N. Konstadt

Elsevier Health Sciences

4. Bibliographic information

Authors Joel A. Kaplan, David L. Reich, Steven N. Konstadt

Publisher : Elsevier Health Sciences