SREE CHITRA TIRUNAL INSTITUTE
FOR MEDICAL SCIENCES AND TECHNOLOGY

Course curriculum for Doctor of Medicine (D.M) and Master of Chirurgiae (M. Ch) Programs

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Contents:

I. Aims and Objectives

Aim:

The M. Ch CVTS is a 3-year residency programme in Cardiovascular and Thoracic Surgery. The training aims at providing sufficient exposure to Cardiac, Vascular and Thoracic Surgery. On completion of the 3-year residency programme, he/she will have through knowledge of the speciality and be able to perform basic operative procedures independently.

Objectives:

1. Acquire knowledge of Cardiac, Thoracic and Vascular anatomy.
2. Acquire knowledge of the Cardiovascular physiology and pathology.
3. Develop Clinical Skills to diagnose and analyse cardiac, thoracic, and vascular disorders.
4. Develop familiarity with diagnostic and laboratory investigations and procedures essential for all cardiac, vascular, and thoracic procedures.
5. Understanding of the incidence, prevalence, and natural history of the disease.
6. Adequate proficiency in Pre-operative management of patients.
7. Develop surgical skills to be able to provide comprehensive and good quality surgical care in Cardiovascular and Thoracic surgery.

8. Understand the importance of Audit of surgical procedures.
9. Develop research skill and attitude.
10. Exhibit professionalism, Proper attitude and ethical concern.

II. Syllabus

M.Ch CARDIOVASCULAR AND THORACIC SURGERY

PART I

1. CARDIAC SURGERY

Fundamentals

Surgical Anatomy of the heart, Cardiac surgical anatomy and physiology, cardiac Embryology, Cardiac Surgical Pharmacology, Pathology of Cardiac Surgery, Cardiac Surgical Imaging, Risk Stratification and Co morbidity, Statistical Treatment of Surgical Outcome Data.

Preoperative/Intraoperative Care

Preoperative Evaluation for Cardiac Surgery, Cardiac Anesthesia, transfusion Therapy and Blood Conservation, Deep Hypothermic Circulatory Arrest, Myocardial protection, Postoperative Care of Cardiac Surgery Patients, Cardiopulmonary Resuscitation.

Temporary Mechanical Circulatory Support, Late Complications of Cardiac Surgery.

Cardiopulmonary bypass

History, Equipment, Physiology and pathology, Hematology, Clinical applications, Cardiopulmonary bypass in neonates, infants and children.

Pathophysiology

Atherosclerosis, Coronary artery disease, Valvular heart disease, Rheumatic fever, Aortic aneurysm, Aortic dissection, Congenital heart disease, Congestive Heart failure, Pericardial diseases.

Immunobiology of Heart and Heart-lung transplantation

2. THORACIC SURGERY

The Lung, Pleura, Diaphragm and Chest Wall

Anatomy of the Thorax, Embryology of the Lungs, ultrastructure and Morphometry of the Human Lung, Cellular and Molecular Biology of the Lung, Surgical Anatomy of the Lungs, Anatomy of the Thoracic Duct and Chylothorax, Lymphatics of the Lungs, Pulmonary Gas Exchange, Mechanics of Breathing.

Thoracic Imaging

Radiographic Evaluation of the Lungs and Chest, Computed Tomography of the Lungs, Pleura, and Chest Wall, Magnetic Resonance Imaging of the

Thorax, Positron Emission Tomography in Chest Diseases, radionuclide Studies of the Lung.

Diagnostic Procedures

Laboratory Investigations in the Diagnosis of Pulmonary Diseases, Molecular Diagnostic Studies in Pulmonary Disease, Bronchoscopic Evaluation of the Lungs and Tracheobronchial Tree, Invasive Diagnostic Procedures, Video-Assisted Thoracic Surgery as a Diagnostic Tool.

Assessment of the Thoracic Surgical Patient

Pulmonary Physiologic Assessment of Operative Risk, Preoperative Cardiac Evaluation of the Thoracic Surgical Patient.

Anesthetic Management of the General Thoracic Surgical Patient

Preanesthetic Evaluation and Preparation Conduct of Anesthesia, Management of the Patient with Airway Pathology, Anesthesia for Pediatric General Thoracic Surgery.

Postoperative Management of The General Thoracic Surgical Patient

General Principles of Postoperative Care, Mechanical Ventilation of the Surgical Patient.

Embryology and anatomy

Lung, Tracheobronchial tree, Diaphragm, Pleura.

Lung cancer

Epidemiology and Carcinogenesis, Screening for Lung Cancer: Challenges for Thoracic Surgery, Pathology of Carcinoma of the Lung, Present Concepts in the Molecular Biology of Lung Cancer, Clinical Presentation of Lung Cancer, Radiologic Evaluation of Lung Cancer, Diagnosis and Staging of Lung Cancer.

Mediastinum

Anatomy

The Mediastinum, Its Compartments, and the Mediastinal Lymph, Nodes, The Thymus, Mediastinal Parathyroids, Neurogenic Structures of the Mediastinum.

Non-invasive Investigations

Radiographic, Computed Tomographic, and Magnetic Resonance.

Investigation of the Mediastinum

Radionuclide Studies of the Mediastinum, Mediastinal Tumor Markers

Pathology of mediastinal tumors

3. VASCULAR SURGERY

Applied Anatomy

Regional and developmental - of Aorta and arteries and branches. Exposure of blood vessels in the chest, abdomen, and neck, Veins in extremities and inferior vena cava.

Applied Physiology

Blood pressure, Cardiac output, regional circulation especially those of subsystem and peripheral in the extremities, carotid arteries, and cerebral circulation.

Applied Pathology

Pathology of diseases of Aorta, Arteries, Pathology of Deep Venous thrombosis, AV malformation.

Applied Bacteriology

Infection in Vascular Surgery, prosthetic graft infection, primary and secondary aorto-enteric fistula.

Cardiovascular Engineering

Concept of flow, pressure gradient, heart as pump, prosthetic heart valves, extracorporeal circulation, biocompatibility, materials in cardiovascular application, medical physics, electronics in transducers, clinical monitoring, and medical imaging.

Biostatistics

Methodology and design of clinical research, Statistical Inference, Biostatistics for clinical Research-sample size, statistical approach,

statistical significance, sensitivity, specificity, Univariate and multivariate analysis, actuarial survival.

PART II

Adult Cardiac Surgery

Ischemic Heart Disease

Indications for Revascularization, Myocardial Revascularization with Percutaneous Devices, with and without Cardiopulmonary, with Carotid Artery Disease, after Acute Myocardial Infarction, Minimally Invasive Myocardial Revascularization, Coronary Artery Reoperations, Trans myocardial Laser Revascularization and Extravascular Angiogenesis Techniques to Increase Myocardial Blood flow.

Surgical Treatment of Complications of Acute Myocardial Infarction: Postinfarction Ventricular Septal Defect and Free Wall Rupture, Ischemic Mitral Regurgitation, Left Ventricular Aneurysm.

Valvular Heart Disease

Aortic Valve Replacement with a Mechanical Cardiac Valve Prosthesis, Bioprosthetic Aortic Valve Replacement: Stented Valves, Stent less Aortic Valve Replacement: Autograft/Homograft, Stent less Aortic Valve Replacement:

Porcine and Pericardial, Aortic Valve Repair and Aortic Valve-Sparing Operations, Surgical Treatment of Aortic Valve Endocarditis, Minimally Invasive Aortic Valve Surgery, Percutaneous Aortic Valve Interventions, Mitral Valve Repair, Mitral Valve Replacement, Surgical Treatment of Mitral Valve Endocarditis, Minimally Invasive and Robotic Mitral Valve Surgery, Percutaneous Catheter-Based Mitral Valve Repair, Tricuspid Valve Disease, Multiple Valve Disease, Re operative Valve Surgery, Valvular and Ischemic Heart Disease.

Diseases of the Great Vessels

Aortic Dissection, Ascending Aortic Aneurysms, Aneurysms of the Aortic Arch, Descending and Thoracoabdominal Aortic Aneurysms, Endovascular Therapy for the Treatment of Thoracic Aortic Disease, Pulmonary Embolism and Pulmonary Thromboendarterectomy, Trauma to the Great Vessels.

Surgery for Cardiac Arrhythmias

Cardiac Rhythm Disturbance, Interventional Therapy for Atrial and Ventricular Arrhythmias, Surgical Treatment of Atrial Fibrillation, Surgical Implantation of Pacemakers and Automatic Defibrillators.

Other Cardiac Conditions and Operations

Adult Congenital Heart Disease, Pericardial Disease, Cardiac Neoplasms, Hypertrophic Obstructive Cardiomyopathy, Heart Failure.

Critical Care

Transplant and Circulatory Support

Heart Transplantation, Mechanical Circulatory Support & Total Artificial Heart, Nontransplant Surgical Options for Heart Failure, Tissue Engineering for Cardiac Valve Surgery, Stem Cell-Induced Regeneration of Myocardium.

CONGENITAL HEART SURGERY

Atrial Septal Defect and Partial Anomalous Pulmonary Venous Connection, Total Anomalous Pulmonary Venous Connection, Cor Triatriatum, Unroofed Coronary Sinus Syndrome, Atrioventricular Septal Defect, Ventricular Septal Defect, Congenital Sinus of Valsalva Aneurysm , Aortico-Left Ventricular Tunnel, Patent Ductus Arteriosus, Ventricular Septal Defect with Pulmonary Stenosis or Atresia, Pulmonary Stenosis or Atresia and Intact Ventricular Septum, Tricuspid Atresia and Management of Single-Ventricle Physiology, Ebstein Anomaly, Truncus Arteriosus,

Aortopulmonary Window, Origin of Right or Left Pulmonary Artery from Ascending Aorta, Anomalies of the Coronary Arteries, Congenital Aortic Stenosis, Coarctation of the Aorta and Interrupted Aortic Arch, Aortic Atresia and Other Forms of Hypoplastic Left Heart Physiology, Congenital Mitral Valve Disease, Vascular Ring and Sling, Complete Transposition of the Great Arteries, Double Outlet Right or Left Ventricle, Congenitally Corrected Transposition of the Great Arteries and Other forms of Atrioventricular Discordant Connection. Double Inlet Ventricle and Atretic Atrioventricular Valve. Anatomically Corrected Malposition of the Great Arteries, Atrial Isomerism, Critical Care.

THORACIC SURGERY

Pulmonary Resections

Thoracic Incisions, General Features of Pulmonary Resections, Technical Aspects of Lobectomy, Sleeve Lobectomy, Pneumonectomy and Its Modifications, Tracheal Sleeve Pneumonectomy, Segmentectomy and Lesser Pulmonary Resections, Emphysema Surgery.

Instruments and Techniques of Video-Assisted Thoracic Surgery, Video Assisted Thoracic Surgery for Wedge Resection, Lobectomy and Pneumonectomy, Median Sternotomy and Parasternal Approaches to the

Lower Trachea and Main Stem, Bronchi, Extended Resection of Bronchial Carcinoma in the Superior.

Anterior Approach to Superior Sulcus Lesions, Complications of Pulmonary Resection, Management of Perioperative Cardiac Events.

Chest Wall

Chest Wall Deformities, Infections of the Chest Wall, Thoracic Outlet Syndrome, Thoracoscopic Sympathectomy, Anterior Transthoracic Approaches to the Spine, Chest Wall Tumors, Chest Wall Reconstruction.

The Diaphragm

Diaphragmatic Function, Diaphragmatic Paralysis, and Eventration of the Diaphragm, Pacing of the Diaphragm, Congenital Posterolateral Diaphragmatic Hernias and Other Less, Common Hernias of the Diaphragm in Infants and Children, Foramen of Morgagni Hernia, Tumors of the Diaphragm.

The Pleura

Pneumothorax, Parapneumonic Empyema, Postsurgical Empyema, tuberculous and Fungal Infections of the Pleura, Fibrothorax and Decortication of the Lung, Thoracoplasty: Indications and Surgical Considerations.

Localized Fibrous Tumors of the Pleura, Diffuse Malignant Mesothelioma, Technique of Extra pleural Pneumonectomy for Diffuse Malignant, Pleural

Mesothelioma, Uncommon Tumors of the Pleura, Malignant Pleural Effusions, Malignant Pericardial Effusions.

Thoracic Trauma

Blunt and Penetrating Injuries of the Chest Wall, Pleura and Lungs. Barotrauma and Inhalation Injuries, Acute Respiratory Distress Syndrome, Management of Foreign Bodies of the Airway, Diaphragmatic Injuries.

The Trachea

Tracheostomy, Techniques of Resection and Reconstruction of trachea, Management of Nonneoplastic Diseases of the Trachea, Benign and Malignant Tumors of the Trachea, Compression of the Trachea by Vascular Rings.

Congenital, Structural, and Inflammatory Diseases of the Lung

Congenital Lesions of the Lung, Pulmonary Complications of Cystic Fibrosis, Congenital Vascular Lesions of the Lungs, Chronic Pulmonary Emboli, Bullous and Bleb Diseases of the Lung, Emphysema of the Lung and Lung Volume Reduction Operations, Bacterial Infections of the Lungs and Bronchial Compressive Disorders, Pulmonary Tuberculosis and Other Mycobacterial Diseases of the Lungs.

Surgery for the Management of Mycobacterium Tuberculosis and Nontuberculous Mycobacterial Infections of the Lung. Thoracic Mycotic and Actinomycotic infections of the Lung, Pleuropulmonary Amebiasis, Hydatid Disease of the Lung, Pulmonary Paragonimiasis and Its Surgical

Complications, Solitary Pulmonary Nodule, Diffuse Lung Disease. Lung Transplantation.

Carcinoma of the Lung

Surgical Treatment of Non-Small Cell Lung Cancer, Mediastinal Lymph Node Dissection, Endoluminal Management of Malignant Airway Disease, Basic Principles of Radiation Therapy in Carcinoma of the Lung, Radiation Therapy for Carcinoma of the Lung,, Chemotherapy of Non-Small Cell Lung Cancer, Multimodality Therapy for Non-Small Cell Lung Cancer, Novel Systemic Therapy for Advanced Non-Small Cell Lung cancer, Small Cell Lung Cancer, novel Strategies for Lung Cancer Immunotherapy.

Other Tumors of the Lung : Carcinoid Tumors, Adenoid Cystic Carcinoma and Other Primary Salivary Gland-Type, Tumors of the Lung, Benign Tumors of the Lung, Uncommon Primary Malignant Tumors of the Lung, Secondary Tumors of the Lungs, Lung Tumors in the Immunocompromised Host.

Mediastinum

Invasive Diagnostic Investigations and Surgical Approaches

Cervical Substernal "Extended" Mediastinoscopy, Sternotomy and Thoracotomy for Mediastinal Disease, Posterior Mediastinotomy, Video-

Assisted Thoracic Surgery for Mediastinal Tumors and Cysts and Other Diseases within the Mediastinum, Mediastinal Infections, Overview of Mass Lesions in the Mediastinum and Control of Vascular Obstructing Symptomatology. Acute and Chronic Mediastinal Infections. Overview of Primary Mediastinal Tumors and Cysts, Diagnostic Investigation of Mediastinal Masses, Lesions Masquerading as Primary Mediastinal Tumors or Cysts, Vascular Masses of the Mediastinum; Superior Vena Cava Syndrome: Clinical Features, Diagnosis, and Treatment. Vein Grafts for the Superior Vena Cava, The Use of Prosthetic Grafts for the Replacement of the Superior Vena Cava.

Primary Mediastinal Tumors

Myasthenia Gravis, Standard Thymectomy, Transcervical Thymectomy, Video-Assisted Thymectomy, Extended Transsternal Thymectomy, Transcervical Transsternal Maximal Thymectomy for Myasthenia Gravis, Evaluation of Results of Thymectomy for Non thymomatous Myasthenia Gravis, Benign Lymph Node Disease Involving the Mediastinum, Biological Markers and Pathology of Mediastinal Lymphomas, Diagnosis and Treatment of Mediastinal Lymphomas,

Benign Germ Cell Tumors of the Mediastinum, Primary Seminomas of the Mediastinum, Non seminomatous Malignant Germ Cell Tumors of the Mediastinum, Poorly Differentiated Carcinoma of the Mediastinum,

Benign and Malignant Neurogenic Tumors of the Mediastinum in Children and Adults, Excision of Hourglass Tumors of the Paravertegral Sulcus, Mediastinal Paragangliomas and Pheochromocytomas, Mesenchymal Tumors of the Mediastinum, Mediastinal Parathyroid Adenomas and Carcinomas.

Mediastinal Cysts

Foregut Cysts of the Mediastinum in Infants and Children, Foregut Cysts of the Mediastinum, Gastroenteric Cysts and Neuro enteric Cysts in Infants and Children, Mesothelial and Other Less Common Cysts of the Mediastinum.

VASCULAR SURGERY

Clinical vascular surgery, endovascular intervention, Recent advances in Vascular & Endovascular Surgery Clinical and operative surgery of Aorta, all arteries, veins, inferior vena cava. Endo Vascular intervention like Angioplasty, Stenting, Endo Vascular stent graft repair of aneurysm of arteries and abdominal aorta. Vascular medicine including prophylaxis, treatment of deep vein thrombosis and pulmonary embolism.

Texts and Journals

Recommended Textbooks:

- Cardiac Surgery: morphology diagnostic criteria, natural history, techniques, results and indications. Kirklin JW, Barrat-Boyes BG. Churchill-Livingstone
- Textbook of Adult Cardiac surgery-Dr Lawrence Cohn
- Surgery of the Chest. Sabiston, David C, Spencer. Saunders
- Cardiopulmonary Bypass, Principles and Practice- Glenn P Gravelee
- General Thoracic Surgery- Thomas W Shields
- Vascular Surgery-Rutherford
- Comprehensive Surgical Management of Congenital Heart Diseases-Richard Jonas.
- Operative Cardiac Surgery: Gardner & Spray
- Natural and Unnatural History of Congenital heart disease; Julien I.E.Hoffman

Recommended Journals:

- Annals of Thoracic Surgery
- Journal of Thoracic and Cardiovascular Surgery
- European Journal of Cardio-Thoracic Surgery
- World Journal for Pediatric & Congenital heart surgery
- Asian annals
- Circulation
- JACC
- Journal of Heart Valve disease
- Annals of Pediatric cardiolog

III. Program schedule and structure

Duration: 3 years

Ist Year:

1. Preliminary evaluation in out-patient department.

2. Admission and pre-operative evaluation and preparation of the patient.

3. Intensive care duty under supervision of senior resident.
4. Assist operative procedures.
5. Perform simple therapeutic procedure, Intercostal drainage, sternotomy and sternal closure, removal of intracardiac lines under supervision, removal of pacing wires, harvest of veins for CABG.
6. Academic presentation focussing on Anatomy and physiology of Cardiac, Vascular, and Thoracic disorders, and journal presentations and clinical case discussion.

IInd Year:

1. Preparation of the patient prior to surgery
2. Intensive care duty under supervision of senior resident/consultant.
3. Assist operative procedures.
4. Perform simple procedures in Theatre: Sternotomy, sternal closure, thoracotomy, Initiation of cardiopulmonary by-pass, weaning from cardiopulmonary by-pass, atrial septal defect closure.
5. Training in Echocardiography in Department of Cardiology – 2 weeks
6. Observation of diagnostic and therapeutic procedures in Cath Lab – 2 weeks
7. Academic presentation focusing on symposium and journal presentations and clinical case discussion.

8. Presentations in various regional, national and international professional meetings
9. Scientific publications in journal of repute

III[rd] Year:

1. Assist simple and complex procedures.
2. Perform simple cardiac, vascular, and thoracic procedures under supervision.
3. Intensive care duty under supervision of consultant.
4. Teaching Junior residents.
5. Academic presentation focusing on symposium and journal presentations and clinical case discussion.
6. Observation of diagnostic and therapeutic procedure in department of imaging science – 2 weeks
7. Observation of Thoracic procedures – outstation – 4 weeks
8. Presentations in various regional, national and international professional meetings
9. Scientific publications in journal of repute.

IV. Resident Evaluation

	SR1 year	SR 2 year	SR 3 year	Total (200)
Seminar	3	3	3	9
Journal Club	3	3	3	9
Case discussion	8	8	8	24
Suggestions 1)Outpatient services	10	05	05	20
2) In patient services	10	10	10	30
3) Specialty clinics & services				
4) Surgical procedures	05	10	15	30
5) Other suggestions				
Attitude to Patient Care	5	5	5	15
Theory examination	5	5	5	15
BMT	3			3
biostatistics	4			4
Papers publication + Award				10
Conference presentation				5
Attendance /Punctuality	2	2	2	6
Thesis			20	20
Total				**200/200**

1) Minimum mandatory seminars/ symposium/ journal club/case presentation must be mentioned in the document.
2) Transcript documents also may be mentioned in the documents, which can be filled by the resident and validated by the PI.
3) Any other suggestions can be given to the DAA.