THE TAMILNADU Dr.M.G.R. MEDICAL UNIVERSITY,

No.69, Anna Salai, Guindy, Chennai – 600 032.

D.M/ M.Ch
SUPER SPECIALTY DEGREE COURSE

SYLLABUS AND CURRICULUM

2021-2022

M.Ch - VASCULAR SURGERY

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

Syllabus - M.Ch -Vascular Surgery

I. AIMS:

The provision of excellent care for the vascular surgical patient, delivered safely, is at the heart of the curriculum. The aims of the curriculum are to ensure the highest standards of vascular surgical practice in INDIA by delivering high quality surgical training and to provide a program of training from the completion of the foundation years through to the completion of specialist surgical training, culminating in the award of a M.Ch. Degree.

The curriculum is based on the following key principles that support the achievement of these aims:

- A common format and similar framework.
- Systematic progression from the end of the foundation years through to the exit from surgical specialist training.
- Curriculum standards that are underpinned by robust assessment processes, both of which conform to the standards specified by the MCI.
- Regulation of progression through training by the achievement of outcomes that are specified within the specialty curricula. These outcomes are competence based rather than time-based.
- Delivery of the curriculum by vascular surgeons who are appropriately qualified to deliver surgical training.
- Formulation and delivery of surgical care by surgeons working in a multidisciplinary environment.
- Collaboration with those charged with delivering health services and training at all levels.

II. OBJECTIVES:

The vascular surgical curriculum has been designed around four broad areas, which are common to all the surgical specialties:

1. **Syllabus:** What trainees are expected to know, and be able to do, in the various stages of their training?

2. **Teaching and learning:** How the content is communicated and developed and how trainees are supervised.

3. **Assessment:** How the attainment of outcomes is measured / judged and feedback to support learning.

4. **Training systems and Imaging systems** - how the educational program is organized, recorded and quality assured.

In order to promote high quality, safe care of surgical patients, the curriculum specifies the parameters of knowledge, clinical skills, technical skills, professional behavior and leadership skills that are considered necessary to ensure patient safety throughout the training process and specifically at the end of training. The curriculum therefore provides the framework for vascular surgeons to develop their skills and judgment and a commitment to lifelong learning in line with the service they provide.

III. THEORY SYLLABUS:

The Specialty of Vascular Surgery is an established surgical specialty in INDIA and has evolved out as the specialty of general surgery. The Vascular Surgery Syllabus and the ability at the completion of training to manage a vascular emergency 'take', provide a common purpose across the specialty of Vascular Surgery.

The major areas of special interest associated with the specialty of Vascular Surgery are listed below, each involving the acquisition of both open and endovascular / endovenous competencies to include relevant imaging skills:

© Aortic

© Carotid

© Limb salvage

© Vascular Access for Patients with CKD

© Reno – vascular

© Visceral

© Venous disease – treatment of primary varicose veins, postphlebitic leg, Deep venous thrombosis and pulmonary embolism with emphasis on endovenous management.

In addition to these clearly defined disease-based areas of special interest there are others that are less well developed within the syllabus but represent substantial areas of practice:

- © Vascular Surgery related to trauma
- © The Vascular Surgery of Childhood
- © Vascular medicine
- © Transplant Surgery

The variations in the scope of practices within the specialty are highly variable and largely shaped by local circumstances, the needs of the service and the personal development of the surgeons delivering those services. All vascular surgeons will be given the opportunity to develop an area of special expertise by the time they gain their M.Ch Degree and some will then go on to include that area as a major part of their consultant practice as their individual careers develop. There is also significant shared ('Interface') practice with other specialties and subspecialties such as interventional radiology, cardiology, cardiothoracic surgery, Diabetology, Orthopaedic surgery, Surgical Gastroenterology, Geriatric medicine, Nephrology, transplant surgery and Neurology.

Areas of Special Interest:

- © Superficial and Deep venous disease
- © Lower limb ischaemia (acute and chronic)
- © Upper limb ischemia (acute and chronic)
- © Aortic aneurysmal disease
- © Peripheral artery aneurysms
- © Vascular accesses
- © Reno vascular disease
- © Carotid artery disease
- © Mesenteric vascular disease
- © Vascular trauma
- © Vascular anamolies
- © Lymphedema

Both open and endovascular interventions

- © Endovascular Interventions
- © Thoracic outlet syndrome
- © Diabetic foot
- © Vascular anomalies
- © Vasospastic disorders and vasculitis

Index Procedures:

In Vascular Surgery these are generally groups of procedures which are common and/or are seen as representing important areas of technical expertise. The more common procedures are also used during assessment by Surgical Directly Observed Procedural Skills (Surgical DOPS) and Procedure Based Assessments (PBAs).

- © Aortic aneurysm –infrarenal or thoracoabdominal aneurysm with visceral vessels involvement
    - Elective open /endovascular repair
    - Ruptured aneurysm repair (Open / endovascular)
- © Aorto - iliac occlusion
    - Aorto - bifemoral/biiliac bypasses
    - Extra anatomic bypasses
    - Endovascular intervention
- © Carotid Endarterectomy/ carotid stenting
- © Infra-inguinal bypasses/ angioplasty +/- stenting
- © Tibial artery bypasses / angioplasty +/- stenting
- © Emergency Embolectomies
- © Fasciotomies for compartment syndrome
- © Repair of false aneurysms-open /endovascular
- © Re-do Vascular Surgery- open / endovascular
- © Removal of infected graft
- © Varicose vein surgery

- Open Surgeries
- Endovenous ablation
- Foam sclerotherpy
- **Interventions for deep venous pathology**
  Venoplasty
- Hybrid procedure
- Open surgical bypass
- Endovenous ablations

© Vascular access for patients with CKD

© Treatment for central vein stenosis

© Intervention for Deep venous thrombosis

Catheter Directed Thrombosis

Mechanical thrombectomy

Pharmacomechanical thrombectomy

© Embolisation of AVM

© Endovenous stenting/plasty

© IVC filters

Bioethics:

1. Respect human life and the dignity of every individual.
2. Refrain from supporting or committing crimes against humanity and condemn all such acts.
3. Treat the sick and injured with competence and compassion and without prejudice and apply the knowledge and skills when needed.
4. Protect the privacy and confidentiality of those for whom we care and breach that confidence only when keeping it would seriously threaten their health and safety or that of others.
5. Work freely with colleagues to discover, develop and promote advances in medicine and public health that ameliorate suffering and contribute to human well being.

6. Educate the public about present and future threats to the health of humanity.
7. Advocate for social, economic, educational and political changes that ameliorate suffering and contribute to human well being.
8. Teach and mentor those who follow us, for they are the future of our caring profession.

IV. CLINICAL TRAINING:

The training programme shall aim to provide sound knowledge in the diagnostic and investigative aspects of Vascular Surgery for the candidate.

It will provide practical training in clinical and operative surgery including endovascular surgery. In addition to the exposure to Vascular Surgery at the institute, the candidate will also have an opportunity during the training period to spend a period up to three months in other specialized centers for enriching his experience in Vascular Surgery.

During the training period the candidate shall work for all three years on full-time resident basis under the Head of the Department Vascular Surgery. He shall take part in all activities of the department including participation in seminars, conferences, teaching assignment, operating sessions, experimental surgery and other duties that may be assigned to him by the Head of the Department.

- **Four Months Rotation among Units**
- **Special Postings:**
  - **First Year:**
    - Radiology 30 Days
    - Cardiothoracic Surgery 30 Days
  - **Second Year:**
    - Students are encouraged to undergo special postings for learning new advanced techniques / Procedure / Skills in institutions of higher repute where the requisite facilities are available without affecting the duties of the parent department (Maximum of two months)

CONFERENCES:

Students are encouraged to participate in

- ✓ Annual Conferences / Mid Term Conferences
- ✓ International Conferences
- ✓ Paper Presentation
- ✓ Research activities and publication in reputed national and international journals

In general terms, by the end of training, vascular surgeons have to demonstrate:

- ✓ Theoretical and practical knowledge related to surgery in general and to their specialty practice
- ✓ Technical and operative skills both open and endovascular
- ✓ Clinical skills and decision making
- ✓ Generic professional and leadership skills;

© An understanding of the values that underpin the profession of vascular surgery and the responsibilities that comes with being a member of the profession. The special attributes needed to be a vascular surgeon.

© A commitment to their ongoing personal and professional development and practice using reflective practice and other educational processes.

© An understanding and respect for the multi-professional nature of healthcare and their role in it and

© An understanding of the responsibilities of being an employee of a hospital and/or a private practitioner.

V. SKILL TRAINING:

FIRST YEAR TOPICS:

1. VASCULAR ANATOMY

Objective

- Knowledge of anatomy and embryology of the vascular system

Knowledge

- Anatomy of venous, arterial and lymphatic system
- Normal and abnormal embryological development of the circulation Anatomy

Clinical Skills

- Able to relate anatomy to imaging and to operative findings
- Palpation of peripheral pulses
- Palpation of the abdominal aorta
- Able to explain vascular anatomy to patients and colleagues

2. VASCULAR PHYSIOLOGY

Objective

- Knowledge of the physiology of the circulation

Knowledge

- Detailed knowledge of the control of blood pressure and factors affecting it
- Detailed knowledge of blood flow, haemostasis and the effects of haemorrhage
- Detailed knowledge of the effects of ischaemia and reperfusion
- Detailed knowledge of microcirculatory and lymphatic physiology

Clinical Skills

- Able to safely manage a patient in the early post- operative phase after major vascular interventions e.g. cardiac, respiratory and renal monitoring and support
- Able to correct clotting abnormalities in patients undergoing vascular interventions
- Able to undertake prophylactic and therapeutic anticoagulation
- Can explain vascular physiology to patients and colleagues

3. VASCULAR PATHOLOGY

Objective

- Knowledge of the diseases (congenital and acquired) of the circulation

Knowledge

- Aware of the congenital and pathological conditions that affect the circulation
- A detailed knowledge of atherosclerosis and its associated risk factors, venous disease, lymphatic disease, thromboembolic disease, vasospastic and vasculitic disease
- A detailed understanding of the mechanisms of vascular trauma, causes of peripheral neuropathy, alternative causes for limb pain (neurological and musculoskeletal)

Clinical Skills

- Able to take detailed history from patient with arterial or venous disease
- Examination of ischaemia and aneurysmal disease
- Examination of varicose veins and swollen leg
- To detect pathological arterial and venous abnormalities

- Able to prioritize to recognize patients who need to be seen or treated urgently
- To select appropriate investigations tailored to the individual patient
- To explain vascular disease to patients and colleagues

Technical Skills

- Hand - held Doppler assessment of varicose veins
- Ankle Brachial Pressure Indices and waveform interpretation
- Duplex ultrasound assessment of arterial and venous system assessment of vessels for AV access procedures
- **4. VASCULAR EPIDEMIOLOGY**

Objective

- Knowledge of the epidemiology of vascular disease

Knowledge

- Principles of epidemiology, including basic study design and relevant terms.
- Epidemiology of peripheral arterial disease.
- Epidemiology of venous disorders including varicose veins and venous Thromboembolism and post-phlebitic syndrome
- Epidemiology and interactions of major vascular risk factors including smoking demographics

Clinical Skills

- Explanation of risk factors to a patient with vascular disease

5. SCREENING AND SURVEILLANCE

Objective

- Knowledge of the principles of screening

Knowledge

- Key elements of design and delivery of screening tests in general AAA screening and surveillance programme.
- Governance and quality control of AAA screening.
- EVAR/TEVAR and vein graft surveillance

Clinical Skills

- Counseling a patient undergoing screening or who has a positive screening test

Technical Skills

- Measure AAA diameter in US scan/carotid stenosis /graft patency

6. RISK FACTOR MODIFICATION

Objective

- Knowledge of vascular risk factors and risk factor modification

Knowledge

- Blood pressure control.

- Lipid lowering therapy.
- Management of diabetes.
- Smoking cessation.
- Antiplatelet and anticoagulant therapy.
- Exercise and exercise therapy.
- Dietary factors and weight control.
- Guidelines for hypertension and hyperlipidaemia management

Clinical Skills

- Explanation of risk factor modification to a patient
- Ability to assess and prescribe blood pressure and other risk factor medication.
- Understanding of main drug interactions and side effects of key risk reduction drugs (e.g. statins, antiplatelet agents & antihypertensives).
- Smoking cessation counseling
- Dietary and exercise advice to PAD patients
- Interpretation of a lipid screen and other relevant biochemical screens

Technical Skills

- Set up an insulin sliding scale

7. VASCULAR CONDITIONS OF CHILDHOOD

Objective

- Assessment and management of children with developmental and traumatic conditions of their circulatory system

Knowledge

- Principles of surgery in children
- Vascular conditions of childhood including trauma.
- Haemangiomas, venous malformations, AV malformations and lymphatic malformations.
- Treatment options

Clinical Skills

- History and examination of children.
- Communication with parents and /or carers
- Examination of vascular anomalies
- Investigation of vascular anomalies(Hand-held Doppler, Duplex ultrasound and Arteriography)
- Management strategy (Medical including compression, Endovascular & Surgical)

Technical Skills

- Arterial repair (e.g. following supracondylar fracture)
- Vascular access

8. NUTRITION

Objective

- Recognise the need for artificial nutritional support, assess whether this is appropriate and arrange treatment

Knowledge

- Effects of malnutrition, both excess and depletion
- Methods of screening and assessment

Clinical Skills

- Arrange access to suitable artificial nutritional support.
- Dietary supplements.
- Enteral nutrition and Parenteral nutrition

Technical Skills

- Insertion of untunneled central venous catheter
- Insertion of tunneled central venous catheter (Hickman or port)

9. CARDIO-RESPIRATORY DISEASE

Objectives

- Assessment and management of patients with co-existent cardiac and/or respiratory disease

Knowledge

- Anatomy of the heart and lungs
- Cardio-respiratory physiology
- Cardio-respiratory pathology (IHD, MI, heart failure, COPD, ARDS)
- Prognosis and impact upon patients undergoing major vascular surgery
- Therapeutic options including pharmacology and drug interactions.
- Current guidelines on resuscitation
- Define indications for and hemodynamic consequences of positive pressure ventilation

Clinical Skills

- Examination of the heart and lungs
- Select patients who require pre-operative investigations (ECG, ECHO, MUGA, 24hr tape, CXR, CT, respiratory function test,)
- Interpretation of results
- Identify patients unsuitable for vascular intervention

Technical Skills

- Arterial blood gas sampling and interpretation of the results.
- Basic management of acute MI/heart failure, Cardiopulmonary resuscitation (ALS)
- Insertion of chest drain and management.
- Mini tracheostomy

10.HAEMATOLOGY

Objectives

- Competent in relevant aspects of blood transfusion, bleeding disorders and drugs that affect clotting

Knowledge

- Coagulation and fibrinolysis pathways
- Epidemiology, natural history, and molecular basis of haemophilia and Thrombophilia
- Pharmacology of unfractionated heparin, LMWH, Warfarin and antiplatelet agents.
- Principles of donor selection and preparation of blood components and viral safety.
- Coagulation factors and their side effects
- Principles of clinical blood transfusion including hazards of blood transfusion.
- Methods of blood conservation including pre-donation and intra-operative cell salvage.
- Mechanism of DIC.
- Effect of massive blood transfusion, renal and hepatic disease

Clinical Skills

- Interpretation of laboratory results
- Methods and complications of reversing anti-coagulation in patients with and without haemorrhage.
- Management of haemophilia and thrombophilia in terms of treatment and prophylaxis before vascular surgery.
- Initiation and monitoring of anticoagulation.
- Initiation of antiplatelet therapy in various situations.
- Appropriate use of blood and blood products,
- Management of complications from blood transfusion

Technical Skills

- Intra-operative use of heparin, monitoring techniques (TEG) and reversal using protamine

11. CLINICAL AUDIT, RESEARCH & HEALTH ECONOMICS

Objective

- An understanding of the relevance of clinical audit, research and health economics to the practice of vascular surgery

Knowledge

- National Vascular Database
- Principles of audit and quality control
- Principles of clinical research and systematic review
- Evidence based vascular practice
- Knowledge of key health economic terms
- Important generic QOL tools for venous and arterial disease
- Relevance of QALYS and calculation of incremental cost effectiveness ratio
- Types of health economic analyses
- Planning and budgeting vascular services

Clinical Skills

- Participation in local and national audit of outcomes
- Conducting a morbidity and mortality meeting
- Conducting a journal club
- Participation in clinical research Presentations at vascular meetings
- Publications in vascular journals
- Can explain the principles of health economics to patients, colleagues and managers
- ALS course and basic research methodology

12. OUTPATIENT, WARD and MDT MEETINGS

Objective

- Assess individual vascular outpatients and inpatients
- Manage an outpatient clinic
- Ward rounds and multi disciplinary meetings

Knowledge

- Individual patient assessment
- Relevant vascular anatomy, physiology and clinical knowledge
- Outpatient and inpatient service
- Understanding of hospital organisation
- Understanding of multi-disciplinary team and meetings
- Relevant guidelines for vascular disease management

Clinical Skills

- Individual patient assessment
- Focused history taking and examination
- Organise appropriate investigations
- Management of an outpatient clinic, ward round and MDT meeting
- Presentation of patients on ward round and at MDT
- Ability to allocate management of patients to appropriate team members,
- Appropriate referral to other specialists when indicated
- Liaison with critical care and other support services (e.g. pain team, physiotherapy, rehab)
- Ability to prioritise urgent patient appointments, investigations and interventions
- Prompt and clear clinic letters and discharge summaries

SECOND YEAR TOPICS:

1. PRINCIPLES OF VASCULAR IMAGING

Objective

- Radiation safety
- Principles and indications for vascular imaging

Knowledge

- Principles of ultrasound, CT and MR imaging and catheter angiography
- Dangers of ionizing radiation and safe practice
- Monitoring of ionizing radiation and how exposure can be reduced
- Regulations and requirements in use of ionizing radiation
- Indications and factors determining appropriate investigation for a patient with vascular disease
- Vascular contrast agents and associated hazards

Clinical Skills

- Explanation of various imaging modalities to a patient
- Selection of appropriate investigation
- Evaluate patient for procedure
- Identify factors that increase risk for patient

2. VASCULAR ULTRASOUND

Objective

- To understand and be able to perform basic vascular and intravascular ultrasound

Knowledge

- Understand the principles of vascular and intravascular Doppler ultrasound

- Understand limitations of US scanning
- Understand ultrasound spatial resolution in relation to scan plane
- Understand the requirements for imaging different vascular territories
- Ultrasound image interpretation

Clinical Skills

- Explanation of ultrasound to a patient

Technical Skills

- Able to choose the appropriate ultrasound probe
- Able to optimize grey scale imaging
- Able to optimize colour flow imaging
- Able to optimize pulsed wave settings
- Able to perform superficial venous ultrasound studies
- Able to perform arterial ultrasound studies for intra-operative quality control
- Able to screen for AAA and measure the AP diameter/carotid screening
- Percutaneous puncture of saphenous vein under US control
- Percutaneous puncture of femoral artery under US control

3. COMPUTED TOMOGRAPHIC IMAGING

Objective

- To understand, interpret and manipulate CT imaging and CT angiography

Knowledge

- Understand how CT images are generated
- Understand concepts of helical and multi-slice scanning
- Understand that scans are performed in the axial plane
- Understand CT spatial resolution
- Recognise X-ray dose and risks associated with study
- Recognise the need to tailor individual scan to clinical problem e.g. AAA elective vs. emergency, mesenteric/renal, carotid, peripheral and venous
- Understand basic principles of image reformatting in various planes
- Understand the principle behind image reconstruction and MIP images
- Understand the use of intravascular and oral contrast agents
- Recognise risks of intravascular contrast and how to avoid them
- Understand common artifacts

Clinical Skills

- Explanation of CT and the risks to a patient
- Able to manage contrast reactions

- Able to recognise normal cross-sectional anatomy
- Able to recognise vascular pathology on scans

Technical Skills

- Able to manipulate images on the console
- Able to obtain appropriate measurements of blood vessels

4. MAGNETIC RESONANCE IMAGING

Objective

- To understand, interpret and manipulate MR imaging and MR angiography

Knowledge

- Understand how MR images generated
- Recognise the risks of MRI
- Understand that scans are performed in any plane
- Understand MR spatial resolution in relation to scan plane
- Recognise the need to tailor individual scan to clinical problem e.g. AAA elective vs. emergency, mesenteric/renal, carotid, peripheral and venous
- Understand the principles of non contrast MR angiographic techniques
- Understand the principles of contrast enhanced MR angiographic techniques
- Understand basic principles of image reformatting in various planes
- Understand the principle behind image reconstruction and MIP images
- Understands the different types of MR angiographic contrast
- Recognise common MR artifacts

Clinical Skills

- Explanation of MRA and the risks to a patient
- Able to recognise normal cross-sectional anatomy
- Able to recognise vascular pathology on scans

Technical Skills

- Able to manipulate images on the console
- Able to obtain appropriate measurements of blood vessels

5. DIGITAL SUBTRACTION ANGIOGRAPHY

Objective

- To understand and perform Digital Subtraction angiography

Knowledge

- Commonly used arterial and venous access sites

- Commonly used contrast agents, including Co2
- Road mapping, parallax, measurement techniques, hand and power injection
- Measures to improve angiographic imaging e.g. breath holding, multi-masking, centering, collimation, frame rate, antegrade etc
- Risks of angiography
- Guide wire and catheter types, characteristics and indications
- Introducer, dilator and sheath types, characteristics and indications

Clinical Skills

- Explanation of catheter angiography and the risks to a patient

Technical Skills

- Retrograde femoral artery puncture
- Antegrade femoral artery puncture
- Ultrasound guided arterial and venous puncture
- Obtains secure vascular access with sheath and flushes catheters
- Pressure measurement
- Positions guide wire and places non selective catheter using fluoroscopy
- Keep radiation dose to minimum by use of appropriate by fluoroscopy, collimation and runs
- Obtain satisfactory intra-operative angiograms
- Recognize inadequate study and need for alternative angiographic views

THIRD YEAR TOPICS:

I. ENDOVASCULAR PROCEDURES

Objective

- To gain endovascular knowledge and skills

Knowledge

- Indications and outcomes for endovascular intervention
- The complementary role of endovascular therapy to medical and surgical therapy
- Balloon and stent types, characteristics and indications
- Stent graft types, characteristics and indications
- Materials used for embolisation, characteristics and indications
- Closure devices, characteristics and indications
- Interventions for venous diseases

Clinical Skills

- Explanation of endovascular intervention and the risks to a patient
- Undertakes preoperative checks and team briefing

- Demonstrates good patient, personal and team safety
- Ensures good asepsis, especially when prosthetic materials are involved
- Good communication with patient and all members of the angio team
- Accurate procedural record and post-procedural instructions
- Recognizes complications e.g. dissection, embolisation
- Use drugs appropriately e.g. vasodilators, anticoagulants, analgesics, sedatives, anti- peristaltics

Technical Skills

- Chooses appropriate equipment e.g. catheter , sheath, guide wire, balloon, stent
- Perform selective catheterization
- Manipulate catheter and wire across lesions
- Performs balloon angioplasty in various vascular territories
- Performs primary stenting in various vascular territories
- Performs selective embolisation
- Use of closure devices
- Use of thermal and non-thermal ablation of varicose veins
- Endovascular intervention for deep venous pathology
- IVC filter placement

II. OPEN VASCULAR SURGERY

Objective

- To gain open vascular surgical knowledge and skills

Knowledge

- Knows the importance of preoperative checks and team briefing for patient safety
- Antibiotic prophylaxis and anticoagulation
- Blood transfusion and the management of transfusion-related complications
- Intra-operative cell salvage and the use of other blood products
- Principles of local anaesthesia and local blocks e.g. metatarsal
- Common vascular skin incisions and exposure
- Methods of vascular control
- Principles of vascular reconstruction
- Intervention for venous diseases
- Selection of amputation level
- Types and characteristics of bypass grafts, anastomoses and vascular sutures
- Types and characteristics of vascular instruments

Clinical Skills

- Explanation of open vascular surgery and the risks to a patient
- Demonstrates good patient, personal and team safety
- Ensures good asepsis, especially when prosthetic materials are involved
- Good communication with patient and all members of the theatre team
- Accurate procedural record and post-procedural instructions

Technical Skills

- Exposure and control of arteries (e.g. common femoral)
- Harvesting of long saphenous (or other) vein
- Arteriotomy and direct or patch repair
- End-to-end and end-to-side anastomosis
- Embolectomy + on-table arteriogram/thrombolysis
- Exposure and control of veins (e.g. SFJ Local amputation (e.g. toes)
- Major amputation (e.g. BKA)
- Wound debridement

1. ACUTE LOWER LIMB ISCHAEMIA

Objective

- Ability to recognise acute lower limb ischaemia and institute emergency management

Knowledge

- Anatomy of arterial system
- Lower limb neurology
- Pathophysiology of acute limb ischaemia - Embolism, Thrombosis, Trauma (blunt & penetrating), Fractures & dislocations and Iatrogenic injury
- Pathophysiology of compartment syndrome
- Investigations - Doppler/Duplex, Angiography, Compartment pressures, Intra-operative angiogram, ECG & echocardiogram
- Management - conservative, embolectomy, thrombolysis & primary amputation

Clinical Skills

- History
- Examination
- Co-ordination with trauma team

Technical Skills

- Hand-held Doppler assessment
- Duplex ultrasound assessment
- Measurement of compartment pressures
- Surgical approaches to the arterial tree
- Surgical control of lower limb blood vessels

- Embolectomy (blind & directed, femoral/popliteal)
- On table angiography and thrombolysis
- Emergency arterial reconstruction
- Vascular shunts
- Lower leg fasciotomies
- Emergency venous reconstruction
- Percutaneous thrombolysis
- Percutaneous clot aspiration

2. VASCULAR TRAUMA

Objective

- Identification, assessment and management of injuries to blood vessels and associated injuries

Knowledge

- Surgical anatomy relative to fractures, nerves and associated structures
- Mechanisms of vascular injury (penetrating, blunt and iatrogenic)
- Low energy and high energy transfer injury
- Pathophysiology of trauma, muscle ischaemia and shock lung
- Pathophysiology of traumatic A-V fistula
- Investigations for bleeding/ischaemia (Duplex, CTA, on-table arteriography)
- Operative approach to specific Injuries - cervical, thoracic, abdominal & limb
- Combined arterial and venous injuries
- Combined fractures and nerve injury

Clinical Skills

- Symptoms and signs of acute arterial / venous injury
- Investigation (ABPI, Duplex & angiography)
- Assessment of multiply injured patient
- Manage systemic effects of arterial trauma (e.g.rhabdomyolysis)

Technical Skills

- Arrest haemorrhage by pressure, pack & tourniquet
- Recognise and treat sucking chest wound and Chest drain
- Proximal vascular control
- Emergency thoracotomy
- Ligation, Lateral suture repair, End to end anastomosis, Interposition graft, Panel / spiral grafts & Fasciotomies
- Shunts
- On-table arteriography
- Endovascular balloon control embolisation
- Insertion of covered stents

3. CHRONIC LOWER LIMB ISCHAEMIA

Objective

- Management of the chronically ischaemic lower limb, including intervention

Knowledge

- Anatomy and embryological development of arteries supplying the lower limb
- Pathology of atherosclerosis, thrombosis and complications
- Pathology of non –atherosclerotic arterial conditions (e.g.fibromuscular dysplasia, Buerger's disease, vasculitis and pyoderma gangrenosum)
- Vascular anomalies (e.g. persistent sciatic artery, cystic adventitial disease and popliteal entrapment)
- Role of medical treatment/exercise therapy
- Wound dressings & VAC

Clinical Skills

- Selection for revascularization or amputation
- Management of postoperative wound infection and graft complications
- Graft surveillance
- Amputation level selection
- Rehabilitation after amputation
- Lower limb prosthesis

Technical Skills

- Exposure of infrarenal aorta, iliac, femoral, popliteal, tibial and pedal vessels
- Aorto-iliac & aorto-femoral bypass
- Axillo-femoral bypass
- Femoral endarterectomy and patch
- Ilio-fem and fem-fem bypass
- Above and below-knee fem-popliteal bypass
- Distal bypass (AT, PT, peroneal & pedal)
- Vein preparation - in-situ/reversed/arm vein/SSV Vein & cuff / patch
- Intra-operative assessment with Doppler and angiography
- Wound debridement/VAC placement
- Angioplasty/stenting - aorta/iliac/SFA/popliteal/tibial
- Sartorius muscle flap
- Digital/ray amputation
- Transmetatarsal/transtibial,Burgess, skew/through knee/above knee amputation & Hindquarter amputation

4. VASCULAR COMPLICATIONS OF DIABETES

Objective

- Assessment and management of patients with complications of diabetes affecting the leg/foot

Knowledge

- Anatomy of the foot
- Complications of diabetes affecting the foot including neuropathy, ulceration, osteomyelitis and Charcot
- Investigations (X-ray, ultrasound & MR of foot, arteriography)
- Prevention of complications
- Orthotic devices and principles of offloading
- Interpretation of microbiology data and selection of antibiotics
- Emergency treatment for infection
- Revascularisation procedures

Clinical Skills

- Explanation of principles of foot care to diabetic patients
- Examination of diabetic foot/ulceration
- ABPI, pole test, 10g monofilament test & Setting up a sliding scale

Technical Skills

- Surgical debridement of foot Wound care including VAC

5. VASCULAR DISEASE OF THE UPPER LIMB

Objective

- Ability to recognise and manage:
  - (i) Acute upper limb ischaemia
  - (ii) Chronic upper limb ischaemia and
  - (iii) Thoracic outlet syndrome

Knowledge

- Anatomy Upper limb vasculature, Upper limb neurology, Thoracic outlet
- Pathology - Thromboembolic disease, Atherosclerotic disease, Thoracic outlet syndrome, Subclavian steal syndrome, Vasospastic disease & Trauma
- Management - Conservative, Pharmacological (anticoagulant/prostacyclin and Endovascular (angioplasty/stent) and Surgical (rib resection, embolectomy & bypass)

Clinical Skills

- Take a relevant history and examine the upper limb vessels and nerves including provocation tests
- Role of Doppler, duplex ultrasound, CT, MRA and conventional angiography.
- Selection for surgical/endovascular intervention

Technical Skills

- Exposure of subclavian, vertebral, axillary, brachial and radial arteries
- Brachial embolectomy
- Subclavian aneurysm repair
- Subclavian to brachial bypass
- Subclavian transposition
- Subclavian to carotid bypass
- Excision of cervical rib
- Thoracic outlet decompression (supraclavicular, infraclavicular and transaxillary approaches)
- Intra-operative arteriography and thrombolysis
- Subclavian artery angioplasty/ stenting

6. VASOSPASTIC DISORDERS AND VASCULITIS

Objective

- Assessment and management of patients with vasospastic disorders (primary and secondary) and vasculitis

Knowledge

- Anatomy and physiology of sympathetic nervous system
- Pathophysiology of primary and secondary vasospastic disorders (e.g. Reynaud's disease, thoracic outlet compression, Vibration White Finger, Connective tissue disease - systemic sclerosis, SLE, rheumatoid arthritis), Vasculitis (Buerger's disease, Takayasu's, giant cell arteritis, PAN, HIV, TB)
- Investigations (Cold provocation, blood tests)
- Treatment options (Cold avoidance, smoking cessation, vasodilators - e.g. calcium channel blockers), digital sympathectomy, chemotherapy & retroviral therapy)

Clinical Skills

- History and examination Management strategy
- Skin biopsy
- Digital Sympathetomy
- Thoracic outlet decompression

7. CAROTID ARTERY DISEASE

Objective

- Assessment and management of patients with Cerebrovascular disease
- Surgical management of patients with carotid artery territory symptoms

Knowledge

- Anatomy and pathophysiology of stroke
- Classification of stroke
- Stroke severity score
- Definition of TIA and differential diagnosis
- Etiology and epidemiology of stroke
- Guidelines for management of hypertension and hyperlipidaemia
- Indications and use of investigations (CT/A, MRI/A, carotid duplex, echocardiogram)
- Indications for medical or interventional treatment
- Acute intervention including thrombolysis
- Stroke prevention (antiplatelets, anticoagulants)
- Selection for carotid endarterectomy and stenting
- Carotid body tumours
- Carotid dissection and Carotid trauma

Clinical skill

- Medical management (antiplatelet agents, hypertension, hyperlipidaemia)
- Communication of risks and benefits of intervention
- Assess post-operative complications (stroke, bleeding, airway obstruction, cranial nerve injury)
- Cervical block - Standard and retro jugular approach
- Standard and eversion endarterectomy
- Use of carotid shunts
- Distal intimal tacking sutures
- Primary and patch closure
- Use and interpretation of intra-operative quality control:(angioscopy, duplex ultrasound or completion arteriography)
- Re-do carotid endarterectomy
- Placement of guide wire and catheter
- Placement of cerebral protection device and Endovascular stent

8. ANEURYSM - ELECTIVE

Objective

- Assessment and management of elective aneurysms

Knowledge

- Anatomy of aorta and main branches
- Pathology of aortic aneurysms (atherosclerotic inflammatory, mycotic, collagen disorders, post-dissection & vasculitic)

- Aortic dissection & Thoraco-abdominal aneurysms
- Pathology of other aneurysms (popliteal, visceral, carotid, subclavian and false aneurysms)
- Investigation – US, CTA, MRA and PET
- Treatment options - medical, open, EVAR/TEVAR & hybrid)

Clinical Skills

- History and examination
- Assessment of co-morbidity (cardio-respiratory/renal)
- Endovascular planning
- Ability to recognise/manage post-operative complications: bleeding, thrombosis, embolism, organ failure, endoleak & infection

Technical Skills

- Open repair - Supra-renal AAA repair, Juxta-renal AAA repair, Infrarenal AAA repair, Inflammatory AAA repair & Internal iliac aneurysm repair
- Thoraco-abdominal aneurysm -.open repair
- Thoraco-abdominal aneurysm - hybrid repair
- Popliteal aneurysm repair
- Visceral aneurysm repair
- Carotid aneurysm repair
- Subclavian aneurysm repair
- Repair of femoral false aneurysm
- Re-operation for infected graft
- Endovascular repair infrarenal AAA
- Internal iliac artery/aneurysm coiling
- Aorto-uniliac stent graft, iliac occluder & crossover graft
- Juxtarenal or suprarenal AAA – fenestrated /branched stent
- Thoracic aneurysm/dissection stent graft
- Correction of endoleak
- Stenting of peripheral/visceral aneurysm

9. ANEURYSM - EMERGENCY

Objective

- Assessment and management of emergency aneurysms

Knowledge

- Risk factors for aneurysm rupture
- Appropriate/timely investigation of an emergency aneurysm (acute/ruptured)
- Open and endovascular treatment options

- Surgical methods of immediate aortic control-supracoeliac and infrarenal

Clinical Skills

- History and examination
- Assessment of co-morbidity
- Select patients for conservative management, open/endovascular repair
- Recognise/manage complications

Technical Skills

- Open repair ruptured infrarenal AAA
- Suprarenal/supracoeliac clamp
- Femoral thrombectomy and or additional lower limb revascularisation
- Balloon control of aorta
- Endovascular repair of ruptured infrarenal AAA
- Endovascular stenting of acute aortic dissection
- Endovascular stenting of acute aortic dissection
- Aorto-uniliac stent graft, iliac occluder and crossover graft

10. VASCULAR ACCESS (VA)

Objective

- To describe need for VA, common methods of VA, establish VA and manage complications of VA

Knowledge

- Anatomy of upper and lower limb arteries and veins
- List indications for VA
- Knowledge of methods of renal support; advantages and disadvantages
- Physiology of arterio-venous fistulae
- Knowledge of conduit material
- List complications of VA
- Knowledge of preoperative investigations including ultrasound

Clinical Skills

- Preoperative assessment and choice of VA
- Arrange appropriate investigations
- Ultrasound assessment of patient needing vascular access

Technical Skills

- Radiocephalic AVF
- Brachiocephalic fistula
- Basilic vein transposition AV fistula
- Create forearm loop graft

- Create thigh loop graft
- Saphenous vein transposition AV fistula
- On table fistulogram/angioplasty
- Graft thrombectomy and revision
- Ligation/excision of fistula or graft
- DRIL or other salvage procedure
- Complex revision procedures
- Percutaneous fistulography and endovascular intervention
- Ultrasound guided cannulation of jugular vein and femoral artery
- Insertion of central venous dialysis catheter
- Insertion of peritoneal dialysis catheter

11. RENOVASCULAR DISEASE AND TRANSPLANTATION

Objective

- Knowledge and management of vascular problems related to renal disease and vascular surgical problems in patients with renal disease and renal transplantation

Knowledge

- Renal & Reno-vascular anatomy
- Role of kidney in control of blood pressure
- Role of kidney in calcium homeostasis
- Pathophysiology of chronic kidney disease
- Pathophysiology of acute kidney injury
    - Pre-renal: shock, trauma, sepsis, atherosclerosis
    - Renal: intrinsic renal disease, toxins
    - Post renal: obstruction, stone, tumour

Clinical Skills

- Pre-operative assessment
- Arrange appropriate investigations
- Role of CT angiography in assessing renal disease
- Indications for renal angiography/angioplasty
- Indications for retrograde ureteric imaging
- Indications for isotope renography
- Indications for selective renal vein sampling
- Indications for renal biopsy

Technical Skills

- Open approach to kidney
- Laparoscopic approach to kidney
- Exposure of renal vessels
- Renal artery endarterectomy/bypass
- Open surgical nephrectomy
- Radiological access to renal arteries
- Renal artery embolisation
- Renal artery angioplasty
- Living kidney donor nephrectomy
- open/laparoscopic Renal auto transplant
- Renal allotransplant
- Transplant nephrectomy

12. MESENTERIC VASCULAR DISEASE

Objective

- Assessment and management of patients with acute and chronic mesenteric ischaemia

Knowledge

- Anatomy of mesenteric arterial and venous system
- Physiology of mesenteric vasculature
- Pathophysiology of mesenteric ischaemia
- Presentation of mesenteric vascular disease - acute and chronic
- Investigation - Mesenteric angiography, CT
- Treatment - Medical, surgical, endovascular
- Complications

Clinical Skills

- History and examination of acute and chronic presentation
- Resuscitation
- Interpretation of investigations
- General management

Technical Skills

- Radiological intervention (lysis, angioplasty, stenting)
- Mesenteric thromboembolectomy
- Mesenteric bypass

13. SUPERFICIAL VENOUS DISEASE

Objective

- Assessment and management of varicose veins, including recurrent veins and complications

Knowledge

- Anatomy of the superficial venous system
- Physiology of venous dynamics and Graduated support
- Pathology of superficial venous incompetence, Neovascularisation, Recanalisation and Pelvic venous reflux
- Complications of venous hypertension (Oedema, Lipodermatosclerosis, ulceration, bleeding & recurrence)

Clinical Skills

- Presenting symptoms and complications
- Examination varicosities and venous incompetence
- Identify complications
- Interpretation of venous duplex
- Interpretation of venography
- Interpretation of plethysmography
- Management options (conservative, sclerotherapy, endovenous thermal ablation & surgery)

Technical Skills

- Apply compression bandage
- Injection sclerotherapy
- Truncal foam sclerotherapy
- Cannulate long and short saphenous veins under US control
- Endovenous thermal ablation (EVLT/VNUS) and non –thermal ablation
- Surgery (multiple phlebectomies, sapheno-femoral junction ligation, sapheno-popliteal junction ligation, long saphenous vein stripping)
- Recurrent varicose vein surgery

14.DEEP VENOUS THROMBOSIS

Objective

- Assessment and management of patient with deep venous thrombosis

Knowledge

- Anatomy of deep veins - lower limb / pelvis
- Pathophysiology of thrombosis and DVT
- Management of uncomplicated DVT
- Early / late complications of DVT
- Thrombophilia
- Thromboprophylaxis
- Investigations(Ultrasound, duplex, V/Q scans, CTPA)

- Indications for intervention (caval filters, thrombolysis and surgical thrombectomy)

Clinical Skills

- History and examination
- Investigation (Duplex, interpretation MRV and CTPA)

Technical Skills

- Endovenous therapy (thrombolysis)
- Venous thrombectomy
- Insertion and removal of caval filter

15.DEEP VENOUS INSUFFICIENCY

Objective

- Assessment and management of patient with deep venous insufficiency

Knowledge

- Pathology of deep venous insufficiency (DVT, valvular dysfunction, valvular agenesis)
- Management options (compression systems, valvuloplasty, valve transplant, bypass & amputation)

Clinical Skills

- History - identify risk factors
- Examination - diagnose complications
- Investigation – Duplex, venography & plethysmography

Technical Skills

- Apply compression bandage
- Biopsy of leg ulcer
- Perforator ligation
- Deep venous reconstruction - bypass (e.g. Palma), Iliac venous stent

16.LYMPHOEDEMA

Objective

- Assessment and management of patients with lymphoedema

Knowledge

- Anatomy, Physiology and Pathophysiology of lymphatic system
- Classification of lymphoedema (primary and secondary)
- Clinical features
- Complications - chronic effects.
- Investigation – lymphoscintigraphy, lymphangiogram, CT/ MRI

- Management (manual compression, compression bandaging, compression hosiery, surgical options)

Clinical Skills

- History and examination
- Interpretation of investigations
- Management plan

Technical Skills

- Application of compression bandage
- Treatment of lymphoceles and lymphatic leaks

VI. TEACHING METHODOLOGY
STRUCTURE OF FACULTY

1. Clinical Evaluation Index
2. Case Based Discussion
3. Performance Based Assessment
4. Multi Source Feedback
5. DOPS- Direct Observation Of Procedural Skills

VII. RESEARCH WORK:

- The candidate will be trained in the ability to
  - ✓ Frame a research question.
  - ✓ Plan a study to answer the question.
  - ✓ Collect the relevant information and
  - ✓ Evaluate appropriately the collected data to draw a conclusion.
    - ➢ The candidate should become conversant with the reporting of these results as a research paper in journals and as a presentation in conferences.

Students should compulsorily attend the Research Methodology workshop conducted by the University with in first six months of M.Ch. Course.

VIII. LOG BOOK:

- The candidate must maintain a log book of all his/her activities with respect to:

1. Bio-data.
2. Complete list of postings with periods and dates.

3. Complete list of all the inpatient cases managed by him/her directly.
4. List of important emergency cases and interdepartmental consultations attended by him.
5. List of diagnostic and therapeutic procedures including surgeries assisted or performed.
6. Summaries of some important emergency and elective cases managed by them.
7. List of case presentations, postgraduate seminars, journal reviews and other important academic activities.
8. List of abstracts and papers presented in Scientific Society Meetings, Conferences, Clinico-pathological conferences, etc.
9. Research projects completed.
10. Papers published or sent for publication.
11. Teaching assignments performed and
12. Any other relevant details.

- The Postgraduate student of a Postgraduate Degree Course in Super specialties shall maintain Log Book of the work carried out by them and the training programme undergone during the period of training including details of surgical operations assisted or done independently.
- The Log Book shall be checked and assessed by the faculty members imparting the training and reviewed each week by the guide and chief.
- Periodical evaluation of Log Book to be done by the Head of the Department as per 52nd SAB.

- The Evaluation of the candidates in both theory and practical aspects will help the candidate in the improvement of his/her knowledge skills & attitude**.**

IX. COMPETENCY ASSESSMENT:

- **Overall:**

1) Communication / Commitment / Contribution / Compassion towards patients and Innovation - 10 Marks
2) Implementation of Newly learnt techniques - 10 Marks

3) Documentation of case sheets / discharge Summary / Review - 10 Marks

4) Number of cases presented in Clinical Meetings/Journal Clubs/ Seminars / Papers presented in Conference - 10 Marks

5) No. Of Medals/ Certificates won in the conference / Quiz Competitions and other academic meetings with details - 10 Marks

Total - 50 Marks

- **Assessment:** **I** - February - First Year
  II - August - First Year
  III - February - Second Year
  IV - August - Second Year
  V - February - Third Year
  VI - May - Third Year
- **VIVA** including competency assessment - 100 Marks (50+50)

X. THEORY EXAMINATION:

Paper I - Basic sciences as applied to Vascular Surgery

Paper II - Vascular Surgery

Paper III - Vascular & Endo Vascular Surgery

Paper IV - Recent advances in Vascular Surgery

- **Each paper will contain:**
  - ✓ Essay questions (2 X 15) = 30 Marks
  - ✓ sShort Notes (10 X 7) = 70 Marks

Total = 100 Marks

XI. PRACTICAL SCHEME:

Particulars	**Time for candidate to examine the cases**	**Time for examiners to question the candidates**	**Maximum Marks**
Long Case	*1 Case x 60 Minutes*	*60 Minutes*	*100*
Short Case	*2 Cases x 15 Minutes*	*30 Minutes*	*100*
Ward Rounds	*3 Patients x 10 Minutes*	*30 Minutes*	*100*
OSCE	*5 Stations x 3 Minutes*	*15 Minutes*	*50*

Viva Voce		*15 Minutes*	*100*
Log Book			*50*
Total			***500***

- As per Medical Council of India Post Graduate Medical Education Regulations 2000 (amended up to 10th August 2016) Clause 13.9, a Postgraduate student of a Postgraduate degree Course in broad specialties/Super Specialties would be required to present one poster presentation to read one paper at a National/State conference and to present one Research paper which should be published/accepted for publication/sent for publication during the period of his Postgraduate studies so as to make him eligible to appear at the Postgraduate Degree Examination.

- Apart from Poster/Oral paper presentation in National/State conferences, the Research paper published by the candidate in the University Journal of Medical Sciences will be considered as equivalent to the Research Paper as mentioned in 13.9. Clause. Case Reports can also be published in University Journal of Medical Sciences but case reports will not be considered as Research Paper.

- The candidate can also present Research Paper as per Clause 13.9 of Post Graduate Education Regulation 2000, and if the article sent for publication by the candidate as primary author or corresponding author which has not yet been published/accepted for publication, the candidate should submit a letter from the HOD, stating that the article sent for publication is of publishable merit and the proof of the Research Article submitted to the Journal for publication should be sent to the university forwarded through the HOD [as per 53rd SAB]

- *"The student can submit articles for the University journal anytime from the time of registration in the University till 6 months prior to theory examination".*

XII. OSCE - 5 STATIONS:

1. Pathology slide.
2. Clinical situation – interpretation.
3. Instrument.
4. Imaging.

5. Drug – Usage/indications.

XIII. RECOMMENDED READING FOR THE VASCULAR CURRICULUM:

1. *Vascular and Endovascular Surgery: 4th Edition. Beard J.D., Gaines P.A. (Eds) Saunders Elsevier 2009.*
2. *Atlas of Vascular Disease: 2nd Edition. Creager M. A., Braunwald E. (Eds.) Current Medicine Inc, 2003.*
3. *Atlas of Vascular Surgery: Operative procedures. Ouriel K., Rutherford R.B. (Eds.) W.B. Saunders, 1998.*
4. *Atlas of Vascular Anatomy: An angiographic approach. Uflacker R., Lippincott Williams & Wilkins, 2006.*
5. *Peripheral Arterial Disease: Mohler E., Jaff M.(Eds) ACP, 2008.*
6. *An Introduction to Vascular Biology: 2nd Edition. Halliday A. W., Hunt B. J., Poston L., Schachter M. (Eds.) Cambridge University Press, 2002 Final Stage.*
7. *Vascular Surgery: 9th Edition. Rutherford R.B. (Ed.), Saunders, 2005.*
8. *Comprehensive Vascular and Endovascular Surgery: 2nd Edition. Hallet J.W., Mills J.L., Earnshaw J.J., Reekers J.A., Rooke TM (Eds), Mosby Elsevier, 2009.*
9. *Pathways of Care in Vascular Surgery Beard J.D., Murray S. (Eds), TFM Publishing Ltd, 2002.*
10. *Rare Vascular Disorders. A Practical Guide for the Vascular Specialist: Parvin S.D., Earnshaw J.J. tfm Publishing Ltd, 2005.*
11. *Abrams' Angiography: Interventional Radiology: 2nd Edition. Baum S. and Pentecost M. J. (Eds.) Lippincott Williams & Wilkins. 2006.*
12. *Grainger & Allison's Diagnostic Radiology, 5th Edition. Adam a et al. (Eds.), Churchill Livingstone, 2008.*
13. *CT and MR Angiography: Comprehensive Vascular Assessment. Rubin G. D. and Rofsky N. M. (Eds.) Lippincott Williams & Wilkins, 2008.*
14. *Introduction to Vascular Sonography: 5th Edition Zweibel W. (Ed.) W.B. Saunders, 2005.*
15. *Connective Tissue Diseases. Belch J.J.F. and Zurier R.B. (Eds.) Chapman and Hall, 1995.*
16. *Recent Advances in Thrombosis and Haemostasis Tanaka K. and Davie E.W. (Eds.) Springer, 2008.*

17. *The Foot in Diabetes (3rd Edition) Boulton A.J.M., Connor H., Cavanagh P.R.C. (Eds.) John Willey, 2000.*
18. *Amputation Surgery and Lower Limb Prosthetics. Murdoch G. (Ed.) Blackwell, 1988.*
19. *The Vein Book. Bergan J. J. (Ed.) Elsevier, 2007.*
20. *HANDBOOK OF venous disorders and lymphatic disorders – gloviski.*
21. *Endovascular skills peter A Schneider*
22. *RICH'S vascular trauma*
23. *Vascular and Endovascular surgery by moore*
24. *Atlas of Endovascular venous surgery – jos and I.Almedia*
25. *Rutherford's vascular exposure*
26. *Anatomic exposures in Vascular Surgery – WIND, VALENTINE*

***Note:** The editions are as applicable and the latest editions shall be the part of the syllabi.

RECOMMENDED COURSES:

1. Specialty Skills in Vascular Surgery
2. Amputations
3. Advanced Skills in Vascular Surgery
4. Endovascular Aneurysm Repair Planning
5. Vascular Ultrasound Course
6. Radiation Protection Training Course.

XIV. RECOMMENDED WEBSITES/JOURNALS:

- A few of the more useful websites are listed below.

1. *British Society of Interventional Radiology: http://www.bsir.org*
2. *Cardiovascular and Interventional Radiological Society of Europe: http://www.cirse.org*
3. *European Board of Vascular Surgery: http://www.uemsvascular.com*
4. *European Journal of Vascular and Endovascular Surgery: http://www.sciencedirect.com/esvs*
5. *European Society for Vascular Surgery: http://www.esvs.org*
6. *European Venous Forum: http://www.europeanvenousforum.org*
7. *Society for Vascular Surgery (North America): http://www.vascularweb.org*

8. *Vascular Education: http://www.vascularеducation.com Approved October 2012 Page 53*
9. *Vascular Society of Great Britain and Ireland: http://www.vascularsociety.org.uk*
10. *Indian journal of vascular* and endovascular *surgery.*
11. *National medical journal of India*
12. *Journal of vascular surgery*
13. *New England Journal of Medicine*
14. *Endovascular today*
15. *European Journal of cardiothoracic and vascular surgery*
16. *ESVS Journal.*

****