

**Vascular Surgery Fellow Rotation Specific Goals and Objectives**  
**Department of Surgery**  
**UT College of Medicine Chattanooga**

**Vascular Surgery Year 1 (VS1)**

The first year in the Vascular Surgery Fellowship will include 3 four-month block rotations. Two of these rotations are inpatient endovascular patients at Erlanger Medical Center. The other consists of outpatient care at Memorial and Parkridge Hospitals, the Vascular Lab and the Surgical Subspecialties Building (SSB) and will include endovascular and noninvasive vascular care.

**July-October Educational Objectives (Erlanger Vascular Surgery Inpatient Rotation)**

1. Describe human arterial and venous anatomy related regional anatomy. **(MK, IPCS)**
2. Describe basic arterial and venous hemodynamics. **(MK, IPCS)**
3. Discuss the anatomy, pathology, and pathophysiology of the arterial wall. **(MK, IPCS)**
4. Assess patients' vascular system using appropriate skills in the history-taking and clinical examination. **(PC, MK, and IPCS)**
5. Describe life-threatening signs of vascular disease and indicate when immediate intervention is required. **(PC, MK, and IPCS)**

**Skills Objectives**

1. Develop an understanding of the inventory in a vascular lab and the indications for use of each. **(PC and MK)**
2. Develop understanding of angiographic equipment and associated computers. **(PC and MK)**
3. Understand how to successfully access different arterial sites (femoral, brachial, axillary). **(PC and MK)**
4. Learn basic wire/catheter skills. **(PC and MK)**
5. Apply catheter and wire skills to peripheral vascular pathology (iliac, superficial femoral and popliteal arteries). **(PC and MK)**
6. Learn basics of stent graft for abdominal aortic and thoracic aneurysm repair. **(PC and MK)**
7. Receive initial instruction on thrombolysis for acute thrombosis of arteries and veins including use of percutaneous thrombectomy. **(PC and MK)**
8. Participate in faculty patient office weekly. **(PC and IPCS)** This skill objective is included for every rotation at this year level.

The above educational and skills objectives will be taught with the following methods:

- Clinical Skills and Simulation Center **(PC, MK, and PBLI)**
- Didactic lecture **(MK and PBLI)**
- Direct supervision of patient care **(PC)**

**November – February (Outpatient Vascular Surgery and Vascular Lab)**

1. Differentiate between the following diagnostic tools available for assessing vascular disease and explain the relative contribution of each **(PC, MK, and IPCS)**:

- a) Angiography
  - b) Computer axial topographic (CAT) scanning
  - c) Ultrasound
  - d) Magnetic resonance imaging (MRI)
2. Summarize the pathophysiology, clinical manifestations, and therapeutic options of specific categories of vascular disease (**PC, MK, and IPCS**):
- a. Venous disease
    - i. Thromboembolic disease
    - ii. Pulmonary embolism
  - b. Arterial disease
    - i. Atherosclerosis and its related disorders
    - ii. Occlusive disease
    - iii. Aneurysmal disease
  - c. Interaction of cardiovascular and pulmonary systems

3. Discuss basic principles of Doppler ultrasound for performing bedside arterial and venous Doppler testing **(PC, MK, IPCS, and SBP)**.
4. Outline the principles of non-invasive laboratory diagnosis; including a description of the role and limitations of the vascular laboratory. **(PC, MK, IPCS, and SBP)**
  - a) ABI/waveforms
  - b) Carotid duplex
  - c) Venous duplex
  - d) PPG/LRR venous
  - e) Graft flow studies
5. Outline the principles of care for ischemic limbs. **(PC, MK, and IPCS)**
6. Summarize principles for the preoperative assessment and postoperative care of patients undergoing major vascular surgical procedures. **(PC, MK, and IPCS)**
7. Outline the fundamental elements of medical management of the vascular patient, including the role of risk assessment and preventive measures. **(PC, MK, and IPCS)**

#### **Skills Objectives**

1. Learn techniques for percutaneous venous ablation **(PC and MK)**
2. Learn interventions for vascular access for hemodialysis (i.e. balloon angioplasty of access, etc) **(PC and MK)**
3. Learn peripheral angioplasty for PVD **(PC and MK)**
4. Perform duplex scanning, peripheral arterial evaluations and interpreting arterial and venous exams including physics, hemodynamics, and quality control. **(PC and MK)**

5. Perform necessary qualifying activities towards becoming an accredited RVT. **(PC, MK, and SBP)**

The above educational and skills objectives will be taught through:

1. Direct supervision **(PC)**
2. Industry simulators **(PC and MK)**
3. Didactic lecture **(MK and PBLI)**
4. Literature review **(MK and PBLI)**

### **March – June (Erlanger Vascular Surgery Inpatient Rotation)**

1. Describe the hemodynamics and pathophysiology of specific clinical symptoms: **(MK and IPCS)**
  - a) Claudication
  - b) Transient ischemic attack (TIA)
  - c) Stroke
  - d) Mesenteric angina
  - e) Angina pectoris
  - f) Renovascular hypertension
  - g) Arteriovenous (AV) fistula
2. Explain the concept of critical arterial stenosis **(MK and IPCS)**
3. Differentiate between acute arterial and acute deep venous occlusion. **(MK and IPCS)**
4. Determine a plan for assessment of operative risk in these categories: **(PC and MK)**
  - a) Cardiac
  - b) Pulmonary
  - c) Renal
  - d) Metabolic
  - e) Levels of anesthetic risk
5. Describe the use of adjunctive measures such as: **(PC, MK, and IPCS)**
  - a) Antibiotics
  - b) Anticoagulants
  - c) Thrombolytic agents
  - d) Anti-platelet agents
6. Explain the physiologic and organic manifestations of vascular disease, such as renovascular hypertension, portal hypertension and renal failure. **(MK and IPCS)**

### **Skills Objectives**

While continuing to develop expertise from the knowledge gained in the previous two rotations, further educational objectives are:

1. Learning advanced endovascular techniques including renal, splenic vessels, tibial and carotid artery interventions. **(PC, MK, and PBLI)**
2. Learn techniques such as atherectomy, cryoplasty, laser atherectomy **(PC and MK)**
3. Learn to treat more difficult AAA and thoracic aneurysm stent grafts **(PC, MK, and PBLI)**

4. Perform more complex thrombolysis procedures **(PC, MK, and PBLI)**

The above knowledge and skills will be taught through a combination of:

- direct supervision **(PC)**
- didactic lecture **(MK and PBLI)**
- reading **(MK and PBLI)**
- industry simulators and **(PC, MK, and PBLI)**
- Clinical skills and simulation center **(PC, MK, and PBLI)**

### **Vascular Surgery Year 2 (VS2)**

The second year will consist of 3 block rotations, 2 at Erlanger Medical Center for inpatient vascular surgery care and one in a combination of inpatient vascular surgery at nearby Parkridge and Memorial Hospitals and the vascular office-based practice in the University Surgical Associates Surgical Subspecialties Building.

#### **July –October (Erlanger Vascular Surgery Inpatient Rotation)**

1. Review and describe the basic clinical manifestations of the following vascular disorders: **(PC, MK, and IPCS)**
  - a) Thromboembolic disease-arterial and venous
  - b) Chronic venous insufficiency and lymphatic obstruction
  - c) Portal hypertension
2. Differentiate between the following diagnostic tools available for assessing vascular disease and explain the relative contribution of each: **(PC, MK, IPCS, and PBLI)**
  - a) Magnetic resonance imaging (MRI) and magnetic resonance angiography (MRA)
  - b) Duplex scanning (ultrasonography)
3. Summarize the etiology, pathophysiology, and therapeutic options of specific categories of vascular disease: **(PC, MK, and IPCS)**
  - a. Venous disease
    - 1) Varicose vein disease
    - 2) Post-phlebitic syndrome
    - 3) Portal hypertension
  - b) Lymphatic disease
    - 1) Anatomy of lymphatic system and lymphatic return
    - 2) Congenital lymphatic anomalies
    - 3) Acquired lymphatic disease
    - 4) Operative procedures for correction of lymphatic disease
  - c) Arterial disease
    - 1) Aortic and other vascular aneurysm
    - 2) Atherosclerotic vascular disease
    - 3) Arterial embolic disease
    - 4) Extracranial cerebrovascular disease
    - 5) Visceral ischemic syndromes
    - 6) Renovascular hypertension
    - 7) Degenerative arterial disease
    - 8) Trauma
    - 9) Arteriovenous fistulas (local and cardiac hemodynamic effects)

4. Describe the natural history of medically-treated vascular disease in the following categories: **(PC, MK, and IPCS)**
  - a) Carotid arterial stenosis
  - b) Abdominal aortic aneurysm
  - c) Chronic femoral artery occlusion
5. Describe the role of anticoagulant agents, including antiplatelets agents, in the management of patients with vascular disease. **(PC, MK, and IPCS)**
6. Analyze the role of the endothelium in atherosclerosis, thrombosis, and thrombolysis. **(PC and MK)**
7. Discuss the principles of and contraindications for anticoagulation and thrombolytic therapy. **(PC, MK, and IPCS)**
8. Describe the surgically correctable causes of hypertension and their diagnostic modalities. **(PC, MK, and IPCS)**
9. Discuss the mechanics of action and the therapeutic role of the following pharmacologic types of agents: **(PC, MK, and IPCS)**
  - a) Vasopressors
  - b) Vasodilators
  - c) Adrenergic blocking agents
  - d) Anticoagulants
  - e) Antiplatelet agents
  - f) Thrombolytics
10. Demonstrate knowledge of the general principles of vascular surgical technique including: **(PC, MK, and IPCS)**
  - a) Vascular control and suturing
  - b) Endarterectomy
  - c) Angioplasty
  - d) Bypass grafting
11. Discuss clotting factors and how they interact, including hyper coagulable states and coagulopathies. **(PC, MK, and IPCS)**
12. Discuss the role of the following factors in maintaining homeostasis in the coagulation pathways: **(PC, MK, and IPCS)**
  - a) Protein S
  - b) Protein C
  - c) Platelets
  - d) Platelet granules
  - e) Endothelial cells
  - f) Antithrombin III

### **Skills Objectives**

1. Participate in all consults on the Vascular Service. **(PC, IPCS, and P)**
2. Round daily with the Vascular Surgery Service. **(PC and IPCS)**
3. Accompany attendings to their patient office at least weekly for instruction in the pre and post surgical care of the vascular patient. **(PC and IPCS)** This skill objective is part of every rotation at this year level.
4. Organize the weekly Vascular Conference and M & M. **(MK, IPCS, and PBLI)**

5. Perform advanced “open” cases such as aneurysm repair (thoracic and aortic), cerebral vascular, open peripheral vascular surgeries, thoracic outlet surgery and amputations (**MK, PC, and PBLI**)
6. Learn open venous stripping for varicose veins (**MK and PC**)

**November-February (Memorial, Parkridge)**

1. Review and describe the basic clinical manifestations of the following vascular disorders: (**MK and IPCS**)
  - a) Congenital vascular disease
2. Summarize the etiology, diagnosis, and therapeutic options of specific categories of vascular disease: (**PC, MK, and IPCS**)
  - a) Arterial disease
    1. Inflammatory vascular disease and vasculitis
    2. Arteriovenous fistulas or malformations
    3. Neurovascular compression syndromes (thoracic outlet syndrome)
  - b) Miscellaneous
    1. Tumors
    2. Sympathetic nervous system (e.g. causalgia, reflex sympathetic dystrophy)
3. Discuss the principles of angiography to include the following considerations: (**PC, MK, and IPCS**)
  - a) Indications and complications (including contrast-induced renal failure)
  - b) Review principles and techniques of intraoperative angiography
  - c) Review principles and techniques of emergency room angiography
4. Explain the risk: reward ratios of surgical care for patients with vascular disease. (**PC, MK, and IPCS**)
5. Demonstrate awareness of the costs associated with providing surgical care to patients with vascular disorders. (**PC and SBP**)
6. Differentiate between different operative approaches to the vascular system to include: (**PC and IPCS**)
  - a) Incisions and exposure
  - b) Handling of vascular tissues
  - c) Principles of vascular bypass grafting
  - d) Emergency vascular surgery
  - e) Re-operative vascular surgery
  - f) Principles of endarterectomy
7. Illustrate the operative exposure of the major vessels, including: (**PC, MK, and IPCS**)
  - a) Aortic arch
  - b) Proximal subclavian
  - c) Carotid artery
  - d) Descending thoracic aorta
  - e) Suprarenal aorta
  - f) Infrarenal aorta
  - g) Femoral artery
  - h) Popliteal arterial

### **Skills Objectives**

1. Participate in all consults at the other hospitals **(PC and P)**
2. Accompany attendings to their patient office at the SSB at least weekly for instruction in the pre and post surgical care of the vascular patient **(PC and P)**
3. Organize the weekly Vascular Conference and M & M at Erlanger Medical Center. **(MK, IPCS, and PBLI)**
4. Participate in advanced open vascular cases at Memorial and Parkridge. **(PC, MK, and PBLI)**

The learning and skills objectives noted above will be accomplished through:

- direct supervision **(PC)**
- didactic lecture and **(MK and PBLI)**
- reading **(MK and PBLI)**

### **March-June (Inpatient Vascular Surgery at Erlanger)**

1. Outline the indications for operations for claudication, abdominal aortic aneurysm, carotid stenosis and amputation. **(PC, MK, and IPCS)**
2. Describe the indications for balloon angioplasty and vascular stent placement with risks and complications. **(PC, MK, and IPCS)**
3. Describe the pathogenesis and complications of aneurysmal disease. **(MK and IPCS)**
4. Summarize the etiology, microbiology, and treatment of diabetic foot infection. **(PC, MK, and IPCS)**
5. Categorize the prevention and management of operative and postoperative complications, including graft infections, ischemic bowel, graft thrombosis, and extremity ischemia. **(PC, MK, and IPCS)**
6. Outline the manifestation of failing peripheral vascular grafts. **(PC, MK, and IPCS)**
7. Discuss the principles of preoperative vascular surgery. **(PC, MK, and IPCS)**
8. Outline procedure for managing vascular surgical emergencies such as acute tissue ischemic or major hemorrhage (traumatic or ruptured aneurysm). **(PC, MK, and IPCS)**
9. Demonstrate a basic knowledge of the various types of graft and suture material available. **(PC, MK, and IPCS)**
10. Analyze alternative measures for the diagnosis and management of renovascular hypertension. **(PC, MK, and PBLI)**
11. Discuss alternative operative procedure for the management of portal hypertension. **(PC, MK, and IPCS)**
12. Summarize the surgical techniques available for managing the following vascular disorders: **(PC, MK, and IPCS)**
  - a) Abdominal aortic bypass or aneurysectomy
  - b) Carotid stenosis
  - c) Femoral-popliteal occlusion
  - d) Tibial artery occlusion
13. Analyze the management of complex vascular problems considering the following factors: **(PC, MK, and PBLI)**
  - a) Morbidity and mortality
  - b) Advanced surgical techniques

- 1) Endoscopy
  - 2) Microvascular techniques
  - 3) Endoluminal grafting
- 14. Review critical factors for decision making in vascular surgery: (PC, MK, PBLI, and SBP)**
- a) Risk: reward ratio
  - b) Morbidity and mortality probability
  - c) Preoperative and postoperative assessment
  - d) Non-invasive laboratories, duplex scanning
  - e) Role of advanced radiologic techniques: Angioplasty, CT scanning, MRI/MRA imaging
- 15. Apply the decision making process in analyzing complex vascular diseases, including the following: (PC, MK, PBLI, and IPCS)**
- a) Cerebrovascular problems
  - b) Mesenteric vascular disease
  - c) Renovascular disease
  - d) Aneurysmal disease
  - e) Lower extremity arterial occlusion
  - f) Venous disease
- 16. Outline the management of prosthetic graft infections, including: (PC, MK, and IPCS)**
- a) Diagnosis
  - b) Use of alternate routes for revascularization
  - c) Use of alternative graft materials
- 17. Summarize complications of common major vascular procedures such as: (PC, MK, and IPCS)**
- a) Carotid endarterectomy
  - b) Aortic reconstruction
  - c) Lower extremity vascular reconstruction

### **Skills Objectives**

- 1. Participate in all consults on the Vascular Service. (PC and P)**
- 2. Round daily with the General Surgery Vascular Service. (PC and P)**
- 3. Accompany attendings to their patient office at least weekly for instruction in the pre and post surgical care of the vascular patient. (PC)**
- 4. Organize the weekly Vascular Conference and M & M. (MK and PBLI)**
- 5. Perform advanced “open” cases such as aneurysm repair (thoracic and aortic), cerebral vascular, open peripheral vascular surgeries, thoracic outlet surgery and amputations (PC, MK, and PBLI)**
- 6. Learn open venous stripping for varicose veins (PC and MK)**

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