VASCULAR SURGERY

ENTRUSTABLE PROFESSIONAL ACTIVITES

(VS EPA)

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EVALUATION AND MANAGEMENT OF A PATIENT WITH ACUTE LIMB ISCHEMIA

EVALUATION AND MANAGEMENT OF A PATIENT WITH ACUTE MESENTERIC ISCHEMIA

EVALUATION AND MANAGEMENT OF A PATIENT WITH ACUTE THROMBOEMBOLIC VENOUS DISEASE

EVALUATION AND MANAGEMENT OF A PATIENT FOR AMPUTATION

EVALUATION AND MANAGEMENT OF A PATIENT WITH AN ASYMPTOMATIC AORTOILIAC ANEURYSM

EVALUATION AND MANAGEMENT OF A PATIENT WITH CEREBROVASCULAR DISEASE

EVALUATION AND MANAGEMENT OF A PATIENT WITH CHRONIC MESENTERIC ISCHEMIA

EVALUATION AND MANAGEMENT OF A PATIENT WITH CHRONIC VENOUS DISEASE

EVALUATION AND MANAGEMENT OF A PATIENT WITH CLAUDICATION

EVALUATION AND MANAGEMENT OF A PATIENT WITH CHRONIC LIMB-THREATENING ISCHEMIA

EVALUATION AND MANAGEMENT OF A PATIENT IN NEED OF DIALYSIS ACCESS

EVALUATION AND MANAGEMENT OF A PATIENT WITH A PERIPHERAL ARTERY ANEURYSM

EVALUATION AND MANAGEMENT OF A PATIENT WITH A SYMPTOMATIC OR RUPTURED AORTOILIAC ANEURYSM

EVALUATION AND MANAGEMENT OF A PATIENT WITH TYPE B AORTIC DISSECTION

EVALUATION AND MANAGEMENT OF A PATIENT WITH TRAUMATIC/IATROGENIC VASCULAR INJURY

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Evaluation and Management of a Patient with Acute Limb Ischemia

Description of the Activity	Acute ischemia of either the upper or lower extremities is a common problem managed by vascular surgeons. All vascular surgeons must have a comprehensive understanding of the etiology and management approach for acute limb ischemia, including diagnostic techniques, medical management, and open and endovascular surgical interventions. Additionally, all vascular surgeons should understand perioperative management, including recognition and treatment of complications of surgical intervention, needed follow-up, and surveillance strategies.

Functions	Nonoperative/Preoperative
	
	❖ Synthesize essential information from a patient's referring providers, records, history, physical examination, and initial diagnostic evaluation to develop a differential diagnosis.
	❖ Perform a timely, cost-effective, evidence-based diagnostic evaluation to confirm and grade the degree of ischemia, the anatomic extent of the disease, and the underlying etiology.
	❖ Recognize complications of acute extremity ischemia requiring emergency revascularization.
	❖ Determine whether revascularization is indicated and the timing of intervention.
	  ❖ Recognize clinical scenarios in which revascularization is not indicated and major amputation or palliative care should be considered.
	❖ Synthesize the optimal medical management and preoperative optimization of the patient's comorbidities in preparation for revascularization, including the role of anticoagulation and its contraindications.
	❖ Select a surgical approach consistent with a patient's anatomy, comorbidities, and symptoms.
	❖ Counsel a patient regarding the durability of potential revascularization procedures and the prognosis for limb salvage versus the likelihood of amputation.
	❖ Obtain informed consent. Describe the indications, risks, benefits, alternatives, and potential complications of the planned operation, and ensure patient/caregiver understanding.
	❖ Synthesize an operative plan that demonstrates understanding of the operative anatomy, etiology, indications, contraindications, risks, benefits, alternatives, and potential complications of:
	  ❖ Thrombectomy – both open and endovascular
	  ▪ Upper extremity
	  • Axillary
	  • Brachial
	  • Forearm
	  ▪ Lower extremity
	  • Aortoiliac
	  • Femoropopliteal
	  • Tibial
	  ❖ Revascularization – both open and endovascular
	  ▪ Upper extremity
	  ▪ Lower extremity

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Evaluation and Management of a Patient with Acute Limb Ischemia

- Fasciotomy
  - Upper extremity – forearm
  - Lower extremity
    - Calf
    - Thigh

Intraoperative

- Perform the endovascular procedures required for acute extremity ischemia with either thrombectomy or revascularization.
- Perform the open procedures required for acute extremity ischemia with either thrombectomy or revascularization.
- Integrate new information discovered intraoperatively or intraoperative complications requiring modification of the surgical plan or technique, such as:
  - ✓ Anastomotic stenosis
  - ✓ Distal embolization
  - ✓ Graft thrombosis
  - ✓ Inadequate arterial outflow
  - ✓ Reperfusion injury
  - ✓ Vasospasm
- Recognize the indications for decompressive fasciotomy, and perform upper and lower extremity fasciotomies as necessary.
- Work with anesthesia staff, nursing staff, and other perioperative health care professionals to create and maintain an intraoperative environment that promotes patient-centered care.

Postoperative

- Initiate and oversee postoperative care, including assessing the neuromuscular function of the extremity, prescribing appropriate medical therapy, and determining follow-up imaging and longer-term care.
- Communicate with the patient/caregiver(s) and members of the health care team to ensure understanding of postprocedure instructions and the patient's ability to carry out the resultant plan within the context of their life (eg, transportation, living situation, insurance, access to a pharmacy).
- Recognize, evaluate, and manage early and late complications following extremity revascularization.
  - ✓ Access site complications
  - ✓ Bleeding
  - ✓ Compartment syndrome
  - ✓ Infectious complication (access/surgical site and prosthetic material)
  - ✓ Recurrent extremity ischemia
  - ✓ Reperfusion injury

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Evaluation and Management of a Patient with Acute Limb Ischemia

	✓ Target lesion restenosis/occlusion with the potential need for reintervention ❖ Identify a surveillance plan and indications for reintervention.
Scope	In scope ❖ Lower extremity acute limb ischemia secondary to embolic or thrombotic disease Out of scope ❖ Acute limb ischemia secondary to trauma, including iatrogenic causes ❖ Adventitial cystic disease ❖ Arterial thoracic outlet ❖ Blue toe secondary to arterio-arterial microembolization ❖ Chronic critical limb ischemia ❖ Hemodialysis access–related ischemia ❖ Mycotic peripheral embolic secondary to endocarditis ❖ Popliteal entrapment ❖ Radiation arteritis ❖ Sciatic artery aneurysm ❖ Thromboangiitis obliterans (Buerger disease) Special Population ❖ Patients with: ✓ Acute aortic occlusion ✓ Acute lower extremity ischemia secondary to aortic dissection and malperfusion ✓ Acute lower extremity ischemia secondary to intra-arterial devices (eg, extracorporeal membrane oxygenation [ECMO]) ✓ Thrombosed aortic and peripheral aneurysms

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Evaluation & Management of a Patient with Acute Limb Ischemia

Level	Preoperative/Nonoperative	Intraoperative Open	Intraoperative Endovascular	Postoperative
1 **Limited Participation** Demonstrates understanding of information and has very basic skills **Framework:** What a learner directly out of medical school should know The attending can show and tell.	• Elicits a history (acute onset/duration of symptoms) and performs a relevant vascular exam (absent pulses, motor/sensory deficits) • Prepares a patient for surgery by ordering labs (Cr, type and cross) and anticoagulation • Recognizes the need for operative intervention in a patient with ALI and indications for urgent vs emergent treatment	• Demonstrates understanding of sharps safety, safe use of devices, and surgical field sterility • Performs basic surgical tasks efficiently, including suturing and knot-tying • Demonstrates basic surgical skills, including making an incision and closure • Identifies potential crises (bleeding, dissection, vessel injury) that could occur during an open approach to ALI • Describes the potential for compartment syndrome after an open approach for ALI	• Demonstrates understanding of sharps safety, safe use of devices, and surgical field sterility • Uses US to visualize access vessels • Recognizes the importance of maintaining wire access • Identifies potential crises (loss of access, ruptured artery, dissection) that could occur during endo treatment of ALI • Describes the potential for compartment syndrome after an endo approach for ALI	• Describes risk factors for ALI, including AFib, DM, and smoking, recognizing that these factors can impact the outcome of interventions • Identifies a basic postop problem (pain, access site complication, compartment syndrome) and initiates management with supervision • Identifies critical data points for a postop hand-off (pulse/signal exam, anticoagulation plan) • Recognizes common patient safety issues unique to this population (in-hospital fall, medication error, narcotic overdose)
2 **Direct Supervision**	• Orders imaging and interprets findings, including a differential for underlying etiology	• Demonstrates respect for tissues (gentle handling of vessels) and developing skill in	• Uses US to obtain vascular access; demonstrates basic catheter and wire-handling techniques	• Formulates a postop plan that includes management of medical comorbidities and

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Level	Preoperative/Nonoperative	Intraoperative Open	Intraoperative Endovascular	Postoperative
Demonstrates understanding of the steps of the operation but requires direction through principles and does not know the nuances of a basic case **Framework:** The learner can use the tools but may not know exactly what, where, or how to do it. The attending gives active help throughout the case to maintain forward progression.	• Ensures basic equipment is ready for an endo approach (US, entry kit, sheath, basic catheters) or an open approach (Fogarty embolectomy balloons, sutures); ensures the patient is prepped and positioned; recognizes the importance of C-arm positioning (R/L side) • Recognizes the need for urgent/emergent operative intervention and determines when a patient needs an open vs endo procedure	instrument handling (using a Castroviejo needle driver) • Performs parts of an anastomosis with frequent prompting and assistance • Describes most potential operative errors and intraop findings; needs assistance to demonstrate how to avoid errors • Describes findings with arterial injury, venous injury, and dissection that can be encountered during open treatment for ALI	• Describes radiographic and clinical findings with arterial rupture, embolization, or dissection that can occur during endo treatment for ALI • Describes most potential operative errors and intraop findings; needs assistance to demonstrate how to avoid errors • Describes findings with arterial injury, venous injury, and dissection that can be encountered during endo treatment for ALI	appropriate use of anticoagulation, antiplatelets, lytic infusions, and statins • Manages a common postop problem (anemia, change in pulse exam, compartment syndrome, hematoma), including ordering and interpreting additional testing • Coordinates patient care with the interprofessional team (nursing, pharmacy, PT, ICU, cardiology) • Guides care and instructs a patient (prescribes non-narcotic meds, advocates use of side rails, calls nurse to mobilize) to avoid common patient safety issues
3 **Indirect Supervision** Can do a basic operation but will not recognize	• Interprets physical exam and imaging results to determine a treatment plan (endo vs open [lysis, percutaneous vs open thrombectomy vs bypass])	• Demonstrates efficient instrument handling and safe exposure, dissection, and control of vessels	• Performs a diagnostic angiogram, efficiently traverses a stenosis, and delivers stents/balloons to the appropriate location	• Recognizes complications and side effects of antiplatelet and anticoagulation medications and the need for follow-up

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Evaluation & Management of a Patient with Acute Limb Ischemia

Level	Preoperative/Nonoperative	Intraoperative Open	Intraoperative Endovascular	Postoperative
abnormalities and does not understand the nuances of an advanced case **Framework:** The learner can perform the operation in straightforward circumstances. The attending gives passive help. This help may be given while scrubbed for more complex cases or during a check-in for more routine cases.	• Anticipates unexpected challenges and recognizes the need for additional equipment when the preop plan is not progressing • Ensures all endo equipment (lysis catheters, devices) or open equipment is ready; ensures the patient is prepped widely and positioned to allow ease of procedure; recognizes the importance of C-arm positioning (R/L side) to facilitate the procedure • Develops a specific surgical plan for the clinical situation and identifies alternative treatment options	• Performs a complete thrombectomy (passes Fogarty with minimal tension until a negative pass), endarterectomy, anastomosis, and patch with minimal prompting and passive assistance • Describes an appropriate response to bleeding, venous injury, or dissection during open intervention for ALI	• Develops an endo plan (percutaneous or hybrid) with backup options if the initial plan fails; demonstrates understanding of device limitations based on a patient's anatomy and device instructions for use • Describes an appropriate response to loss of arterial access, dissection, embolization, or arterial rupture during endo intervention for ALI	• Manages a postop complication (target lesion/graft occlusion, compartment syndrome, bleeding), recognizing the need to return to the OR • Participates in analysis of patient safety events and analyzes complications • Coordinates the care of a post-ALI procedure patient with multiple services in a complex situation (periop MI, need for take-back, fasciotomy)
4 **Practice Ready** Can manage more complex patient presentations and operations and take care of most cases **Framework:**	• Synthesizes patient data, including medical comorbidities (COPD, DM, MI), and establishes a plan for endo or open intervention for ALI; independently determines the best treatment plan considering the patient's comorbidities and history (eg, revascularization vs	• Proficiently handles instruments and equipment, uses assistants, guides the conduct of the operation, and makes independent intraop decisions; anticipates when assistance is needed	• Plans and performs an intervention, including appropriate endo/thrombectomy device sizing and selection and alternate access (pedal, brachial) thrombectomy devices • Anticipates patient-specific complications during endo intervention for ALI	• Plans careful postop follow-up for a patient, including discussion of all aspects of risk factor modification, consultation as needed, and screening for comorbidities • Leads the team and provides supervision in the management of a

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Level	Preoperative/Nonoperative	Intraoperative Open	Intraoperative Endovascular	Postoperative
The learner can treat all straightforward ALI cases and has a strong understanding of surgical options and techniques for less common scenarios. The attending is available at the request of the learner but is not routinely needed for common presentations, though input may be needed for more complex presentations.	amputation, hybrid intervention) • Independently determines the best alternative treatment when an initial revascularization plan is unsuccessful; ensures that appropriate equipment is available • Ensures the OR is set up appropriately for an advanced open intervention, including a plan for bypass conduit if needed • Adjusts a plan for intervention based on evolving preoperative information (eg, change in level of ischemia)	• Anticipates patient-specific complications during an open intervention, including potential arterial and venous injury from redo operative fields and difficulty establishing inflow control due to calcification; describes appropriate management of these situations, including alternative exposures or incorporation of endo techniques	(potential arterial injury from small access, heavily calcified lesion, difficult iliac bifurcation, long lesion); describes appropriate management of the complication, including conversion to an open procedure • Adapts a management plan based on a change in a patient's anatomy or clinical situation (conversion to CTO or worsening ischemia), including from endo to open	complex complication (target lesion/graft occlusion, bleeding) • Leads multidisciplinary analysis and discloses a safety event to a patient/caregiver(s) • Ensures safe transition of care from the ICU to the floor and at discharge for a post-ALI procedure patient, including with other disciplines and specialties and in a complex situation

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Evaluation and Management of a Patient with Acute Mesenteric Ischemia

Description of the Activity	Vascular surgeons are often called to evaluate patients with symptoms or diagnostic findings suggestive of acute mesenteric ischemia. These surgeons should have a comprehensive understanding of the presenting signs and symptoms, diagnostic techniques, and management of this disease process. This includes criteria for intervention, selection of interventional or surgical approach, urgency of intervention, and collaboration with consultants. Additionally, surgeons should understand perioperative management, including recognition and treatment of complications of surgical intervention, needed follow-up, and surveillance strategies.
Functions	❖ Nonoperative/Preoperative ➢ Synthesize essential information from a patient's referring providers, records, history, physical examination, and initial diagnostic evaluation to develop a differential diagnosis. ➢ Perform an evidence-based diagnostic evaluation. ➢ Initiate medical management. ➢ Determine whether intervention is indicated. ➢ Communicate the diagnosis and potential treatment options to the patient/caregiver(s) and consultants. ➢ Select a surgical approach consistent with a patient's underlying etiology, anatomy, and comorbidities. ➢ Obtain informed consent. Describe the indications, risks, benefits, alternatives, and potential complications of the planned operation, and ensure patient/caregiver understanding. ➢ Synthesize an operative plan that demonstrates understanding of the anatomy, physiology, indications, contraindications, risks, benefits, alternatives, and potential complications of: ▪ Antegrade and retrograde bypass ▪ Antegrade and retrograde stenting ▪ Open thrombectomy ▪ Percutaneous thrombectomy ➢ Coordinate preoperative consultation with other surgical teams (general surgery) if suspicion for necrotic bowel is high. ❖ Intraoperative ➢ Perform the procedures required to manage acute mesenteric ischemia. ▪ Antegrade and retrograde bypass ▪ Antegrade and retrograde stenting ▪ Open thrombectomy ▪ Percutaneous thrombectomy ➢ Coordinate care delivery with other surgical teams. ➢ Integrate new information discovered intraoperatively to modify the surgical plan or technique as necessary, such as: ▪ Aortic or iliac calcification precluding clamp application ▪ Enteric perforation and contamination ▪ Inability to pass thrombectomy balloon catheter ▪ Inability to perform endovascular revascularization ▪ Necrotic bowel

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Evaluation and Management of a Patient with Acute Mesenteric Ischemia

	▪ Portal vein injury ➢ Work with anesthesia staff, nursing staff, and other perioperative health care professionals to create and maintain an intraoperative environment that promotes patient-centered care. ❖ Postoperative ➢ Oversee postoperative care in conjunction with other medical and surgical services, including resuscitation, monitoring, prescribing medical therapy, follow-up imaging, and postoperative disposition. ➢ Communicate with a patient/caregiver(s) and members of the health care team to ensure understanding of postprocedure instructions and the patient's ability to carry out the resultant plan within the context of their life (eg, transportation, living situation, insurance, access to a pharmacy). ➢ Recognize, evaluate, and manage early and late complications following mesenteric revascularization, including: ▪ Arterial dissection ▪ Arterial embolization ▪ Bowel ischemia ▪ Graft/stent thrombosis ▪ Hemorrhage ▪ Ischemia/reperfusion injury ▪ Multiple organ failure ▪ Stent dislodgment ➢ Identify a surveillance plan and indications for reintervention.
Scope	❖ In scope ➢ Acute in situ thrombosis of a chronically diseased visceral vessel ➢ Acute visceral thromboembolic event ➢ Mesenteric artery dissection with associated malperfusion ❖ Out of scope ➢ Aortic dissection with associated mesenteric malperfusion ➢ Arteritis with associated occlusive disease ➢ Mesenteric venous thrombosis ➢ Nonocclusive mesenteric ischemia (NOMI) ➢ Pediatric mesenteric ischemia ➢ Visceral aneurysm

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Evaluation & Management of a Patient with Acute Mesenteric Ischemia

Level	Preoperative/Nonoperative	Intraoperative Open	Intraoperative Endovascular	Postoperative
1 **<u>Limited Participation</u>** Demonstrates understanding of information and has very basic skills **<u>Framework:</u>** What a learner directly out of medical school should know The attending can show and tell.	• Elicits a history (acute onset of abdominal pain, AFib) and performs a relevant vascular exam (pain out of proportion), recognizing the critical nature of the presentation of AMI • Identifies the need for diagnostic imaging, including duplex, CTA, or other modalities • Recognizes the accompanying signs of possible sepsis (acidosis, hypotension) that can accompany AMI • Recognizes the need for emergent intervention • Communicates basic facts about AMI to a patient/caregiver(s) and other health care teams	• Demonstrates understanding of sharps safety, safe use of devices, and surgical field sterility • Efficiently performs basic surgical tasks, including suturing and knot-tying • Demonstrates basic surgical skills, including making an incision and closure • Identifies open surgical options to treat AMI and identifies indications for a selected procedure over alternatives; demonstrates basic understanding of visceral arterial anatomy • Identifies crises that could occur during a procedure (clamp injuries, early graft thrombosis, embolization, bowel ischemia)	• Uses US to demonstrate anatomy for vascular access; recognizes the importance of maintaining wire position during wire and catheter exchanges • Demonstrates basic understanding of the anatomy of the visceral arterial system • Identifies endo treatment options and indications for a selected procedure • Identifies crises that could occur during a procedure (dissection, thrombosis, embolization, bowel ischemia)	• Identifies a basic postop problem (fever, hematoma, wound complication) and initiates management with supervision • Communicates with the health care team in a respectful manner

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Evaluation & Management of a Patient with Acute Mesenteric Ischemia

Level	Preoperative/Nonoperative	Intraoperative Open	Intraoperative Endovascular	Postoperative
2 **<u>Direct Supervision</u>** Demonstrates understanding of the steps of the operation but requires direction through principles and does not know the nuances of a basic case	• Orders and interprets lab tests (WBC count, lactate) and diagnostic imaging (CTA, MRA) • Independently analyzes preop imaging, recognizing visceral malperfusion, and initiates resuscitation and anticoagulation to prepare for operative intervention	• Demonstrates respect for tissues (gentle handling of vessels) and developing skill in instrument handling • Creates an arteriotomy for a thromboembolectomy and sutures on a vessel (primary closure or patch) with	• Uses US to obtain vascular access; demonstrates basic catheter and wire-handling techniques • Identifies most steps of the procedure and the equipment required; requires prompting to	• Manages a common postop problem (hypotension, ileus, ischemia/reperfusion injury), ordering and interpreting additional tests as needed • Communicates recommendations to the critical care,

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Level	Preoperative/Nonoperative	Intraoperative Open	Intraoperative Endovascular	Postoperative
Framework: The learner can use the tools but may not know exactly what, where, or how to do it. The attending gives active help throughout the case to maintain forward progression.	• Ensures necessary imaging, equipment (embolectomy catheters), and basic OR setup are available for an urgent open or endo AMI intervention • Synthesizes clinical data (imaging, labs) to choose open or endo revascularization based on patient-specific factors (occlusion vs stenosis, clinical condition of the patient) • Synthesizes clinical data to decide on endo (percutaneous suction thrombectomy), open (open thrombectomy, bypass), or hybrid repair (ROMS) • Communicates the complexities of AMI and the ramifications of revascularization to a patient and consulting services; recognizes the need for coordinated multidisciplinary care	frequent prompting and assistance • Identifies most steps of the procedure (exposure, inflow/outflow control, endarterectomy or bypass) and the equipment required; requires prompting to advance the procedure • Recognizes a crisis (eg, ischemic or marginal viability bowel) • Describes complications that can occur during an open surgical approach to AMI (clamp injuries, early graft thrombosis, poor donor/target vessels)	advance the procedure • Identifies complications of percutaneous access and angioplasty during an endo procedure for AMI, including dissection, rupture, embolization, and thrombosis	general surgery, and palliative care teams during patient care discussions

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Evaluation & Management of a Patient with Acute Mesenteric Ischemia

Level	Preoperative/Nonoperative	Intraoperative Open	Intraoperative Endovascular	Postoperative
3 **Indirect Supervision** Can do a basic operation but will not recognize abnormalities and does not understand the nuances of an advanced case **Framework:** The learner can perform the operation in straightforward circumstances. The attending gives passive help. This help may be given while scrubbed for more complex cases or during a check-in for more routine cases.	• Synthesizes exam (pain out of proportion to exam), lab (WBC count, lactate), and imaging (CTA) results as well as the acuity of the patient's condition to formulate a plan for endo or open intervention for AMI • Independently analyzes imaging to predict how a plan may change; ensures all necessary equipment is available for the planned intervention (open or endo) • Develops a specific open surgical plan for the clinical situation and demonstrates understanding of alternative treatment options • Develops a specific endo plan (percutaneous or hybrid) based on patient anatomy and device instructions • Actively listens to a patient and consulting services and adapts communication regarding a complex presentation of AMI; considers general surgery input in care coordination and planning	• Performs an exploratory laparotomy in a virgin abdomen • Demonstrates efficient instrument handling and safe exposure, dissection, and control of vessels • Performs a complete endarterectomy, anastomosis, and patch with minimal prompting and passive assistance • Identifies all critical steps of the procedure and the equipment required; advances the procedure with minimal prompting • Recognizes a crisis (ischemic bowel, inability to perform thrombectomy) and describes the change in plan required to ensure visceral revascularization • Describes the appropriate response to crises that occur	• Performs an aortogram and visceral angiogram with stenting in an intermediate-complexity lesion • Describes the appropriate response to complications of percutaneous access and angioplasty during an endo procedure for AMI, including dissection and thrombosis	• Recognizes and manages a complex immediate postop complication (target lesion/graft occlusion, hypotension, acidosis, MI, renal failure, delayed bowel ischemia), including the need to return to the OR • Listens to input from the consult services and implements it for patient care

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Level	Preoperative/Nonoperative	Intraoperative Open	Intraoperative Endovascular	Postoperative
		during open surgical approaches to AMI, including clamp injuries, early graft thrombosis, and poor donor/target vessels		
4 **Practice Ready** Can manage more complex patient presentations and operations and take care of most cases **Framework:** The learner can treat all straightforward AMI cases and has a strong understanding of surgical options and techniques for less common scenarios. The attending is available at the request of the learner but is not routinely needed for	• Synthesizes patient data, including the acuity of a patient's condition (shock, need for bowel resection, second look) and formulates a plan for endo or operative intervention for AMI, including all relevant details • Develops an evidence-based operative plan for the etiology of AMI involving an open, endo, or hybrid approach and ensures that all necessary supplies, instrumentation, and implants are available • Adapts the management plan for a changing clinical situation • Adapts the management plan based on a change in the patient's condition (eg, acute abdomen), including from endo to open • Coordinates a goals-of-care discussion with a patient with	• Proficiently handles instruments and equipment, uses assistants, guides the conduct of the operation, and makes independent intraop decisions, anticipating when assistance is needed • Identifies all critical steps of the procedure and the equipment required; advances the procedure without prompting and demonstrates understanding of critical decision points • Anticipates a crisis (ischemic bowel, inability to perform embolectomy or clamp inflow vessels) and converts to an alternate	• Identifies all critical steps of the procedure and the equipment required in a complex lesion; advances the procedure without prompting and demonstrates understanding of critical decision points (eg, conversion to open) • Anticipates a crisis that occurs during an endo procedure for AMI, including dissection and inability to cross the lesion, and quickly changes the operative approach when necessary • Recognizes the potential need to examine the bowel at	• Leads the team and provides supervision in managing a postop complication (target lesion/graft occlusion, hypotension, acidosis, MI, renal failure) • Coordinates input from consult services to optimize patient care

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Level	Preoperative/Nonoperative	Intraoperative Open	Intraoperative Endovascular	Postoperative
common presentations, though input may be needed for more complex presentations.	complex comorbidities and a complex presentation of AMI, their caregiver(s), and other health care teams; leads preop planning and management between consulting teams such as general surgery	revascularization procedure when necessary • Anticipates treatment for a crisis during open intervention for AMI (eg, inability to clamp inflow/outflow) • Recognizes the potential need to examine the bowel at the time of surgery or as a second look	the time of intervention or as a second look	

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Evaluation and Management of a Patient with Acute Thromboembolic Venous Disease

Description of the Activity	Vascular surgeons evaluate and treat patients with acute venous pathologies and should have a comprehensive understanding of the different causes, clinical presentation, diagnostic techniques, and medical and surgical management of this disease process, including selection criteria for intervention and timing of intervention. Additionally, surgeons should understand perioperative management, including recognition and treatment of complications of interventions, follow-up, and surveillance strategies.
Functions	❖ Nonoperative/Preoperative ➢ Synthesize essential information from a patient's referring providers, records, history, physical examination, and initial diagnostic evaluation to develop a differential diagnosis. ➢ Perform an evidence-based, cost-effective diagnostic evaluation. ➢ Determine whether intervention is indicated. ➢ Synthesize an optimal medical management plan for a patient in whom intervention is not indicated, including wound care and edema management. ➢ Communicate the diagnosis and potential treatment options to the patient/caregiver(s) and consultants. ➢ Recognize complications of acute venous disease requiring emergency intervention. ➢ Select a treatment approach consistent with a patient's anatomy, comorbidities, and acuity of presentation. ➢ Obtain informed consent. Describe the indications, risks, benefits, alternatives, and potential complications of the planned intervention, and ensure patient/caregiver understanding. ➢ Synthesize a treatment plan that demonstrates understanding of the operative anatomy, physiology, indications, contraindications, risks, benefits, alternatives, and potential complications of: ▪ Anticoagulation ▪ Catheter-directed intervention ▪ Inferior vena cava (IVC) filters ▪ Thrombolysis ❖ Intraoperative ➢ Perform the procedures required to manage acute venous disease. ▪ Catheter-directed thrombolysis, pharmacomechanical thrombolysis ▪ Iliocaval stenting ▪ IVC filter insertion and removal ▪ Mechanical thrombectomy ▪ Open surgical thrombectomy, fasciotomy ▪ Venography, intravascular ultrasound ➢ Integrate new information discovered intraoperatively to modify the surgical plan or technique as necessary, such as: ▪ Aberrant iliac vein/caval anatomy ▪ Compartment syndrome ▪ Iliocaval occlusion

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Evaluation and Management of a Patient with Acute Thromboembolic Venous Disease

	▪ Pulmonary embolism (PE) ➢ Work with anesthesia staff, nursing staff, and other perioperative health care professionals to create and maintain an intraoperative environment that promotes patient-centered care. ❖ Postoperative ➢ Initiate and oversee postoperative care, including monitoring for complications, prescribing appropriate medical therapy, managing edema, ordering follow-up imaging, and performing filter removal if indicated. ➢ Communicate with the patient/caregiver(s) and members of the health care team to ensure understanding of postprocedure instructions and the patient's ability to carry out the resultant plan within the context of their life (eg, transportation, living situation, insurance, access to a pharmacy). ➢ Recognize, evaluate, and manage early and late complications following intervention (bleeding, early re-thrombosis, fracture, IVC filter migration, pain from stent placement, PE, perforation, stent fracture or migration, thrombosis). ➢ Identify a surveillance and anticoagulation management plan and indications for reintervention.
Scope	❖ In scope ➢ Acute thrombophlebitis ➢ Anticoagulation, lytic therapy ➢ IVC filter management ➢ May-Thurner syndrome ➢ Phlegmasia ➢ Upper and lower extremity acute deep vein thrombosis (DVT) ❖ Out of scope ➢ Acute PE ➢ Lymphedema ➢ Venous thoracic outlet syndrome ❖ Special Population ➢ Patients with phlegmasia ➢ Pediatric patients with acute DVT ➢ Pregnant patients with acute DVT

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THE AMERICAN BOARD OF SURGERY

Evaluation & Management of a Patient with Acute Thromboembolic Venous Disease

Level	Preoperative/ Nonoperative	Intraoperative	Postoperative
1 **Limited Participation** Demonstrates understanding of information and has very basic skills **Framework:** What a learner directly out of medical school should know The attending can show and tell.	• Elicits a history and performs a vascular exam (swelling, discoloration, labored breathing) • Evaluates risk factors for acute DVT (hypercoagulable state, perioperative, travel, immobilization) • Identifies imaging modalities used for acute venous disease (duplex, CT, MRA, IVUS) • Identifies the need for intervention over medical management • Demonstrates understanding of literature regarding the management of an acute DVT and uses available resources to guide routine patient care • Respectfully communicates basic facts about the condition to a patient/caregiver(s); demonstrates understanding of the elements of an informed consent discussion	• Identifies treatment options and indications for the selected procedure • Uses US to obtain vascular access with guidance • Respectfully communicates with the health care team and remains open to feedback about performance	• Demonstrates basic understanding of how to manage long-term anticoagulation • Communicates with the health care team to ensure understanding of the postop management plan; gathers and reports recommendations from different members of the health care team (eg, consulting services)
2 **Direct Supervision** Demonstrates understanding of the steps of the operation but requires direction through principles and	• Orders and interprets appropriate imaging (venous duplex, CTV) to evaluate a patient with acute VTE and establish a differential • Uses imaging findings to support a differential; uses duplex findings to identify acute DVT and determine eligibility for intervention • Synthetizes clinical data to choose endo intervention (lysis, percutaneous	• Identifies most steps of the procedure and the equipment required; requires prompting to advance the procedure • Uses US to obtain vascular access; demonstrates basic catheter and wire-handling techniques	• Describes the duration of long-term anticoagulation based on current CHEST guidelines • Communicates efficiently with the health care team; executes recommendations from consulting services but may still require assistance identifying when to question or discuss recommendations

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THE AMERICAN BOARD OF SURGERY

Evaluation & Management of a Patient with Acute Thromboembolic Venous Disease

Level	Preoperative/ Nonoperative	Intraoperative	Postoperative
does not know the nuances of a basic case **Framework:** The learner can use the tools but may not know exactly what, where, or how to do it. The attending gives active help throughout the case to maintain forward progression.	thrombectomy, IVC filter) vs open surgical thrombectomy • Demonstrates understanding of CHEST and SVS guidelines and discusses them with a patient • Explains all the risks and benefits of medical therapy vs invasive intervention and actively listens to a patient/caregiver(s) to determine expectations		
3 **Indirect Supervision** Can do a basic operation but will not recognize abnormalities and does not understand the nuances of an advanced case **Framework:**	• Interprets physical findings and the results of imaging (duplex, CT) to develop a treatment plan for acute VTE, including anticoagulation and factors requiring escalation of care • Demonstrates understanding of the duration of medical management and its possible complications and contraindications • Uses imaging findings to support a differential and determine if a patient is a candidate for venous thrombectomy • Develops a specific endo plan (lysis vs mechanical thrombectomy) and demonstrates understanding of the	• Identifies all critical steps of the procedure and the equipment required; advances the procedure with minimal prompting • Performs a venogram and parts of an iliocaval thrombectomy or lysis; recognizes indications for various thrombectomy devices and uses them correctly	• Communicates with the health care team, including consulting services; incorporates recommendations into the treatment plan

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Evaluation & Management of a Patient with Acute Thromboembolic Venous Disease

Level	Preoperative/ Nonoperative	Intraoperative	Postoperative
The learner can perform the operation in straightforward circumstances. The attending gives passive help. This help may be given while scrubbed for more complex cases or during a check-in for more routine cases.	indications and limitations of various devices • Demonstrates understanding of the literature on the indications, risks, and benefits of invasive treatment for DVT vs medical management and applies it independently • Explains the details and possible complications of the procedure to a patient/caregiver(s) and includes patient/caregiver preferences in the decision-making process		
4 **<u>Practice Ready</u>** Can manage more complex patient presentations and operations and take care of most cases **<u>Framework</u>:** The learner can treat all straightforward DVT cases and has a strong understanding of surgical options and	• Synthesizes patient data, including the clinical severity of the condition, and determines a treatment plan, including consideration of anticoagulation, lysis, or clot retrieval, depending on patient factors • Formulates a comprehensive medical management plan for a patient with acute DVT, including starting anticoagulation, and recognizes the factors that suggest the need for further intervention (eg, right heart strain) • Identifies contraindications for anticoagulation and determines if a patient requires an IVC filter	• Adapts the management plan based on a change in a patient's anatomy or clinical situation (eg, phlegmasia), including from endo to open • Identifies all critical steps of the procedure and the equipment required (stents, IVUS); advances the procedure without prompting; recognizes critical decision points • Performs all steps of an iliofemoral and caval thrombectomy and adjunctive procedures (stenting, thrombolysis, suction thrombectomy, IVUS) and	• Communicates with the health care team to ensure understanding of the postop management plan; resolves discrepancies in recommendations between consulting services to optimize patient care

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Evaluation & Management of a Patient with Acute Thromboembolic Venous Disease

Level	Preoperative/ Nonoperative	Intraoperative	Postoperative
techniques for less common scenarios. The attending is available at the request of the learner but is not routinely needed for common presentations, though input may be needed for more complex presentations.	• Initiates cross-sectional and duplex imaging and 3D reformatting to identify abnormal findings (eg, extensive iliocaval thrombosis) and plan an advanced venous procedure • Adapts a management plan based on a change in a patient's anatomy, including from endo to open • Discusses conflicting data and treatment options with a patient to make an individualized treatment plan in an uncertain situation • Customizes communication about the condition to a patient/caregiver(s) based on individual characteristics and anticipates logistical problems in optimizing the patient for surgery • Clearly conducts an informed consent discussion for surgical intervention, individualizing risks and benefits for the patient	troubleshoots intraop decisions independently	

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THE AMERICAN BOARD OF SURGERY

Evaluation and Management of a Patient for Amputation

Description of the Activity	Vascular surgeons are frequently involved in the management of patients requiring lower extremity amputation in both acute and chronic settings. These patients may be established patients or present as referrals for pain or nonhealing or infected wounds, including those in extremis due to infection/sepsis or trauma. Vascular surgeons should have a comprehensive understanding of the spectrum of indications for amputation, the necessary workup to determine healing capacity, and the principles of surgical management, including selection criteria for intervention and the level and timing of amputation. Surgeons should understand perioperative management, including recognition and treatment of complications of amputation, follow-up for healing, and referral for prostheses.
Functions	❖ Nonoperative/Preoperative ➢ Synthesize information from a patient's records, history, physical exam, and diagnostic evaluations to determine if amputation is indicated. ➢ Evaluate wound-healing potential and identify a patient requiring revascularization before amputation. ➢ Select the level of amputation that provides the highest probability of healing, with consideration given to postamputation ambulation. ➢ Consider and coordinate multidisciplinary care. ➢ Communicate the operative plan and options to a patient/caregiver(s) and consultants. ➢ Obtain informed consent. Describe the indication, risks, benefits, alternatives, and complications of the proposed procedure, including a discussion of nonhealing amputation sites and an evidence-based determination of the likelihood of prosthetic fitting and ambulation. ❖ Intraoperative ➢ Perform lower extremity amputation procedures. ▪ Above-knee amputation (AKA) ▪ Below-knee amputation (BKA) ▪ Digit amputation ▪ Ray amputation ▪ Staged amputation, including guillotine ▪ Transmetatarsal amputation (TMA) ➢ Recognize and manage unexpected intraoperative findings, such as: ▪ Evidence of infection ▪ Nonviable or ischemic tissue ▪ Residual prosthetic graft material ▪ Venous hypertension with bleeding ➢ Work with anesthesia staff, nursing staff, and other perioperative health care professionals to create and maintain an intraoperative environment that promotes patient-centered care. ❖ Postoperative

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Evaluation and Management of a Patient for Amputation

	➢ Initiate and oversee postoperative care and disposition, including pain and wound management, referral for rehabilitation, and prosthesis fitting. ➢ Communicate with the patient/caregiver(s) and members of the health care team (primary care provider, nursing staff, other health care providers) to ensure understanding of the preprocedure and postprocedure instructions and the patient's ability to carry out the resultant plan within the context of their life (eg, transportation, living situation, insurance, access to a pharmacy). ➢ Recognize and manage the most common complications after amputation, such as: ▪ Bleeding, hematoma ▪ Chronic pain ▪ Deep venous thrombosis or pulmonary emboli ▪ Infection ▪ Nonhealing or ischemic residual extremity ▪ Poorly fitting prosthesis ▪ Traumatic injury to a residual extremity
Scope	❖ In scope ➢ AKA ➢ BKA ➢ Digital/ray amputation ➢ Guillotine ➢ TMA ❖ Out of scope ➢ Cancer-related (eg, sarcoma) ➢ Hip disarticulation ➢ Upper extremity/hand ❖ Included Diagnoses ➢ Diabetic foot infection ➢ End-stage peripheral vascular disease ➢ Mangled extremity/trauma ➢ Wet/dry gangrene ❖ Special Population ➢ Patients with:

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Evaluation and Management of a Patient for Amputation

	▪ Nonhealing prior amputation ▪ Orthopedic hardware ▪ Prior prosthetic graft ▪ Sepsis secondary to lower extremity infection

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THE AMERICAN BOARD OF SURGERY

Evaluation & Management of a Patient Needing Amputation

Level	Preoperative/ Nonoperative	Intraoperative	Postoperative
1 **Limited Participation** Demonstrates understanding of information and has very basic skills **Framework:** What a learner directly out of medical school should know The attending can show and tell.	• Identifies a patient who will need amputation for an unsalvageable limb • Demonstrates understanding that gas/wet gangrene is a surgical emergency requiring urgent amputation • Identifies socioeconomic determinants of health and disparities in this patient population • Discusses consent with a patient or surrogate, clearly describing the side and level of the amputation • Communicates with a patient/caregiver(s) in a compassionate and patient-focused manner about the need for amputation	• Demonstrates understanding of sharps safety, safe use of devices, and surgical field sterility • Performs basic surgical tasks efficiently, including suturing and knot-tying • Demonstrates basic surgical skills, including making an incision and closure • Identifies the correct level for the amputation and the basic steps of the operation	• Identifies a basic postop problem (anemia, fever) and initiates management with supervision • Identifies critical data points for hand-offs (eg, antibiotics, knee immobilizer, weight-bearing status) • Identifies key health system components of postamputation care (skilled nursing, rehab, PT, prosthetics) and different payor types • Communicates with a patient/caregiver(s) in a timely way regarding complications, changes in course, expected discharge time, and location
2 **Direct Supervision** Demonstrates understanding of the steps of the operation but requires direction through principles and	• Synthesizes clinical data (wound, perfusion) to recommend the level of amputation (TMA, BKA, AKA) • Identifies a patient as part of a population/community at risk for inequities in care for peripheral arterial disease • Discusses consent with a patient/caregiver(s), clearly	• Demonstrates respect for tissues (gentle handling of flap edges and neurovascular bundle) and developing skill in instrument handling • Assists in dissection for the amputation; separates the vessels and performs suture ligation • Sets up the flap for closure with assistance	• Manages a common postop problem (anemia, hematoma, MI), ordering and interpreting additional testing when needed • Coordinates the care of a postamputation patient in a routine situation with the interprofessional team (nursing, rehab, PT, prosthetics) • Describes components of the health care system used by postamputation

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THE AMERICAN BOARD OF SURGERY

Evaluation & Management of a Patient Needing Amputation

Level	Preoperative/ Nonoperative	Intraoperative	Postoperative
does not know the nuances of a basic case **Framework:** The learner can use the tools but may not know exactly what, where, or how to do it. The attending gives active help throughout the case to maintain forward progression.	describing potential procedural and systemic complications • Communicates and shows empathy to a patient/caregiver(s), considering patient-specific factors (age, functional status, social situation); actively listens to the patient/caregiver(s) to understand expectations	• Identifies most steps of the procedure and the equipment required (tourniquet, saw); requires prompting to advance the procedure	patients (rehab, PT, prosthetics), including how they are interrelated and impact patient care • Anticipates the need for further difficult conversation between health care providers and a patient/caregiver(s), identifying conflicts that may arise; adjusts to complex communication barriers
3 **Indirect Supervision** Can do a basic operation but will not recognize abnormalities and does not understand the nuances of an advanced case **Framework:**	• Describes specific alternate approaches for amputation, including alternative flaps • Uses local resources to provide a patient in need of amputation access to needed care • Discusses consent with a patient/caregiver(s), including any possible changes due to intraop decision-making and the anticipated postop course • Communicates with a patient/caregiver(s) with anticipation of the challenges a postamputation patient faces	• Performs the procedural steps independently; identifies and controls neurovascular structures; delicately handles tissues to facilitate wound closure • Identifies all critical steps of the procedure and the equipment required; advances the procedure with minimal prompting	• Recognizes and manages a complex postop problem (eg, infection), including identifying the need to return to the OR • Coordinates the care of a postamputation patient in a complex situation with multiple services; uses consultants (prosthetist, therapist) to mitigate discharge barriers • Uses resources and consults with multidisciplinary providers to expedite discharge (social work, home health, insurance) and minimize the risk of readmission

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Evaluation & Management of a Patient Needing Amputation

Level	Preoperative/ Nonoperative	Intraoperative	Postoperative
The learner can perform the operation in straightforward circumstances. The attending gives passive help. This help may be given while scrubbed for more complex cases or during a check-in for more routine cases.			• Communicates well with a challenging patient and acknowledges uncertainty in their clinical course
4 **<u>Practice Ready</u>** Can manage more complex patient presentations and operations and take care of most cases **<u>Framework</u>:** The learner can treat all straightforward amputation cases and has a strong understanding of	• Adapts the operative plan for a changing clinical situation (eg, progressive infection, sepsis) • Identifies a patient in a population at risk for poor amputation outcomes and adapts the treatment plan to address disparities • Identifies the need for a surrogate decision-maker for a patient who is unable to provide informed consent • Engages other health care providers and caregivers (eg, palliative care) to navigate the care of a patient	• Proficiently handles instruments and equipment, uses assistants, guides the conduct of the operation, and makes independent intraop decisions, anticipating when assistance is needed • Identifies all critical steps of the procedure and the equipment required and advances the procedure without prompting in a complex case	• Leads the team and provides supervision in managing postop complications (wound/systemic) • Ensures safe transition of care at discharge for a postamputation patient in a complex situation (undomiciled patient), including coordination with other disciplines and specialties • Advocates for the outpatient care needs of a patient, with consideration of limitations of their payment model • Leads a difficult conversation with a patient regarding complication/futility of care; resolves conflicts that arise between the health care team and the patient/caregiver(s); facilitates a difficult

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Evaluation & Management of a Patient Needing Amputation

Level	Preoperative/ Nonoperative	Intraoperative	Postoperative
surgical options and techniques for less common scenarios. The attending is available at the request of the learner but is not routinely needed for common presentations, though input may be needed for more complex presentations.			discussion about the long-term prognosis and return to ADLs

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THE AMERICAN BOARD OF SURGERY

Evaluation and Management of a Patient with an Asymptomatic Aortoiliac Aneurysm

Description of the Activity	Vascular surgeons evaluate and treat patients with asymptomatic aortoiliac aneurysms. These surgeons should have a comprehensive understanding of the screening recommendations, diagnostic techniques, and medical and surgical management of this disease process, including selection criteria for intervention, type of intervention, and timing of intervention. Additionally, surgeons should understand perioperative management, including recognition and treatment of complications of surgical intervention, needed follow-up, and surveillance strategies.
Functions	❖ Nonoperative/Preoperative ➢ Synthesize essential information from a patient's referring providers, records, history, physical examination, and initial diagnostic evaluation to develop a differential diagnosis. ➢ Provide medical optimization, including smoking cessation and blood pressure control. ➢ Determine whether intervention is indicated, and consider nonoperative, expectant management in select patients. ➢ Synthesize an optimal medical management and surveillance plan for a patient in whom intervention is not indicated. ➢ Perform appropriate cardiopulmonary risk stratification, and consider frailty assessments. ➢ Select a surgical approach consistent with a patient's anatomy and comorbidities. ➢ Obtain informed consent. Describe the indications, risks, benefits, alternatives, and potential complications of the planned operation, and ensure patient/caregiver understanding. ➢ Synthesize an operative plan that demonstrates understanding of the operative anatomy, physiology, indications, contraindications, risks, benefits, alternatives, and potential complications of: ▪ Endovascular abdominal aortic aneurysm repair (EVAR) ▪ Fenestrated endovascular abdominal aortic aneurysm repair (fEVAR) ▪ Open abdominal aortic aneurysm (AAA) repair via transperitoneal approach ▪ Open AAA repair via retroperitoneal approach ❖ Intraoperative ➢ Perform the procedures required to manage asymptomatic infrarenal aortoiliac aneurysms. ▪ EVAR ▪ fEVAR ▪ Open AAA, retroperitoneal ▪ Open AAA, transperitoneal ➢ Integrate new information discovered intraoperatively to modify the surgical plan or technique as necessary, such as: ▪ Difficult proximal control or inadequate proximal anastomosis ▪ Hemodynamically unstable or anuric patient ▪ Inability to cannulate the stent graft contralateral gate (or branch vessels during fEVAR) ▪ Inadvertent coverage of renal or hypogastric arteries during EVAR/fEVAR ▪ Inadvertent iliac rupture during EVAR/fEVAR

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THE AMERICAN BOARD OF SURGERY

Evaluation and Management of a Patient with an Asymptomatic Aortoiliac Aneurysm

	▪ Injury to iliac veins during distal control ▪ Lack of femoral pulses following repair ▪ Need for conversion to open repair ▪ Type I/III endoleak ➢ Work with anesthesia staff, nursing staff, and other perioperative health care professionals to create and maintain an intraoperative environment that promotes patient-centered care. ❖ Postoperative ➢ Initiate and oversee postoperative care, including determining postoperative disposition, performing resuscitation, prescribing appropriate medical therapy, and ordering follow-up imaging. ➢ Communicate with the patient/caregiver(s) and members of the health care team to ensure understanding of postprocedure instructions and the patient's ability to carry out the resultant plan within the context of their life (eg, transportation, living situation, insurance, access to a pharmacy). ➢ Recognize, evaluate, and manage early and late complications following aortoiliac aneurysm repair. ➢ Identify surveillance plan and indications for reintervention.
Scope	❖ In scope ➢ Endoleak type II ➢ Iliac artery aneurysm (including hypogastric) ➢ Infrarenal AAA ➢ Para-anastomotic aneurysm ➢ Penetrating atherosclerotic ulcer ➢ Pseudoaneurysm ❖ Out of scope ➢ Aortoenteric fistula ➢ Dissection resulting in aneurysmal degeneration ➢ Endoleak with sac expansion or endoleaks type I/III ➢ Mycotic aneurysm ➢ Pararenal AAA ➢ Pediatric patients ➢ Symptomatic or ruptured aneurysm

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THE AMERICAN BOARD OF SURGERY

Evaluation & Management of a Patient with an Asymptomatic Aortoiliac Aneurysm

Level	Nonoperative/ Preoperative	Intraoperative Open	Intraoperative Endovascular	Postoperative
1 **Limited Participation** Demonstrates understanding of information and has very basic skills **Framework:** What a learner directly out of medical school should know The attending can show and tell.	• Elicits a history (smoking, family history of aneurysm) and performs a relevant vascular exam (pulsatile abdominal mass, complete pulse exam inclusive of femoral, popliteal, and pedal pulses) • Identifies criteria for surveillance and indications for AAA repair (size > 5.5 cm, rapid growth) • Identifies the various imaging modalities to diagnose and follow AAA (duplex, CTA, MRA)	• Demonstrates understanding of sharps safety, safe use of devices, and surgical field sterility • Performs basic surgical tasks efficiently, including suturing and knot-tying • Demonstrates basic surgical skills, including making an incision and closure	• Demonstrates a basic understanding of the anatomy of the aorta and iliac vessels • Recognizes the importance of maintaining wire position • Demonstrates understanding of basic ALARA principles; wears lead and a dosimeter at all times; performs basic "driving" maneuvers	• Identifies a straightforward postop problem (fever, pain, nausea, anemia) and initiates management with guidance • Maintains professional and clear communication with the patient/caregiver(s), the ICU, and other consulting teams • Communicates with a patient/caregiver(s) about changing conditions, providing routine information
2 **Direct Supervision** Demonstrates understanding of the steps of the operation but requires direction through principles and does not know the nuances of a basic case	• Orders and interprets imaging to establish the presence of an AAA (aortic duplex, CTA) • Describes the natural history of AAA and demonstrates understanding of surveillance and timing of repair, citing SVS guidelines	• Demonstrates respect for tissues (gentle handling of vessels) and developing skill in instrument handling • Performs parts of a distal anastomosis with frequent prompting and assistance	• Uses US to obtain vascular access; demonstrates basic catheter and wire-handling techniques • Uses fluoroscopy techniques and shielding to decrease radiation exposure to a patient and operator with guidance	• Manages a postop problem (eg, chest pain, respiratory distress), including ordering and interpreting additional tests • Actively listens to a patient/caregiver(s) to elicit preferences and manage expectations

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Evaluation & Management of a Patient with an Asymptomatic Aortoiliac Aneurysm

Level	Nonoperative/ Preoperative	Intraoperative Open	Intraoperative Endovascular	Postoperative
Framework: The learner can use the tools but may not know exactly what, where, or how to do it. The attending gives active help throughout the case to maintain forward progression.	• Uses imaging findings to support a differential and preop plan (abdominal US, CTA, MRA) • Identifies the indication for open AAA repair (> 5.5 cm, short/angulated neck, poor iliac access) and synthesizes why open repair would be preferred • Synthetizes clinical data to decide on EVAR vs open repair			• Communicates relevant operative events and the postop care plan to the ICU
3 **Indirect Supervision** Can do a basic operation but will not recognize abnormalities and does not understand the nuances of an advanced case **Framework:** The learner can perform the operation	• Synthesizes patient data such as imaging to arrive at a differential, including primary and secondary treatment options • Interprets physical exam findings, pertinent history, and imaging to determine a plan for surveillance or endo/open treatment of an asymptomatic AAA • Recognizes the impact of disease progression (aneurysm growth) on a	• Safely exposes aortoiliac anatomy with attention to preservation/management of critical structures (ureter, left renal vein, IMA) • Appropriately sizes and configures an aortoiliac graft for reconstruction and pelvic flow preservation • Performs clamping for vascular control (and unclamping) with	• Performs a diagnostic angiogram, places stiff wires, and safely delivers a main body device to the correct level • Appropriately sizes and configures an aortoiliac endograft for reconstruction and pelvic flow preservation • Accesses resources to determine exam-specific radiation dose information; independently manages the fluoroscopy system; uses radiation protection devices and techniques	• Recognizes and manages a complex vascular critical care complication, identifying the need to return to the OR • Delivers difficult information to a patient/caregiver(s) using shared decision-making • Communicates with the team efficiently and adapts to different team members' styles; provides feedback to the team, peers, and learners

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Evaluation & Management of a Patient with an Asymptomatic Aortoiliac Aneurysm

Level	Nonoperative/ Preoperative	Intraoperative Open	Intraoperative Endovascular	Postoperative
in straightforward circumstances. The attending gives passive help. This help may be given while scrubbed for more complex cases or during a check-in for more routine cases.	longitudinal care plan and surveillance • Uses available imaging to support a differential and preop plan for a complicated asymptomatic AAA (abdominal US, CTA, MRA) • Develops a specific operative plan for open repair (transperitoneal vs retroperitoneal), demonstrating understanding of alternative options • Develops an EVAR plan and recognizes device limitations based on a patient's anatomy and device instructions for use	appropriate sequence (outflow before inflow) • Demonstrates efficient instrument handling and safe exposure, dissection, and control of vessels • Performs complete proximal and distal anastomoses with minimal prompting and passive assistance		
4 **<u>Practice Ready</u>** Can manage more complex patient presentations and operations and take care of most cases	• Synthesizes patient data such as imaging (CTA) to arrive at a differential; discusses primary and secondary treatment options and continued surveillance vs intervention with a patient with advanced comorbidities and AAA	• Proficiently handles instruments and equipment, uses assistants, and guides the conduct of the operation; makes independent intraop decisions; anticipates when assistance is needed	• Performs EVAR/IBE independently; troubleshoots and treats an endoleak • Ensures colleagues and staff practice ALARA principles	• Leads the team and provides supervision in managing a postop problem • Facilitates a caregiver meeting or end-of-life discussion and negotiates a care management plan when interventions may be ineffective

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Evaluation & Management of a Patient with an Asymptomatic Aortoiliac Aneurysm

Level	Nonoperative/ Preoperative	Intraoperative Open	Intraoperative Endovascular	Postoperative
Framework: The learner can treat all straightforward appendicitis cases and has a strong understanding of surgical options and techniques for less common scenarios. The attending is available at the request of the learner but is not routinely needed for common presentations, though input may be needed for more complex presentations.	• Independently alters the longitudinal care plan and aneurysm surveillance based on imaging findings (aneurysm growth) • Independently uses 3D reconstruction to identify abnormal findings and plan repair (size the endograft and troubleshoot difficult anatomy [accessory renal, small iliac vessels, large IMA]) • Independently chooses the graft size for an open repair and uses available imaging to plan the operative approach, including where to clamp and other adjuncts needed (renal flush, need for hypogastric jump grafts) • Adapts a management plan based on a change in a patient's condition, including from endo to open			• Coordinates a caregiver meeting with the various health care teams for a goals-of-care or end-of-life discussion or transition of care

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THE AMERICAN BOARD OF SURGERY

Evaluation and Management of a Patient with Cerebrovascular Disease

Description of the Activity	Vascular surgeons evaluate and treat both asymptomatic and symptomatic cerebrovascular disease. These surgeons should have a comprehensive understanding of screening recommendations, diagnostic techniques, and medical and surgical management of this disease process, including selection criteria for intervention and timing of intervention. Additionally, surgeons should understand perioperative management, including recognition and treatment of complications of surgical intervention, needed follow-up, and surveillance strategies.
Functions	❖ Nonoperative/Preoperative ➢ Synthesize essential information from a patient's referring providers, records, history, physical examination, and initial diagnostic evaluation to develop a differential diagnosis. ➢ Perform an evidence-based, cost-effective diagnostic evaluation, including selective screening. ➢ Determine whether intervention is indicated. ➢ Synthesize an optimal medical management and surveillance plan for a patient for whom intervention is not indicated. ➢ Recognize complications of cerebrovascular disease requiring emergency operative intervention. ➢ Select a surgical approach consistent with a patient's anatomy, comorbidities, and acuity of presentation. ➢ Obtain informed consent. Describe the indications, risks, benefits, alternatives, and potential complications of the planned operation, and ensure patient/caregiver understanding. ➢ Synthesize an operative plan that demonstrates understanding of the operative anatomy, physiology, indications, contraindications, risks, benefits, alternatives, and potential complications of: ▪ Carotid artery bypass ▪ Carotid endarterectomy ▪ Transcarotid artery revascularization (TCAR) ▪ Transfemoral carotid artery stent (TFCAS) ❖ Intraoperative ➢ Perform the procedures required to manage cerebrovascular disease. ▪ Carotid artery bypass ▪ Carotid endarterectomy ▪ TCAR ▪ TFCAS ➢ Integrate new information discovered intraoperatively that requires modification of the surgical plan or technique, such as: ▪ Aberrant cranial nerve anatomy ▪ Carotid tortuosity ▪ Hostile aortic arch ➢ Work with the anesthesia and nursing teams and other perioperative health care professionals to create and maintain an intraoperative environment that promotes patient-centered care. ❖ Postoperative

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	➢ Initiate and oversee postoperative care, including monitoring for neurologic examinations and blood pressure control, prescribing evidence-based medical therapy, and determining follow-up imaging and care. ➢ Communicate with the patient/caregiver(s) and members of the health care team to ensure understanding of postprocedure instructions and the ability of the patient to carry out the resultant plan within the context of their life (eg, transportation, living situation, insurance, access to a pharmacy). ➢ Recognize, evaluate, and manage early and late complications following cerebrovascular intervention. ➢ Identify a surveillance plan and indications for reintervention.
Scope	❖ In scope ➢ Acute stroke, amaurosis fugax, transient ischemic attack ➢ Carotid artery aneurysm or pseudoaneurysm ➢ Carotid artery stenosis or occlusion ➢ Carotid artery thrombus ❖ Out of scope ➢ Acute cardioembolic stroke ➢ Carotid body tumor ➢ Intracranial occlusive disease ➢ Trauma ➢ Vertebral artery stenosis or occlusion ➢ Vertebrobasilar insufficiency ❖ Special Population ➢ Patients with: ▪ Concomitant coronary artery disease requiring coronary artery bypass grafting and carotid artery stenosis ▪ Radiation-induced carotid disease ▪ Reoperative fields ▪ Tandem carotid lesions

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Evaluation & Management of a Patient with Cerebrovascular Disease

Level	Preoperative/Nonoperative	Intraoperative Open	Intraoperative Endovascular	Postoperative
1 **<u>Limited Participation</u>** Demonstrates understanding of information and has very basic skills **<u>Framework:</u>** What a learner directly out of medical school should know The attending can show and tell.	• Elicits a history and performs a relevant vascular exam (eg, cranial nerves, carotid bruit) • Demonstrates understanding of basic risk factor modification (impact of smoking, cholesterol, HTN, DM) • Identifies available imaging modalities (carotid duplex, CTA, MRA, angiography) • Identifies the need for intervention in a straightforward case of symptomatic carotid disease • Demonstrates understanding of the indications for intervention in an asymptomatic carotid patient • Identifies the need for intervention over medical management for symptomatic and asymptomatic disease • Recognizes the diagnosis of carotid occlusive disease and identifies guidelines for its treatment	• Describes landmarks for CEA incision and the relationship of the artery to the SCM and IJ and facial veins, needing assistance to identify them • Identifies the procedure to be performed, alternative options (TCAR, TFCAS), and the indications for CEA relative to other options • Describes potential crises that could occur during CEA (bradycardia, stroke)	• Uses US to identify femoral or carotid anatomy; recognizes the importance of maintaining wire position • Identifies the procedure to be performed, alternative options (CEA), and the indications for TCAR or TFCAS relative to other options	• Identifies a basic postop problem (incisional pain, BP instability, hematoma, headache) and initiates management with supervision • Recognizes the need for long-term surveillance and risk factor modification

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Evaluation & Management of a Patient with Cerebrovascular Disease

Level	Preoperative/Nonoperative	Intraoperative Open	Intraoperative Endovascular	Postoperative
2 **Direct Supervision** Demonstrates understanding of the steps of the operation but requires direction through principles and does not know the nuances of a basic case **Framework:** The learner can use the tools but may not know exactly what, where, or how to do it. The attending gives active help throughout the case to maintain forward progression.	• Orders and interprets duplex and axial imaging, including identification of duplex criteria for stenosis • Describes methods for risk factor modification in cerebrovascular disease, including smoking cessation, statin therapy, antiplatelet agents, and BP control • Uses imaging to support a decision for operative management of carotid disease • Synthesizes patient-specific clinical data to recommend CEA, TCAR, or TFCAS • Elicits a discussion of patient preferences regarding medical treatment or intervention for carotid disease	• Demonstrates care while handling tissue adjacent to nerves and arteries, particularly at the level of the carotid sheath • Identifies most steps of the procedure (inflow/outflow control) and the equipment required (neuroprotection, shunt, neuromonitoring); requires prompting to advance the procedure • Describes expected findings for an intraprocedural CVA, including changes in an EEG or a change in the neurologic status of an awake patient • Describes expected findings for inadequate	• Uses US to obtain vascular access; demonstrates basic catheter and wire-handling techniques • Identifies most steps of the procedure and equipment required; requires prompting to advance the procedure • Describes expected findings for an intraprocedural CVA, including a change in the neurologic status of an awake patient • Describes expected findings for inadequate anticoagulation with thrombus formation	• Manages a common postop problem (eg, chest pain, headache), including ordering and interpreting additional workup (ECG, CT head) • Describes evidence-based surveillance imaging and risk factor modification based on SVS guidelines

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Evaluation & Management of a Patient with Cerebrovascular Disease

Level	Preoperative/Nonoperative	Intraoperative Open	Intraoperative Endovascular	Postoperative
		anticoagulation with thrombus formation		
3 **<u>Indirect Supervision</u>** Can do a basic operation but will not recognize abnormalities and does not understand the nuances of an advanced case **<u>Framework:</u>** The learner can perform the operation in straightforward circumstances. The attending gives passive help. This help may be given while scrubbed for more complex cases or during a check-in for more routine cases.	• Interprets US results and patient risk factors and formulates a rationale for medical or surgical management of carotid stenosis • Recognizes the need for continued surveillance of carotid lesions and the potential need for intervention despite best medical management • Uses imaging findings to support a decision for CEA vs TCAR vs TFCAS • Demonstrates thorough understanding of all operative options, rationalizing their choice for a patient (eg, anatomic criteria, patient comorbidities) • Develops a plan for TCAR vs TFCAS based on the current clinical situation and patient anatomy	• Dissects the carotid artery with appropriate instruments; performs an arteriotomy and sews a patch with limited assistance; moves fluidly throughout a routine operation; requires guidance for a difficult case • Identifies all critical steps of the procedure (order of clamping, endarterectomy, patch) and the equipment required; advances the procedure with minimal prompting • Requires guidance for unanticipated findings or variants (difficult endpoint, high lesion); recognizes the need	• Demonstrates understanding of the procedural sequence of TCAR and TFCAS and their critical steps (TCAR flow reversal, placement of protection device) • Obtains an initial carotid angiogram safely and efficiently; establishes flow reversal, performing the steps in the correct order • Requires guidance for unanticipated findings or variants (tortuosity, spasm) • Requires guidance for unanticipated findings or variants (difficult to traverse lesion); recognizes the need for a completion study and interprets and responds to it	• Identifies a disease-specific complication in a complex carotid patient (acute stroke/thrombosis, cerebral hyperperfusion syndrome, postop bleed, nerve injury) and recognizes the impact of these on longitudinal care • Customizes postop instructions • Recognizes and manages a complex periop problem (stroke, cerebral hyperperfusion), including identifying the need to return to the OR

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Evaluation & Management of a Patient with Cerebrovascular Disease

Level	Preoperative/Nonoperative	Intraoperative Open	Intraoperative Endovascular	Postoperative
	• Identifies duplex criteria for carotid disease; independently applies guidelines for accurate decision-making regarding the type of intervention for a patient with carotid disease	for neuromonitoring and interprets and responds to it; recognizes the need for a completion study and interprets and responds to it • Leads intraop communication with anesthesia, nursing, and perioperative staff (eg, BP management at the time of clamping/neuromonitoring)	• Leads intraop communication with anesthesia, nursing, and perioperative staff (eg, TCAR timeout/clamp/heparinization/neuromonitoring)	
4 **Practice Ready** Can manage more complex patient presentations and operations and take care of most cases **Framework:** The learner can treat all straightforward cerebrovascular disease	• Synthesizes results of imaging with complex findings (contralateral occlusions, anatomically difficult lesions) for a medically challenging patient and establishes an appropriate treatment plan • Oversees the care of a complex patient with cerebrovascular disease, including medication requirements, imaging, and risk management	• Performs and guides the operation in a complex situation (scarring, inflammation, infection); troubleshoots issues with a shunt, clotting, and exposure • Performs and interprets completion imaging • Identifies all critical steps of the procedure	• Selects the great vessels from a transfemoral approach, advances a sheath, and places an embolic protection device; establishes flow reversal in TCAR, obtains a roadmap, and safely crosses the lesion • Describes the procedural sequence for TCAR and TFCAS for a complex case (tortuosity, lesion that is difficult to cross)	• Leads the team and provides supervision in the management of a complex complication (acute stroke/thrombosis, cerebral hyperperfusion syndrome, postop bleed, nerve injury)

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Evaluation & Management of a Patient with Cerebrovascular Disease

Level	Preoperative/Nonoperative	Intraoperative Open	Intraoperative Endovascular	Postoperative
cases and has a strong understanding of surgical options and techniques for less common scenarios. The attending is available at the request of the learner but is not routinely needed for common presentations, though input may be needed for more complex presentations.	• Independently initiates cross-sectional and duplex imaging and 3D reformatting to identify abnormal findings and plan an intervention • Adjusts the operative plan based on a change in the clinical situation (new/evolving neurologic symptoms or medical comorbidities), including conversion between open and endo approaches • Adapts the management plan based on a change in a patient's neurologic symptoms or medical comorbidities, including from endo to open • Interprets imaging studies, demonstrates thorough understanding of all relevant trials, and applies evidence-based medicine to treatment selection; recognizes the benefits/limitations of medical vs open vs endo treatment and selects appropriately	and the equipment required; advances the procedure without prompting in a complex case (eg, high lesion) • Recognizes when operative plan deviation is needed; adapts and implements a plan, including the need for conversion from open to endo • Anticipates patient-specific risk for a crisis during an open approach (contralateral occlusion, difficult endpoint, redo operative field) and describes an appropriate treatment algorithm and potential outcomes, including conversion to an endo or hybrid procedure	and identifies equipment needs; recognizes critical decision points (aborting the difficult arch or if unable to cross the lesion) • Alters the plan during carotid stenting or TCAR or TFCAS when needed, including using different catheters and wires to cross the carotid lesion • Anticipates patient-specific risk for a crisis during TCAR or TFCAS (inability to cross a lesion, failure of stenosis to respond to a balloon, access issues) and describes an appropriate treatment algorithm and potential outcomes, including conversion to an open or hybrid procedure • Recognizes when operative plan deviation is needed; adapts and implements a plan, including the need for	

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Evaluation & Management of a Patient with Cerebrovascular Disease

Level	Preoperative/Nonoperative	Intraoperative Open	Intraoperative Endovascular	Postoperative
			conversion from endo to open	

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Evaluation and Management of a Patient with Chronic Limb-Threatening Ischemia

Description of the Activity	Vascular surgeons evaluate and treat patients with CLTI in outpatient and urgent/inpatient settings. These surgeons should have a comprehensive understanding of the evaluation and management of CLTI, including diagnostic techniques, medical management, and open and endovascular surgical interventions. Additionally, vascular surgeons should understand perioperative management, including recognition and treatment of complications of surgical intervention, needed follow-up, and surveillance strategies.
Functions	❖ Nonoperative/Preoperative ➢ Synthesize essential information from a patient's referring providers, records, history (including relevant risk factors), physical examination, and initial diagnostic evaluation to establish a diagnosis. ➢ Perform an evidence-based, cost-effective diagnostic evaluation. ➢ Synthesize an optimal risk factor modification and medical management plan. ➢ Determine whether intervention is indicated. For patients who are not indicated for intervention, establish a surveillance plan. ➢ Recognize complications of CLTI requiring emergency operative intervention. ➢ Perform cardiopulmonary risk stratification for at-risk patients, consider frailty assessments, and recognize when a specialist referral is necessary. ➢ Select a surgical approach consistent with a patient's anatomy, comorbidities, and acuity of presentation. ➢ Counsel a patient regarding the durability of potential revascularization procedures as well as the prognosis for limb salvage versus the likelihood of amputation. ➢ Obtain informed consent. Describe the indications, risks, benefits, alternatives, and potential complications of the planned operation, and ensure patient/caregiver understanding. ➢ Synthesize an operative plan that demonstrates understanding of the operative anatomy, physiology, indications, contraindications, risks, benefits, alternatives, and potential complications of: ▪ Lower extremity endovascular revascularization ▪ Lower extremity open revascularization ❖ Intraoperative ➢ Perform the procedures required to manage lower extremity peripheral arterial occlusive disease in the setting of CLTI. ▪ Execute endovascular revascularization of the lower extremity. ▪ Execute open surgical operative revascularization of the lower extremity. ➢ Integrate new information discovered intraoperatively that requires modification of the surgical plan or technique. ➢ Work with anesthesia staff, nursing staff, and other perioperative health care professionals to create and maintain an intraoperative environment that promotes patient-centered care.

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Evaluation and Management of a Patient with Chronic Limb-Threatening Ischemia

	❖ Postoperative ➢ Initiate and oversee postoperative care, including monitoring lower extremity pulses, prescribing evidence-based medical therapy, and determining follow-up imaging and care. ➢ Communicate with the patient/caregiver(s) and members of the health care team to ensure understanding of post-procedure instructions and the patient's ability to carry out the resultant plan within the context of their life (eg, transportation, living situation, insurance, access to a pharmacy). ➢ Recognize, evaluate, and manage early and late complications following lower extremity intervention. ▪ Access site complications or other bleeding complications ▪ Early and late bypass graft failure ▪ Infectious complication (access/surgical site and prosthetic material), anastomotic pseudoaneurysm ▪ Target lesion restenosis/occlusion with the potential need for reintervention and need for surveillance ➢ Identify a surveillance plan and indications for reintervention.
Scope	❖ In scope ➢ Aortoiliac occlusive disease ➢ Infrainguinal occlusive disease ❖ Out of scope ➢ Amputation ➢ Patients with: ▪ Acute limb ischemia ▪ Claudication ▪ Upper extremity CLTI

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Evaluation & Management of a Patient with Chronic Limb-Threatening Ischemia

Level	Nonoperative/ Preoperative	Intraoperative Open	Intraoperative Endovascular	Postoperative
1 **<u>Limited Participation</u>** Demonstrates understanding of information and has very basic skills **<u>Framework:</u>** What a learner directly out of medical school should know The attending can show and tell.	• Elicits a history and performs a vascular exam (Doppler pulses, tissue loss, elevation pallor, dependent rubor) • Identifies a basic preop problem (DM, smoking) and initiates management with supervision • Identifies options for diagnostic imaging (arterial Doppler, duplex, CTA) • Identifies the need for revascularization in a patient with CLTI • Identifies the indications for intervention (eg, risk of limb loss without intervention) • Classifies the degree of CLTI and communicates operative urgency using an evidence-based scoring system • Communicates basic facts about the condition to a patient/caregiver(s) in a respectful way and identifies the elements of an informed consent discussion	• Demonstrates understanding of sharps safety, safe use of devices, and surgical field sterility • Performs basic surgical tasks efficiently, including suturing and knot-tying • Demonstrates basic surgical skills, including making an incision and closure • Identifies the planned procedure and alternative options (endo or open) for the treatment of CLTI • Identifies potential crises that could occur during an open approach to CLTI (bleeding, dissection, venous injury) • Recognizes the importance of the preop time-out for prevention of wrong-site, wrong-side surgery	• Uses US to visualize access vessels • Recognizes the importance of maintaining wire access • Identifies potential crises that could occur during endo treatment of CLTI (loss of access, ruptured artery, dissection)	• Identifies a basic postop problem (hematoma, bleeding, fever, wound infection, pain) and initiates management with supervision • Identifies the ethical and professional importance of patient-centered discussions on postop complications and limb salvage in CLTI • Respectfully communicates the expected postop course and the health care team's care plan to a patient/caregiver(s) • Recognizes a basic postop complication (MI, change in vascular exam, compartment syndrome) and relays it to the team •

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Evaluation & Management of a Patient with Chronic Limb-Threatening Ischemia

Level	Nonoperative/ Preoperative	Intraoperative Open	Intraoperative Endovascular	Postoperative
2 **Direct Supervision** Demonstrates understanding of the steps of the operation but requires direction through principles and does not know the nuances of a basic case **Framework:** The learner can use the tools but may not know exactly what, where, or how to do it. The attending gives active help throughout the case to maintain forward progression.	• Orders imaging studies (ABI, duplex, axial) and interprets findings to confirm multilevel arterial disease; needs assistance to formulate an operative plan • Manages a common periop problem (DM, MI), including ordering additional workup • Uses imaging to support operative planning of CLTI • Identifies patient factors that influence the imaging modality (eg, renal insufficiency) • Synthesizes clinical data (anatomy, level of disease, runoff, medical comorbidities) to choose open vs endo intervention • Demonstrates limited familiarity with literature on the management of CLTI and discusses this information with a patient • Customizes communication about the condition to a	• Demonstrates respect for tissues (gentle handling of vessels) and developing skill in instrument handling (using a Castroviejo needle driver) • Performs parts of an anastomosis with frequent prompting and assistance • Identifies most steps of the procedure (exposure, inflow/outflow control, endarterectomy or bypass) and the equipment required (clamps, tunneller), requiring prompting to advance the procedure • Describes most potential operative errors and intraop findings; needs assistance to demonstrate how to avoid them • Describes findings with arterial injury, venous injury, and dissection that can be encountered during open treatment for CLTI • Participates in the preop time-out for prevention of wrong-site, wrong-side surgery	• Uses US to obtain vascular access; demonstrates basic catheter and wire-handling techniques • Describes radiographic and clinical findings with arterial rupture and dissection that can occur during endo treatment of CLTI • Participates in the preop time-out for prevention of wrong-site, wrong-side surgery	• Manages a common postop problem (hematoma, anemia, change in pulse exam), including ordering and interpreting additional testing • Applies ethical principles regarding limb salvage to a patient with CLTI and their caregiver(s) • Communicates standard postop instructions and updates to a patient/caregiver(s) • Recognizes and coordinates complex postop discharge needs, including PT, wound care, anticoagulation management, and follow-up

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Evaluation & Management of a Patient with Chronic Limb-Threatening Ischemia

Level	Nonoperative/ Preoperative	Intraoperative Open	Intraoperative Endovascular	Postoperative
	patient/caregiver(s) in a respectful way; answers a patient's questions about the management of CLTI, including patency rates of intervention and risk of limb loss; conducts an informed consent discussion for a straightforward, elective CLTI case			
3 **<u>Indirect Supervision</u>** Can do a basic operation but will not recognize abnormalities and does not understand the nuances of an advanced case **<u>Framework:</u>** The learner can perform the operation in straightforward circumstances.	• Manages complex comorbidities (anticoagulation reversal, cardiac optimization, palliative care) • Develops a specific open surgical plan for a clinical situation and demonstrates understanding of alternative treatment options • Develops an endo treatment plan for a clinical situation and recognizes device limitations based on patient anatomy • Demonstrates familiarity with literature regarding	• Performs the steps of the operation for femoral, popliteal, and tibial exposures and makes straightforward intraop decisions, including incision placement; identifies suitable inflow/outflow vessels and the adequacy of conduit vs an appropriate alternative • Demonstrates efficient instrument handling and safe exposure, dissection, and control of vessels • Performs a complete endarterectomy, anastomosis, and patch with minimal prompting and passive assistance	• Describes the procedural sequence (access, crossing lesion, plan for treatment) and equipment needs; identifies the critical decision points of an intermediate endo procedure for CLTI • Describes the appropriate response to loss of arterial access, dissection, or arterial rupture during endo intervention for CLTI	• Recognizes and manages a postop complication (target lesion/graft occlusion, bleeding, cardiopulmonary complications), including identifying the need to return to the OR • Applies ethical principles to complex patient physiology regarding limb salvage • Communicates tailored postop instructions to a patient/(caregiver(s) in a caring way, including anticipatory guidance for common postop issues such as limb swelling, reperfusion pain, and wound complications • Communicates with and listens to team members

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Evaluation & Management of a Patient with Chronic Limb-Threatening Ischemia

Level	Nonoperative/ Preoperative	Intraoperative Open	Intraoperative Endovascular	Postoperative
The attending gives passive help. This help may be given while scrubbed for more complex cases or during a check-in for more routine cases.	management and outcomes of intervention for CLTI and applies it independently • Customizes communication about the condition to a patient/caregiver(s) based on individual characteristics; anticipates logistical problems in optimizing the patient for surgery • Clearly conducts an informed consent discussion for a complex or urgent limb revascularization, including individualizing risks and benefits for the patient and discussing patency rates and risk of limb loss, though incorporation of patient preferences may be limited •	• Describes the procedural sequence (arterial exposure, bypass, or endarterectomy) and equipment needs; identifies the critical decision points of an intermediate open procedure for CLTI • Describes the appropriate response to bleeding, venous injury, and dissection during an open intervention for CLTI • Leads the OR staff in a surgical time-out to reduce the risk of wrong-site surgery		and allied health care staff regarding the in-hospital and discharge needs of a patient/caregiver(s) •
4 **<u>Practice Ready</u>** Can manage more complex patient	• Performs a focused, efficient, and accurate H&P that includes pertinent positive and negative symptoms and preoperatively manages	• Proficiently handles instruments and equipment, uses assistants, and guides the conduct of the operation; makes independent	• Identifies all critical steps of the procedure and the equipment required and advances the procedure without	• Leads the team and provides supervision in the management of a complex complication (target lesion/graft occlusion, bleeding)

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Evaluation & Management of a Patient with Chronic Limb-Threatening Ischemia

Level	Nonoperative/ Preoperative	Intraoperative Open	Intraoperative Endovascular	Postoperative
presentations and operations and take care of most cases **<u>Framework</u>:** The learner can treat all straightforward appendicitis cases and has a strong understanding of surgical options and techniques for less common scenarios. The attending is available at the request of the learner but is not routinely needed for common presentations, though input may be needed for more complex presentations.	a patient with complex CLTI, considering all classifications of ischemia • Leads and supervises the team in managing complex comorbidities, critical care, and palliative care • Conducts an informed consent discussion for a patient undergoing complex revascularization • Independently initiates cross-sectional and duplex imaging and 3D reformatting to identify abnormal findings and plan an intervention • Demonstrates adequate background knowledge based on a patient-specific H&P and interprets appropriate imaging studies to develop an operative plan for CLTI, including consideration of open and endo approaches • Describes multiple approaches to open revascularization for CLTI and adapts the plan for a	intraop decisions; anticipates when assistance is needed • Identifies all critical steps of the procedure and the equipment required and advances the procedure without prompting in a complex case • Describes potential errors at critical portions of the procedure and the steps to avoid them • Anticipates patient-specific complications during an open intervention for CLTI (potential arterial and venous injury from redo operative fields, difficulty establishing inflow control due to calcification) and describes appropriate management of these situations, including incorporation of an endo technique • Serves as a role model for other providers in the OR, advocating for patient safety	prompting in a complex case • Describes potential errors at critical portions of the procedure and the steps to avoid them • Anticipates patient-specific complications during an endo intervention for CLTI (potential arterial injury from small access, heavily calcified lesions, difficult iliac bifurcations, long lesions) and describes appropriate management of these situations, including conversion to an open procedure • Serves as a role model for other providers in the OR, advocating for patient safety	• Initiates discussion and resolves complex issues regarding reintervention and limb salvage in a patient with CLTI • Communicates with a patient/caregiver(s) in a caring and nonjudgmental way in a difficult situation, such as a complication or intervention failure; provides anticipatory guidance regarding risks/likelihood of limb loss and implications of amputation • Leads the multidisciplinary team to facilitate in-hospital and posthospital care and follow-up

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Evaluation & Management of a Patient with Chronic Limb-Threatening Ischemia

Level	Nonoperative/ Preoperative	Intraoperative Open	Intraoperative Endovascular	Postoperative
	changing clinical situation (eg, development of wet gangrene, acute-on-chronic ischemia) • Adapts the management plan based on a change in a patient's anatomy, including from endo to open • Independently initiates and interprets the expected cost-effective workup for an advanced or unusual CLTI presentation; determines the optimal personalized operative approach for the patient • Demonstrates familiarity with the most current literature and guidelines regarding management of CLTI • Customizes communication about the condition to a patient/caregiver(s) based on individual characteristics; anticipates logistical problems in optimizing the patient for surgery			

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Evaluation and Management of a Patient with Chronic Mesenteric Ischemia

Description of the Activity	Vascular surgeons are often called to evaluate patients with symptoms or diagnostic findings suggestive of chronic mesenteric ischemia. These surgeons should have a comprehensive understanding of the presenting signs and symptoms, diagnostic techniques, and management of this disease process. This includes medical management, criteria for intervention, and selection of an interventional or surgical approach. Additionally, surgeons should understand perioperative management, including recognition and treatment of complications of surgical intervention, needed follow-up, and surveillance strategies.
Functions	❖ Nonoperative/Preoperative ➢ Synthesize essential information from a patient's referring providers, records, history, physical examination, and initial diagnostic evaluation to develop a differential diagnosis. ➢ Perform an evidence-based diagnostic evaluation. ➢ Determine whether intervention is indicated. ➢ Synthesize an optimal medical management plan. ➢ Create a surveillance plan for a patient in whom intervention is not indicated. ➢ Select a surgical approach consistent with a patient's anatomy and comorbidities. ➢ Obtain informed consent. Describe the indications, risks, benefits, alternatives, and potential complications of the planned operation, and ensure patient/caregiver understanding. ➢ Synthesize an operative plan that demonstrates understanding of the anatomy, physiology, indications, contraindications, risks, benefits, alternatives, and potential complications of: ▪ Aortoceliac bypass ▪ Aorto-superior mesenteric artery (SMA) bypass ▪ Iliac-SMA bypass ▪ Mesenteric stenting, antegrade or retrograde (retrograde open mesenteric stenting [ROMS]) ❖ Intraoperative ➢ Perform the procedures required to revascularize mesenteric vessels. ▪ Integrate new information discovered intraoperatively to modify the surgical plan or technique as necessary, such as: ▪ Diffusely necrotic and nonviable bowel throughout the entire SMA distribution ▪ Inability to pass retrograde thrombectomy Fogarty balloon ▪ Inability to successfully intervene endovascularly if an attempt is made, antegrade or retrograde ▪ Necrotic bowel with perforation and contamination ➢ Work with anesthesia staff, nursing staff, and other perioperative health care professionals to create and maintain an intraoperative environment that promotes patient-centered care. ❖ Postoperative

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Evaluation and Management of a Patient with Chronic Mesenteric Ischemia

	➢ Initiate and oversee postoperative care and postoperative disposition. ➢ Communicate with a patient/caregiver(s) and members of the health care team (primary care physician, nursing staff, and other care providers) to ensure understanding of preprocedure and postprocedure instructions and the patient's ability to carry out the resultant plan within the context of their life (eg, transportation, living situation, insurance, access to a pharmacy). ➢ Recognize and manage the most common complications following mesenteric revascularization, such as: ▪ Arterial dissection ▪ Arterial embolization ▪ Bowel ischemia ▪ Hematoma ▪ Hemorrhage ▪ Hernia ▪ Stent dislodgement
Scope	❖ In scope ➢ All adult patients ❖ Out of scope ➢ Median arcuate ligament syndrome ➢ Nonocclusive mesenteric ischemia ➢ Pediatric patients ➢ Portal vein thrombosis ➢ SMA syndrome ➢ Visceral aneurysmal disease ➢ Visceral debranching for aortic aneurysmal disease

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THE AMERICAN BOARD OF SURGERY

Evaluation & Management of a Patient with Chronic Mesenteric Ischemia

Level	Preoperative/Nonoperative	Intraoperative Open	Intraoperative Endovascular	Postoperative
1 **Limited Participation** Demonstrates understanding of information and has very basic skills **Framework:** What a learner directly out of medical school should know The attending can show and tell.	• Identifies various types of applicable imaging of the visceral vessels (duplex, CTA, MRA) • Demonstrates respect and professionalism when discussing a care plan with other team members or consultants	• Demonstrates understanding of sharps safety, safe use of devices, and surgical field sterility • Performs basic surgical tasks efficiently, including suturing and knot-tying • Demonstrates basic surgical skills, including making an incision and closure • Identifies open surgical options to treat CMI and identifies indications for the selected procedure over alternatives; demonstrates basic understanding of visceral arterial anatomy • Identifies crises that could occur during the procedure (clamp injuries, early graft thrombosis)	• Uses US to demonstrate anatomy for vascular access and recognizes the importance of maintaining wire position during wire and catheter exchanges • Demonstrates basic understanding of the anatomy of the visceral arterial system • Identifies endo treatment options and indications for the selected procedure • Identifies crises that could occur during the procedure (dissection, thrombosis) • Identifies basic ALARA principles; wears lead and a dosimeter at all times; performs basic "driving" maneuvers	• Identifies a basic postop problem (wound complication, hematoma, nausea) and initiates management with supervision • Recognizes the need for long-term surveillance and risk factor modification
2 **Direct Supervision**	• Orders vascular imaging studies (duplex, CTA, MRA) and interprets findings (multiple mesenteric vessel involvement,	• Demonstrates respect for tissues (gentle handling of vessels) and developing skill in instrument handling	• Uses US to obtain vascular access; demonstrates basic catheter and wire-handling techniques • Identifies most steps of the procedure and the	• Manages a common postop problem (ileus, MI), including ordering and interpreting additional tests

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THE AMERICAN BOARD OF SURGERY

Evaluation & Management of a Patient with Chronic Mesenteric Ischemia

Level	Preoperative/Nonoperative	Intraoperative Open	Intraoperative Endovascular	Postoperative
Demonstrates understanding of the steps of the operation but requires direction through principles and does not know the nuances of a basic case **Framework:** The learner can use the tools but may not know exactly what, where, or how to do it. The attending gives active help throughout the case to maintain forward progression.	atherosclerosis vs chronic dissection) • Uses imaging to support operative planning of CMI and identifies patient factors that influence the imaging modality (eg, renal insufficiency) • Concisely communicates basic facts about CMI to other health care teams	• Performs parts of a proximal anastomosis (iliac artery inflow) with frequent prompting and assistance • Identifies most steps of the procedure (exposure, inflow/outflow control, endarterectomy or bypass) and the equipment required; needs prompting to advance the procedure • Describes complications that occur during an open surgical approach to CMI, including clamp injuries, early graft thrombosis, and poor donor/target vessels	equipment required; needs prompting to advance the procedure • Uses fluoroscopy techniques and shielding to decrease radiation exposure to a patient and operator as appropriate and with guidance • Identifies and describes complications of percutaneous access and angioplasty during an endo procedure for CMI, including dissection and thrombosis	• Describes long-term surveillance and risk factor modification
3 **Indirect Supervision** Can do a basic operation but will not recognize abnormalities and does not understand the	• Synthesizes H&P, lab, and diagnostic imaging (duplex, CTA, angiography) findings to coordinate a treatment plan and alternative options for CMI • Integrates multiple imaging modalities to confirm a treatment plan	• Performs an exploratory laparotomy in a virgin abdomen • Demonstrates efficient instrument handling and safe exposure, dissection, and control of vessels • Performs a complete endarterectomy,	• Performs an aortogram and visceral angiogram with stenting in an intermediate-complexity lesion • Identifies all critical steps of the procedure and the equipment required; advances the procedure with minimal prompting	• Recognizes and manages a complex immediate postop complication (target lesion/graft occlusion, hypotension, acidosis, MI, renal failure), including identifying the need to return to the OR

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THE AMERICAN BOARD OF SURGERY

Evaluation & Management of a Patient with Chronic Mesenteric Ischemia

Level	Preoperative/Nonoperative	Intraoperative Open	Intraoperative Endovascular	Postoperative
nuances of an advanced case **Framework:** The learner can perform the operation in straightforward circumstances. The attending gives passive help. This help may be given while scrubbed for more complex cases or during a check-in for more routine cases.	• Tailors communication regarding the treatment plan for CMI to other health care teams based on their level of expertise; communicates information from other specialties (eg, gastroenterology) to other team members	anastomosis, and patch with minimal prompting and passive assistance • Identifies all critical steps of the procedure and the equipment required; advances the procedure with minimal prompting • Describes the appropriate response to crises that occur during an open approach to CMI, including clamp injury, early graft thrombosis, and poor donor/target vessels	• Describes the appropriate response to complications of percutaneous access and angioplasty, including dissection and thrombosis during an endo procedure for CMI • Accesses resources to determine exam-specific radiation dose information; independently manages the fluoroscopy system; uses radiation protection devices and techniques	• Recognizes the impact of comorbidities (atherosclerotic risk factors) and complications (MI, bowel necrosis) on the longitudinal care plan
4 **Practice Ready** Can manage more complex patient presentations and operations and take care of most cases **Framework:**	• Synthesizes patient data, including the acuity of the patient's condition, comorbidities, and imaging, and formulates a plan for endo or operative intervention for CMI, including all relevant details of the intervention • Independently initiates cross-sectional and duplex imaging and 3D reformatting to identify	• Proficiently handles instruments and equipment, uses assistants, and guides the conduct of the operation; makes independent intraop decisions; anticipates when assistance is needed • Identifies all critical steps of the procedure and the equipment required; advances the	• Performs a visceral angiogram, antegrade stenting, and ROMS in a complex CTO scenario • Identifies all critical steps of the procedure and the equipment required; advances the procedure without prompting; recognizes critical decision points • Anticipates and describes crises that occur in an endo procedure for CMI,	• Leads the team and provides supervision in managing a postop complication (target lesion/graft occlusion, hypotension, acidosis, MI, renal failure) • Independently alters the longitudinal care plan based on a complication (bowel necrosis, MI)

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THE AMERICAN BOARD OF SURGERY

Evaluation & Management of a Patient with Chronic Mesenteric Ischemia

Level	Preoperative/Nonoperative	Intraoperative Open	Intraoperative Endovascular	Postoperative
The learner can treat all straightforward CMI cases and has a strong understanding of surgical options and techniques for less common scenarios. The attending is available at the request of the learner but is not routinely needed for common presentations, though input may be needed for more complex presentations.	abnormal findings and plan an intervention • Coordinates recommendations from all services (gastroenterology, cardiology, general surgery, nutrition, pharmacy) to tailor a patient's treatment plan and facilitates regular discussion with these services	procedure without prompting in a complex case • Anticipates and describes the treatment for crises in an open procedure for CMI, including the inability to clamp inflow/outflow	including dissection and inability to cross the lesion; changes the operative approach quickly in the setting of a complication • Communicates the relative risks and benefits of exam-specific radiation exposure to a patient and ensures colleagues and staff practice ALARA principles	

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THE AMERICAN BOARD OF SURGERY

Evaluation and Management of a Patient with Chronic Venous Disease

Description of the Activity	Vascular surgeons evaluate and treat patients with chronic venous disease in the outpatient setting. Surgeons should have a comprehensive understanding of the different etiologies, clinical presentation, diagnostic techniques, and medical and surgical management of this disease process, including selection criteria for intervention and timing of intervention. Additionally, surgeons should understand perioperative management, including recognition and treatment of complications of interventions, needed follow-up, and surveillance strategies.
Functions	❖ Nonoperative/Preoperative ➢ Synthesize essential information from a patient's referring providers, records, history, physical examination, and initial diagnostic evaluation to develop a differential diagnosis. ➢ Perform an evidence-based, cost-effective diagnostic evaluation. ➢ Determine whether intervention is indicated. ➢ Synthesize an optimal medical management plan for a patient in whom intervention is not indicated, considering wound care, edema management, and multilayer dressings. ➢ Communicate the diagnosis and potential treatment options to the patient/caregiver(s) and consultants. ➢ Select a treatment approach consistent with a patient's anatomy and comorbidities. ➢ Obtain informed consent. Describe the indications, risks, benefits, alternatives, and potential complications of the planned intervention, and ensure patient/caregiver understanding. ➢ Synthesize a treatment plan that demonstrates understanding of the operative anatomy, physiology, indications, contraindications, risks, benefits, alternatives, and potential complications of: ▪ Endovenous ablation ▪ Iliocaval stenting ▪ Phlebectomy ▪ Sclerotherapy ❖ Intraoperative ➢ Perform the procedures required to manage chronic venous disease. ▪ Endovenous ablation ▪ Iliocaval stenting ▪ Phlebectomy ▪ Sclerotherapy ➢ Integrate new information discovered intraoperatively to modify the surgical plan or technique as necessary, such as: ▪ Aberrant iliac vein/caval anatomy ▪ Acute deep venous thrombosis ▪ Iliocaval occlusion ➢ Work with anesthesia staff, nursing staff, and other perioperative health care professionals to create and maintain an intraoperative environment that promotes patient-centered care.

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THE AMERICAN BOARD OF SURGERY

Evaluation and Management of a Patient with Chronic Venous Disease

	❖ Postoperative ➢ Initiate and oversee postoperative care, including monitoring for complications, prescribing appropriate medical therapy, managing wound care and edema, and scheduling follow-up imaging. ➢ Communicate with the patient/caregiver(s) and members of the health care team to ensure understanding of postprocedure instructions and the patient's ability to carry out the resultant plan within the context of their life (eg, transportation, living situation, insurance, access to a pharmacy). ➢ Recognize, evaluate, and manage early and late complications following intervention (eg, bleeding, early thrombosis, endovenous heat-induced thrombosis [EHIT], pain from stent placement, perforation). ➢ Identify a surveillance and wound management plan and indications for reintervention.
Scope	❖ In scope ➢ Chronic venous insufficiency ➢ May-Thurner syndrome ➢ Post-thrombotic syndrome ➢ Varicose veins ➢ Venous stasis ulcers ❖ Out of scope ➢ Arteriovenous malformation ➢ Lymphedema ➢ Nutcracker syndrome ➢ Pelvic congestion syndrome ❖ Special Population ➢ Patients with: ▪ Concomitant peripheral artery disease and chronic venous disease ▪ Congenital heart disease and chronic venous disease ➢ Pediatric patients with venous disease

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THE AMERICAN BOARD OF SURGERY

Evaluation & Management of a Patient with Chronic Venous Disease

Level	Nonoperative/ Preoperative	Intraoperative Open	Intraoperative Endovascular	Postoperative
1 **Limited Participation** Demonstrates understanding of information and has very basic skills **Framework:** What a learner directly out of medical school should know The attending can show and tell.	• Elicits a history (pain, discomfort, activity limitations) and performs a relevant physical exam (swelling, varicose veins, ulcers, signs of superficial thrombophlebitis); detects skin changes, including hemosiderin deposition, sclerotic changes, and healed ulcer • Identifies risk factors (prior DVT, advanced age, obesity, female gender, prolonged standing, pregnancies, family history) • Identifies options for imaging evaluation (duplex US, CTV, MRV, IVUS) • Identifies indications for intervention (refractory symptoms, nonhealing ulcer) • Demonstrates familiarity with literature regarding classification and management; uses available resources to guide routine patient care • Communicates basic facts about the condition to a patient in a respectful way;	• Demonstrates basic surgical skills for phlebectomy (incision planning, vein extraction, hemostasis, wound closure) • Identifies indications for the selected operative procedure	• Uses US to identify vascular anatomy for venous ablation procedures and recognizes the importance of maintaining wire and sheath access • Identifies mechanisms for endovenous ablation (heat-induced, including laser and radiofrequency; cyanoacrylate; mechanochemical; chemical) • Identifies basic endo treatment options for superficial venous insufficiency (catheter-mediated endovenous ablation, sclerotherapy) and indications for the selected endo procedure	• Recognizes the need for long-term compression therapy and the significance of compression strength

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THE AMERICAN BOARD OF SURGERY

Evaluation & Management of a Patient with Chronic Venous Disease

Level	Nonoperative/ Preoperative	Intraoperative Open	Intraoperative Endovascular	Postoperative
	identifies elements of an informed consent discussion • Accurately and promptly records all relevant information •			
2 **<u>Direct Supervision</u>** Demonstrates understanding of the steps of the operation but requires direction through principles and does not know the nuances of a basic case **<u>Framework:</u>** The learner can use the tools but may not know exactly what, where, or how to do it. The attending gives active help throughout the case to maintain forward progression.	• Orders and interprets imaging (duplex US, CTV, MRV, IVUS) • Demonstrates understanding of conservative management (compression, elevation, NSAIDs, weight loss, exercise) • Identifies duplex findings associated with venous thrombosis (deep and superficial venous insufficiency) • Synthetizes clinical data to choose the best treatment strategy (endovenous ablation, phlebectomy, sclerotherapy) • Demonstrates understanding of the literature on the indications, risks, and benefits of intervention for superficial venous insufficiency vs medical	• Demonstrates respect for tissue handling during open venous surgery and developing skill in instrument handling; performs the procedure with limited supervision • Describes the procedural sequence for surgical intervention (phlebectomy, saphenous vein ligation and stripping) and the equipment required; requires prompting to advance the procedure	• Uses US to safely obtain percutaneous access of the vein Describes procedural sequence for endo intervention for superficial venous insufficiency (catheter-mediated endovenous ablation, sclerotherapy) and the equipment required; requires prompting to advance the procedure	• Demonstrates understanding of the expected postprocedural course and potential complications and relays them to a patient; describes the indications for and duration of anticoagulation based on current CHEST guidelines

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THE AMERICAN BOARD OF SURGERY

Evaluation & Management of a Patient with Chronic Venous Disease

Level	Nonoperative/ Preoperative	Intraoperative Open	Intraoperative Endovascular	Postoperative
	management and discusses it with the patient • Explains the risks and benefits of medical therapy vs invasive intervention, with consideration for potential communication barriers (literacy, language) • Promptly communicates test results and treatment plan options to a patient and the health care team •			
3 **<u>Indirect Supervision</u>** Can do a basic operation but will not recognize abnormalities and does not understand the nuances of an advanced case **<u>Framework:</u>** The learner can perform the operation	• Interprets physical exam findings (swelling, varicose veins, ulcers, signs of superficial thrombophlebitis, skin changes) and imaging results to develop a plan for conservative management (compression, elevation, NSAIDs, weight loss, exercise) or intervention • Recognizes the limitations of conservative management and indications for intervention • Uses imaging findings to diagnose more complex	• Handles vascular instruments with increasing efficiency of motion; performs basic vascular procedures independently and intermediate vascular procedures with limited supervision • Identifies all critical steps of basic surgical treatment procedures (phlebectomy, saphenous vein ligation and stripping) and the equipment required; advances the procedure with minimal prompting	• Performs basic and intermediate endovenous procedures (venous ablation, sclerotherapy) and troubleshoots basic procedural challenges Identifies all steps of basic endo treatment procedures for superficial venous insufficiency (catheter-mediated endovenous ablation, sclerotherapy) and the equipment required; advances the procedure with minimal prompting	• Recognizes the impact of disease progression and complications on the longitudinal care plan

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THE AMERICAN BOARD OF SURGERY

Evaluation & Management of a Patient with Chronic Venous Disease

Level	Nonoperative/ Preoperative	Intraoperative Open	Intraoperative Endovascular	Postoperative
in straightforward circumstances. The attending gives passive help. This help may be given while scrubbed for more complex cases or during a check-in for more routine cases.	venous pathology such as May-Thurner syndrome or pelvic congestion syndrome • Develops a plan for intervention when indicated and recognizes the limitations of treatment options based on venous anatomy and patient factors • Engages a patient in a shared decision-making discussion regarding treatment options, including consideration of the patient's payment model • Demonstrates understanding of clinical practice guidelines for disease management and applies it independently • Discusses procedural aspects of intervention for superficial and deep venous disease, including risks and benefits; includes patient preferences in the decision-making process • Uses the EHR to communicate with a patient's health care team			

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THE AMERICAN BOARD OF SURGERY

Evaluation & Management of a Patient with Chronic Venous Disease

Level	Nonoperative/ Preoperative	Intraoperative Open	Intraoperative Endovascular	Postoperative
4 **Practice Ready** Can manage more complex patient presentations and operations and take care of most cases **Framework:** The learner can treat all straightforward appendicitis cases and has a strong understanding of surgical options and techniques for less common scenarios. The attending is available at the request of the learner but is not routinely needed for common presentations, though input may be needed for more complex presentations.	• Performs a targeted H&P, recognizing all relevant signs and symptoms; develops a comprehensive differential; orders and interprets a cost-effective diagnostic evaluation • Synthesizes a conservative management plan for a patient with venous ulceration, including wound care, edema management, and compression • Independently initiates imaging to plan an advanced venous procedure such as recanalization of chronically occluded deep veins • Adapts the management plan based on a change in a patient's clinical status or anatomy • Advocates for patient care needs and offers indicated intervention with consideration of a patient's payment model • Critically appraises and applies evidence about the benefits of intervention vs	• Demonstrates proficient handling of instruments and equipment; guides the conduct of the operation; troubleshoots complications that arise during surgical intervention Identifies all critical steps and the equipment required; advances the procedure without prompting; identifies critical decision points	• Performs more advanced venous interventions with appropriate endo skills (venous thrombectomy, angioplasty and stenting) and identifies when alternative techniques are necessary Identifies all critical steps of basic and advanced endovenous procedures and the equipment required (ablation catheters, balloons, coils, stents, IVUS); advances the procedure without prompting; identifies critical decision points	• Independently alters longitudinal care based on a complication (PE, early rethrombosis, bleeding, filter perforation) •

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THE AMERICAN BOARD OF SURGERY

Evaluation & Management of a Patient with Chronic Venous Disease

Level	Nonoperative/ Preoperative	Intraoperative Open	Intraoperative Endovascular	Postoperative
	conservative management and tailors it to a patient, even in the face of conflicting evidence • Reviews details provided in the informed consent; comprehensively describes the indications, risks, benefits, alternatives, and potential complications of the planned intervention and alternate management options; ensures patient understanding before committing to a treatment paradigm; customizes communication about the condition to the patient based on individual communication needs • Uses the EMR to obtain detailed information about a patient's history and test results from prior encounters and outside systems			

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THE AMERICAN BOARD OF SURGERY

Evaluation and Management of a Patient with Claudication

Description of the Activity	Vascular surgeons evaluate and treat patients with claudication in the outpatient setting. These surgeons should have a comprehensive understanding of the evaluation and management of peripheral arterial disease as manifested by claudication, including diagnostic techniques, risk factor modification, medical management, and open and endovascular surgical interventions and indications. Additionally, vascular surgeons should understand perioperative management, including recognition of complications of intervention, needed follow-up, and surveillance strategies.
Functions	❖ Nonoperative/Preoperative ➢ Synthesize essential information from a patient's referring providers, medical records, history (including relevant risk factors), physical examination, and initial diagnostic evaluation to establish a diagnosis. ➢ Perform an evidence-based, cost-effective diagnostic evaluation. ➢ Synthesize and implement an optimal risk factor modification and medical management plan, including: ▪ Antiplatelet therapy ▪ Exercise therapy ▪ Smoking cessation ▪ Statin therapy ➢ Determine whether intervention is indicated. ➢ Select a surgical approach consistent with a patient's anatomy, comorbidities, and acuity of presentation. ➢ Obtain informed consent. Describe the indications, risks, benefits, alternatives, and potential complications of the planned operation, and ensure patient/caregiver understanding. ➢ Synthesize an operative plan that demonstrates understanding of the operative anatomy, physiology, indications, contraindications, risks, benefits, alternatives, and potential complications of: ▪ Lower extremity endovascular revascularization ▪ Lower extremity open revascularization ❖ Intraoperative ➢ Perform the procedures required to manage lower extremity peripheral arterial occlusive disease in the setting of claudication. ▪ Execute endovascular revascularization of the lower extremity. ▪ Execute open surgical operative revascularization of the lower extremity. ➢ Integrate new information discovered intraoperatively that requires modification of the surgical plan or technique, such as: ▪ Emboli ▪ Technical issues (failure to cross the lesion) ➢ Work with anesthesia staff, nursing staff, and other perioperative health care professionals to create and maintain an intraoperative environment that promotes patient-centered care. ❖ Postoperative

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THE AMERICAN BOARD OF SURGERY

Evaluation and Management of a Patient with Claudication

	➢ Initiate and oversee postoperative care, including monitoring lower extremity pulses, prescribing evidence-based medical therapy, and determining follow-up imaging and care. ➢ Communicate with the patient/caregiver(s) and members of the health care team to ensure understanding of Postprocedure instructions and the patient's ability to carry out the resultant plan within the context of their life (e.g., transportation, living situation, insurance, access to a pharmacy). ➢ Recognize, evaluate, and manage early and late complications following lower extremity intervention. ▪ Access site complications or other bleeding complications ▪ Early and late bypass graft failure ▪ Target lesion restenosis or occlusion with the potential need for reintervention and surveillance ▪ Infectious complication (access/surgical site and prosthetic material) or anastomotic pseudoaneurysm ➢ Identify a surveillance plan and indications for reintervention
Scope	❖ In scope ➢ Aortoiliac stenosis or occlusion ➢ Infrainguinal arterial stenosis or occlusion ➢ Recurrent stenosis or failed endoscopic or prior open procedures ❖ Out of scope ➢ Chronic critical limb ischemia ➢ Acute limb ischemia ➢ Upper extremity ➢ Venous ❖ Special Population ➢ Patients with: ▪ Diabetes ▪ End-stage renal disease ▪ Entrapment syndrome

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THE AMERICAN BOARD OF SURGERY

Evaluation & Management of a Patient with Claudication

Level	Nonoperative/ Preoperative	Intraoperative Open	Intraoperative Endovascular	Postoperative
1 **<u>Limited Participation</u>** Demonstrates understanding of information and has very basic skills **<u>Framework:</u>** What a learner directly out of medical school should know The attending can show and tell.	• Elicits a history and performs a vascular exam (peripheral pulses) • Identifies risk factors for developing claudication (smoking, cholesterol, DM) • Prepares a patient for intervention (CBC, tests for renal function and coagulation) and identifies the need to evaluate for coronary disease • Identifies options for diagnostic imaging (arterial Doppler, duplex, CTA) • Identifies the need for intervention in a patient with claudication and recognizes the limits of conservative measures (exercise, smoking cessation, risk management) • Identifies the need for intervention over conservative therapy • Identifies clinical practice guidelines for management, including indications for possible intervention for a routine patient Communicates basic facts about claudication to a	• Sutures and knot-ties with security • Demonstrates understanding of sharps safety, safe use of devices, and surgical field sterility • Demonstrates basic surgical skills, including making an incision and closure • Identifies available intraop imaging modalities • Identifies the procedure to be performed, alternative options (endo or open), and the indications for intervention relative to medical management • Identifies potential crises (bleeding, dissection, venous injury) that could occur during an open approach to claudication	• Uses US to visualize access vessels • Recognizes the importance of maintaining wire access • Lists the types of available procedures (PTA, stenting, atherectomy) • Identifies the procedure to be performed, alternative options (endo or open), and the indications for intervention relative to medical management • Identifies potential crises (loss of access, ruptured artery, dissection) that could occur during endo treatment of claudication • Identifies basic ALARA principles; wears lead and a dosimeter at all times; performs basic "driving" maneuvers	• Identifies a basic postop problem (hematoma, change in pulse exam) and initiates management with supervision • Recognizes the need for long-term surveillance and risk factor modification • Respectfully communicates a multimodal pain management strategy to a patient/caregiver(s) with recognition of the potential for bias

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THE AMERICAN BOARD OF SURGERY

Evaluation & Management of a Patient with Claudication

Level	Nonoperative/ Preoperative	Intraoperative Open	Intraoperative Endovascular	Postoperative
	patient/caregiver(s) in a respectful way; provides anticipatory guidance regarding the natural history of this condition			
2 **<u>Direct Supervision</u>** Demonstrates understanding of the steps of the operation but requires direction through principles and does not know the nuances of a basic case **<u>Framework:</u>** The learner can use the tools but may not know exactly what, where, or how to do it. The attending gives active help throughout the case to maintain forward progression.	• Orders imaging studies (ABI, duplex, axial) and interprets findings to verify arterial disease leading to claudication • Communicates the risks and benefits of nonoperative management and risk factor modification, including smoking cessation, statin use, and a monitored exercise program • Demonstrates understanding of cath lab setup for basic claudication interventions; positions the patient and selects the appropriate basic wires and catheters; drapes the patient and equipment appropriately • Demonstrates understanding of the setup for basic operative intervention for claudication; positions and drapes the patient appropriately	• Demonstrates respect for tissues (gentle handling of vessels) and developing skill in instrument handling (using a Castroviejo needle driver) • Performs parts of an anastomosis with frequent prompting and assistance • Selects intraop imaging based on patient factors • Identifies most steps of the procedure (inflow/outflow control) and the equipment required (clamps, patch, conduit); requires prompting to advance the procedure • Describes most potential operative errors and intraop findings, needing assistance to demonstrate how to avoid them • Describes findings with arterial and venous injury and dissection that can be encountered during open treatment for claudication	• Uses US to obtain vascular access; demonstrates basic catheter and wire-handling techniques • Identifies most steps of the procedure (access, selective catheterization) and the equipment required (sheath, wires, catheters); requires prompting to advance the procedure • Describes radiographic and clinical findings with arterial rupture and dissection that can occur during endo treatment of claudication • Uses fluoroscopy techniques and shielding to decrease radiation exposure to the patient and operator with guidance	• Identifies an appropriate medical therapy (clopidogrel, ASA, statins) in the postprocedural time frame • Manages a common postop problem (eg, access site complication) and orders and interprets additional testing (duplex of access site) • Describes long-term surveillance and risk factor modification • Leads a discussion about multimodal pain management strategies • Communicates standard postop instructions and updates to a patient/caregiver(s)

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THE AMERICAN BOARD OF SURGERY

Evaluation & Management of a Patient with Claudication

Level	Nonoperative/ Preoperative	Intraoperative Open	Intraoperative Endovascular	Postoperative
	• Uses imaging to support operative planning for claudication • Synthesizes clinical data (anatomy, level of disease, runoff, medical comorbidities) to recommend open vs endo intervention • Synthesizes clinical data to guide a decision between open, endo, or hybrid techniques • Demonstrates limited familiarity with literature regarding the management of claudication and can discuss this information clearly with a patient • Customizes communication about the condition to a patient/caregiver(s) in a respectful way; answers patient questions about claudication management, including patency rates and risk of limb loss; conducts an informed consent discussion for a straightforward, elective revascularization			
3	• Interprets an H&P, US results, and patient risk	• Demonstrates efficient instrument handling and	• Performs a diagnostic angiogram, efficiently	

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THE AMERICAN BOARD OF SURGERY

Evaluation & Management of a Patient with Claudication

Level	Nonoperative/ Preoperative	Intraoperative Open	Intraoperative Endovascular	Postoperative
Indirect Supervision Can do a basic operation but will not recognize abnormalities and does not understand the nuances of an advanced case **Framework:** The learner can perform the operation in straightforward circumstances. The attending gives passive help. This help may be given while scrubbed for more complex cases or during a check-in for more routine cases.	factors to formulate a plan for endo or open intervention for claudication • Recognizes that despite maximal conservative efforts (exercise, medical management, smoking cessation) a patient may be appropriate for intervention; identifies potential adverse effects of some therapy (DAPT, cilostazol) • Recognizes when the plan for intervention in a claudicated patient must change, including from endo to open, based on information gained during the preprocedural workup (worsening ABI, development of wound) • Identifies and manages comorbidities, anticoagulation reversal, and cardiac optimization • Demonstrates understanding of cath lab setup for an intermediate claudication intervention; positions the patient and selects the appropriate wires and catheters; drapes	safe exposure, dissection, and control of vessels • Performs a complete endarterectomy, anastomosis, or patch with minimal prompting and passive assistance • Interprets intraop imaging to guide alterations in the operative plan • Identifies all critical steps of the procedure and the equipment required; advances the procedure with minimal prompting • Describes the appropriate response to bleeding, venous injury, and dissection during open intervention for claudication	traverses a stenosis, and delivers a stent/balloon to the appropriate location • Identifies all critical steps of the procedure (access, selective cath, crossing lesion) and the equipment required (stents, atherectomy, lithotripsy); advances the procedure with minimal prompting • Describes the appropriate response to loss of arterial access, dissection, or arterial rupture during an endo intervention for claudication • Accesses resources to determine exam-specific radiation dose information; independently manages the fluoroscopy system; uses radiation protection devices and techniques	• Communicates postop instructions to a patient/caregiver(s) in a caring and sensitive way, including surveillance and anticipatory guidance for signs of failing intervention • Recognizes and manages a complex postop complication (target lesion/graft occlusion, bleeding), including identifying the need to return to the OR • Recognizes abnormal surveillance imaging findings and their impact on the longitudinal care plan • Uses a multimodal opioid-sparing pain management strategy

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Evaluation & Management of a Patient with Claudication

Level	Nonoperative/ Preoperative	Intraoperative Open	Intraoperative Endovascular	Postoperative
	the patient and equipment appropriately • Demonstrates understanding of the setup for intermediate operative intervention for a claudication case; positions and drapes the patient appropriately • Develops a specific open surgical plan for the clinical situation and demonstrates understanding of alternative treatment options • Develops an endo treatment plan for the current clinical situation and recognizes device limitations based on patient anatomy • Demonstrates familiarity with literature regarding management and outcomes of intervention for claudication and applies this information independently • Customizes communication about a condition to a patient/caregiver(s) based on individual characteristics and anticipates the efficacy of nonoperative management; in the case of			

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THE AMERICAN BOARD OF SURGERY

Evaluation & Management of a Patient with Claudication

Level	Nonoperative/ Preoperative	Intraoperative Open	Intraoperative Endovascular	Postoperative
	surgery, anticipates logistical problems in optimizing the patient •			
4 **Practice Ready** Can manage more complex patient presentations and operations and take care of most cases **Framework:** The learner can treat all straightforward appendicitis cases and has a strong understanding of surgical options and techniques for less common scenarios. The attending is available at the request of the learner but is not routinely needed for common presentations, though	• Synthesizes patient data, including imaging, to formulate a plan for conservative management or endo or open intervention for claudication, including a rationale and approach • Formulates a plan that includes all aspects of risk management, a monitored exercise program, and ongoing surveillance needs for a patient being treated conservatively • Demonstrates understanding of cath lab setup for an advanced claudication intervention; positions the patient and selects the appropriate wires and catheters; drapes the patient and equipment appropriately • Demonstrates understanding of the setup for advanced operative intervention for claudication; positions and	• Proficiently handles instruments and equipment, uses assistants, and guides the conduct of the operation; makes independent intraop decisions; anticipates when assistance is needed • Optimizes the management plan based on intraop imaging • Adapts the management plan based on a change in the patient's anatomy or clinical situation (conversion to CTO or acute ischemia), including from endo to open • Identifies all critical steps of the procedure and the equipment required; advances the procedure without prompting in a complex case • Describes potential errors at a critical portion of the procedure and the steps to avoid them	• Plans and performs an intervention to treat a stenosis or CTO, including appropriate endo device sizing and selection • Optimizes the management plan based on intraop imaging • Adapts the management plan based on a change in the patient's anatomy or clinical situation (conversion to CTO or acute ischemia), including from endo to open • Identifies all critical steps of the procedure and the equipment required; advances the procedure without prompting in a complex case • Describes potential errors at a critical portion of the procedure and the steps to avoid them	• Customizes communication with a patient/caregiver(s) in a caring and nonjudgmental way in the case of a complication or intervention failure; provides anticipatory guidance regarding the risks/likelihood of limb loss and the implications of amputation • Leads the team and provides supervision in the management of a complex complication (target lesion/graft occlusion, bleeding) • Independently alters longitudinal care based on a complication (early rethrombosis, bleeding) • Uses a multimodal opioid-sparing pain strategy that includes the use of a regional and systemic adjunct to a pain control regimen

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THE AMERICAN BOARD OF SURGERY

Evaluation & Management of a Patient with Claudication

Level	Nonoperative/ Preoperative	Intraoperative Open	Intraoperative Endovascular	Postoperative
input may be needed for more complex presentations.	drapes the patient appropriately • Changes the plan for intervention in a complex claudication case based on an evolving clinical situation • Independently initiates cross-sectional and duplex imaging and 3D reformatting to identify abnormal findings and plan an intervention • Adapts the management plan for a changing clinical situation (decision to intervene for worsening claudication, development of wounds) • Adapts the management plan based on a change in a patient's anatomy, including from endo to open • Demonstrates familiarity with the most current literature and guidelines regarding the management of claudication • Independently initiates and interprets an expected cost-effective workup for an advanced or equivocal claudication presentation and determines the optimal	• Anticipates patient-specific complications during an open intervention (potential arterial or venous injury, difficulty establishing inflow control due to calcification) and describes appropriate management, including incorporation of an endo technique	• Anticipates patient-specific complications during an endo intervention (potential arterial injury from small access, heavily calcified lesions, difficult iliac bifurcations, long lesions); describes appropriate management, including conversion to an open procedure	

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THE AMERICAN BOARD OF SURGERY

Evaluation & Management of a Patient with Claudication

Level	Nonoperative/ Preoperative	Intraoperative Open	Intraoperative Endovascular	Postoperative
	personalized operative approach • Conducts an informed consent discussion for complex revascularization, individualizing the risks and benefits for the patient • Customizes communication about the condition to a patient/caregiver(s) based on individual characteristics and anticipates logistical problems in optimizing the patient for surgery			

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THE AMERICAN BOARD OF SURGERY

Evaluation and Management of a Patient with ESRD

Description of the Activity	Vascular surgeons evaluate and manage patients with end-stage renal disease for dialysis access creation and maintenance in elective and emergency care settings. Surgeons should have a comprehensive understanding of dialysis access clinical practice guidelines, preoperative evaluation, and surgical creation and maintenance of hemodialysis access, including selection criteria for various types of hemodialysis access options. Additionally, surgeons should understand perioperative management, including recognition and treatment of surgical complications, treatment of failing or thrombosed dialysis access, and surveillance strategies.
Functions	❖ Nonoperative/Preoperative ➢ Synthesize essential information from a patient's referring providers, records, history, physical examination, and initial evaluation for hemodialysis access options to develop a plan for hemodialysis access creation. ➢ Complete a cost-effective, evidence-based workup, and formulate a hemodialysis access plan with respect to the current National Kidney Foundation's Kidney Disease Outcomes Quality Initiative (KDOQI). ➢ Determine which hemodialysis access option is indicated and the timing of creation. ➢ Select a surgical approach consistent with a patient's anatomy, comorbidities, and acuity of presentation. ➢ Communicate potential dialysis access options to a patient/caregiver(s) and consultants. ➢ Obtain informed consent. Describe the indications, risks, benefits, alternatives, and potential complications of the planned operation, including nuances relevant to the patient's individual arterial and venous anatomy, stage of kidney disease, and comorbidities, and ensure patient/caregiver understanding. ➢ Synthesize an operative plan that demonstrates understanding of the operative anatomy, physiology, indications, contraindications, risks, benefits, alternatives, and potential complications of: ▪ Arteriovenous graft (AVG) placement ▪ Autogenous arteriovenous fistula (AVF) creation ▪ Tunneled dialysis catheter placement ➢ Identify special populations in whom operative dialysis access planning may require additional consideration ❖ Intraoperative ➢ Work with the anesthesia team to identify and coordinate an optimal anesthesia plan (local, block, general). ➢ Perform the procedures required to create hemodialysis access. ▪ AVG placement ▪ Autogenous AVF creation ▪ Tunneled dialysis catheter placement ➢ Integrate new information discovered intraoperatively that requires modification of the surgical plan or technique, such as: ▪ Aberrant anatomy (high brachial bifurcation) ▪ Inadequate venous conduit ➢ Work with anesthesia staff, nursing staff, and other perioperative health care professionals to create and maintain an intraoperative environment that promotes patient-centered care.

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THE AMERICAN BOARD OF SURGERY

Evaluation and Management of a Patient with ESRD

	❖ Postoperative ➢ Initiate and oversee postoperative care, including monitoring for early complications (hematoma, ischemic steal, ischemic monomelic neuropathy) and determining follow-up imaging and care. ➢ Communicate with the patient/caregiver(s) and members of the health care team to ensure understanding of postprocedure instructions and the ability of the patient to carry out the resultant plan within the context of their life (eg, transportation, living situation, initiation or continuation of dialysis). ➢ Recognize, evaluate, and manage early and late complications following hemodialysis access creation. ➢ Identify a follow-up plan, an assessment for maturation and readiness for access, and indications for reintervention.
Scope	❖ In scope ➢ Brachiobasilic, brachiocephalic, and radiocephalic AVF ➢ Endovascular AVF creation ➢ Fistulogram and endovascular intervention ➢ Hero graft ➢ Management of steal ➢ Tunneled dialysis catheter placement ➢ Upper extremity AVG ❖ Out of scope ➢ Pediatric hemodialysis access ➢ Peritoneal dialysis ❖ Special Population ➢ Obese patients ➢ Older adult patients ➢ Patients with: ▪ Arterial inflow stenosis or occlusion ▪ Central venous occlusion ▪ High-output cardiac failure ▪ Lower extremity AVF/AVG

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THE AMERICAN BOARD OF SURGERY

Evaluation & Management of a Patient with ESRD

Level	Preoperative/Nonoperative	Intraoperative	Postoperative
1 **Limited Participation** Demonstrates understanding of information and has very basic skills **Framework:** What a learner directly out of medical school should know The attending can show and tell.	• Elicits a history and performs a relevant vascular exam (radial/ulnar pulses, Allen test, chest wall varicosities, prior access) • Identifies the necessary vascular lab imaging for standard dialysis access planning (vein mapping) • Identifies the need for open intervention vs medical management • Identifies socioeconomic determinants of health and disparities in the ESRD patient population • Identifies multiple points of access in a patient with ESRD (hospital, skilled nursing facility, other medical specialties, dialysis unit) and different payer types • Uses current guidelines to guide patient care	• Describes different anesthetic approaches for a dialysis access patient • Demonstrates basic surgical skills, including vein mapping and recognition of arterial and venous anatomy	• Demonstrates knowledge of care coordination with dialysis centers and nephrologists for timing of access • Demonstrates basic understanding of their role in and communication with the dialysis care team
2 **Direct Supervision** Demonstrates understanding of the steps of the operation but requires direction through principles and does not know the nuances of a basic case	• Orders imaging studies (duplex) and interprets findings (vein diameter) to determine options for dialysis access creation • Uses imaging to support operative planning of dialysis access • Synthesizes clinical data to choose an appropriate open surgical procedure (autogenous AVF, AVG)	• Recognizes the rationale for the selected anesthetic approach • Demonstrates respect for tissues (gentle handling of vessels) and developing skill in instrument handling (using a Castroviejo needle driver) • Performs parts of an anastomosis with frequent prompting and assistance	• Coordinates multidisciplinary care of a patient in a routine clinical situation with nephrologists and dialysis centers • Clearly communicates information to the health care team

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THE AMERICAN BOARD OF SURGERY

Evaluation & Management of a Patient with ESRD

Level	Preoperative/Nonoperative	Intraoperative	Postoperative
Framework: The learner can use the tools but may not know exactly what, where, or how to do it. The attending gives active help throughout the case to maintain forward progression.	• Identifies a patient in a population or community that is at risk for inequities in care for ESRD • Describes components of the health care system that are used by ESRD patients (dialysis center, nephrology) and how they are interrelated and impact patient care • Elicits patient preferences regarding renal replacement therapy and takes them into account when providing evidence-based care		
3 **Indirect Supervision** Can do a basic operation but will not recognize abnormalities and does not understand the nuances of an advanced case **Framework:** The learner can perform the operation in straightforward circumstances.	• Interprets a patient's physical exam, US results, and risk factors to formulate a plan for appropriate dialysis access (fistula vs graft, location, peritoneal dialysis) • Identifies a patient who requires a change in access plan due to factors found during workup or intraoperatively • Develops a specific open surgical plan (fistula creation and maintenance, failure to mature, thrombosis) and identifies alternative surgical options • Uses local resources to provide a patient in need of dialysis access with care • Engages a patient/caregiver(s) in shared decision-making based on the	• Synthesizes patient data to choose an appropriate anesthetic plan • Demonstrates efficient instrument handling and safe exposure, dissection, and control of vessels • Performs a complete anastomosis with minimal prompting and passive assistance	• Coordinates multidisciplinary care for an ESRD patient with complex needs and barriers to access using the correct members of the interprofessional team; performs safe hand-offs • Adapts communication to the needs of different members of the health care team and communicates concerns

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Evaluation & Management of a Patient with ESRD

Level	Preoperative/Nonoperative	Intraoperative	Postoperative
The attending gives passive help. This help may be given while scrubbed for more complex cases or during a check-in for more routine cases.	patient's access to care and payment model • Independently identifies and applies evidence-based care for a complex patient with ESRD		
4 **<u>Practice Ready</u>** Can manage more complex patient presentations and operations and take care of most cases **<u>Framework</u>:** The learner can treat all straightforward ESRD cases and has a strong understanding of surgical options and techniques for less common scenarios. The attending is available at the request	• Synthesizes patient data and imaging to create a plan for HD access in a patient with complex findings, medical issues, or difficult redo surgery situation • Uses imaging findings to formulate a complex access plan • Adapts an open surgical management plan for a changing clinical situation (eg, vein too small, no thrill upon completion) • Identifies a patient at risk for a poor outcome and adapts the treatment plan to address disparities • Advocates for patient-care needs and offers an indicated intervention with consideration of a patient's payment model • Critically appraises guidelines and evidence to provide individualized access care to a complex patient	• Prepares a specialized anesthetic plan for the procedure • Proficiently handles instruments and equipment, uses assistants, and guides the conduct of the operation; makes independent intraop decisions; anticipates when assistance is needed	• Coordinates recommendations from different members of the health care team to optimize patient care and facilitates feedback in a complex situation • Leads the coordination of patient-centered care among different disciplines and specialties, including nephrology and dialysis access centers

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THE AMERICAN BOARD OF SURGERY

Evaluation & Management of a Patient with ESRD

Level	Preoperative/Nonoperative	Intraoperative	Postoperative
of the learner but is not routinely needed for common presentations, though input may be needed for more complex presentations.			

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THE AMERICAN BOARD OF SURGERY

Evaluation and Management of a Patient with a Peripheral Artery Aneurysm

Description of the Activity	Vascular surgeons evaluate and treat patients with a wide variety of peripheral artery aneurysms, in terms of both anatomic location and acuity, and should have a comprehensive understanding of the different causes, clinical presentations, and diagnostic techniques of this disease process. Surgeons should also understand medical and surgical management, including selection criteria for intervention and timing of intervention. Additionally, surgeons should be able to perform perioperative management, including recognition and treatment of complications of interventions, needed follow-up, and surveillance strategies.
Functions	❖ Nonoperative/Preoperative ➢ Synthesize essential information from a patient's referring providers, records, history, physical examination, and initial diagnostic evaluation to develop a differential diagnosis. ➢ Perform an evidence-based, cost-effective diagnostic evaluation, including selective screening. ➢ Determine whether intervention is indicated. ➢ Synthesize an optimal medical management plan for a patient in whom intervention is not indicated. ➢ Communicate the diagnosis and potential treatment options to the patient/caregiver(s) and consultants. ➢ Recognize complications of peripheral aneurysms that require emergency intervention, such as rupture or embolization. ➢ Select a treatment approach consistent with a patient's anatomy, comorbidities, and acuity of presentation. ➢ Obtain informed consent. Describe the indications, risks, benefits, alternatives, and potential complications of the planned intervention, and ensure patient/caregiver understanding. ➢ Synthesize a treatment plan that demonstrates understanding of the operative anatomy, physiology, indications, contraindications, risks, benefits, alternatives, and potential complications of: ▪ Endovascular repair, such as stenting or embolization ▪ Hybrid approaches ▪ Observation ▪ Open repair ❖ Intraoperative ➢ Perform the procedures required to manage peripheral aneurysms. ▪ Endovascular repair: stenting, lysis, embolization ▪ Hybrid repair ▪ Open repair: resection and bypass ➢ Integrate new information discovered intraoperatively to modify the surgical plan or technique as necessary, such as: ▪ End-organ ischemia ▪ Extrinsic vascular compression ▪ Mycotic aneurysm ➢ Work with anesthesia staff, nursing staff, and other perioperative health care professionals to create and maintain an intraoperative environment that promotes patient-centered care.

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THE AMERICAN BOARD OF SURGERY

Evaluation and Management of a Patient with a Peripheral Artery Aneurysm

	❖ Postoperative ➢ Initiate and oversee postoperative care, including monitoring for complications, prescribing appropriate medical therapy (eg, anticoagulation, antiplatelet therapy, lipid-lowering agents), and ordering follow-up imaging. ➢ Communicate with the patient/caregiver(s) and members of the health care team to ensure understanding of postprocedure instructions and the patient's ability to carry out the resultant plan within the context of their life (eg, transportation, living situation, insurance, access to a pharmacy). ➢ Recognize, evaluate, and manage early and late complications following intervention (eg, bleeding, distal embolization, end-organ ischemia, inadequate aneurysm exclusion, infection). ➢ Identify a surveillance and screening plan and indications for reintervention.
Scope	❖ In scope ➢ Brachial artery aneurysms, pseudoaneurysms ➢ Femoral artery aneurysms, pseudoaneurysms ➢ Popliteal artery aneurysms, pseudoaneurysms ➢ Radial artery aneurysms, pseudoaneurysms ➢ Subclavian artery aneurysms, pseudoaneurysms ❖ Out of scope ➢ Mycotic aneurysms ➢ Tibial artery aneurysms ➢ Ulnar aneurysms, hypothenar hammer syndrome ❖ Special Population ➢ Intraoperative consults ➢ Patients with: ▪ Arterial thoracic outlet syndrome and subclavian aneurysms ▪ Collagen vascular disease ▪ Iatrogenic peripheral aneurysms ➢ Pediatric patients with peripheral aneurysms

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THE AMERICAN BOARD OF SURGERY

Evaluation & Management of a Patient with a Peripheral Artery Aneurysm

Level	Preoperative/Nonoperative	Intraoperative Open	Intraoperative Endovascular	Postoperative
1 **<u>Limited Participation</u>** Demonstrates understanding of information and has very basic skills **<u>Framework:</u>** What a learner directly out of medical school should know The attending can show and tell.	• Performs an H&P, including pulses • Recognizes the indications for aneurysm surveillance • Identifies different types of imaging modalities (duplex US, CTA, MRA, arteriography) • Identifies the indications for intervention based on size criteria and other factors (eg, presence of thrombus, growth) • Uses imaging to support operative planning	• Performs basic surgical skills (skin incision, soft tissue dissection, wound closure) • Sutures and knot-ties with security • Demonstrates understanding of sharps safety, safe surgical energy use, and surgical field sterility	• Uses US to visualize access vessel anatomy and patency • Recognizes the importance of maintaining wire access • Demonstrates understanding of basic ALARA principles; wears lead and a dosimeter at all times; uses basic fluoroscopic protection (lead shields, maneuvers)	• Identifies a basic postop problem (pain, surgical site complication) • Recognizes the need for long-term surveillance
2 **<u>Direct Supervision</u>** Demonstrates understanding of the steps of the operation	• Orders imaging (duplex US, CTA, MRA, arteriography) and interprets imaging (presence and location of aneurysm, thrombus, evidence of distal embolization)	• Usually demonstrates coordination between hands and maintains the optimal tissue plane when dissecting vessels • Demonstrates respect for tissues (gentle	• Uses US to obtain vascular access; demonstrates basic catheter and wire-handling techniques • Uses fluoroscopy techniques and shielding to decrease radiation exposure to a	• Identifies a postop complication (MI, bleeding, thromboembolism) and orders appropriate testing • Communicates expected standard postop care to a patient/caregiver(s) and

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THE AMERICAN BOARD OF SURGERY

Evaluation & Management of a Patient with a Peripheral Artery Aneurysm

Level	Preoperative/Nonoperative	Intraoperative Open	Intraoperative Endovascular	Postoperative
but requires direction through principles and does not know the nuances of a basic case **<u>Framework:</u>** The learner can use the tools but may not know exactly what, where, or how to do it. The attending gives active help throughout the case to maintain forward progression.	• Describes the natural history, surveillance plan, and indications for repair • Determines which imaging modality to use given anatomic and patient factors (axial imaging vs arteriogram, contrast allergy, renal disease) • Synthesizes clinical data (medical comorbidities) and imaging findings (aneurysm and runoff vessel anatomy) to guide the decision between an open, endo, or hybrid technique	handling of vessels) and developing skill in instrument handling (using a Castroviejo needle driver) • Performs parts of an anastomosis with frequent prompting and assistance	patient and operator with guidance	consulting clinicians and describes long-term follow-up
3 **<u>Indirect Supervision</u>** Can do a basic operation but will not recognize abnormalities and does not understand the	• Interprets a physical exam, imaging studies, and risk factors to formulate a treatment plan suited to the patient (surveillance, endo vs open intervention) • Recognizes the impact of disease progression (aneurysm growth) and complications (embolization,	• Demonstrates efficient instrument handling, safe exposure, dissection, and control of vessels • Performs a complete anastomosis with minimal prompting and passive assistance	• Performs a diagnostic angiogram, efficiently catheterizes branches, and delivers a stent/balloon/graft to the appropriate location • Identifies common variations of the arterial anatomy on imaging; locates potential access sites to perform endo repair; anticipates	• Identifies, evaluates, and manages a complex postop complication (MI, bleeding, thromboembolism) and escalates the level of care as needed • Recognizes abnormal surveillance imaging findings and their impact on the longitudinal care plan

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THE AMERICAN BOARD OF SURGERY

Evaluation & Management of a Patient with a Peripheral Artery Aneurysm

Level	Preoperative/Nonoperative	Intraoperative Open	Intraoperative Endovascular	Postoperative
nuances of an advanced case **Framework:** The learner can perform the operation in straightforward circumstances. The attending gives passive help. This help may be given while scrubbed for more complex cases or during a check-in for more routine cases.	rupture, mass effect) on a patient's longitudinal care plan, individualizing risks and benefits to the patient • Develops a patient-specific plan for intervention, considering endo and open surgical options	• Identifies common variations of arterial anatomy on imaging; anticipates complications or high-risk anatomy	complications or high-risk anatomy • Accesses resources to determine exam-specific radiation dose information; independently manages the fluoroscopy system; uses radiation protection devices and techniques	
4 **Practice Ready** Can manage more complex patient presentations and operations and take care of most cases **Framework:**	• Manages a patient with complex anatomy and comorbidities (ALI, sepsis, symptomatic aneurysm) • Directs and orders resuscitation, operative optimization and planning, anticoagulation needs, and cardiac risk stratification to	• Proficiently handles instruments and equipment, uses assistants, and guides the conduct of the operation; makes independent intraop decisions; anticipates when assistance is needed	• Plans and delivers a stent graft to exclude a peripheral aneurysm; troubleshoots and treats an endoleak; manages an intraop complication • Adapts the management plan based on a change in the anatomy, including	• Coordinates and leads a multidisciplinary care team in the management of a postop complication • Independently alters longitudinal care based on complications

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THE AMERICAN BOARD OF SURGERY

Evaluation & Management of a Patient with a Peripheral Artery Aneurysm

Level	Preoperative/Nonoperative	Intraoperative Open	Intraoperative Endovascular	Postoperative
The learner can treat all straightforward peripheral arterial aneurysm cases and has a strong understanding of surgical options and techniques for less common scenarios. The attending is available at the request of the learner but is not routinely needed for common presentations, though input may be needed for more complex presentations.	allow expeditious intervention if needed ● Independently alters longitudinal care based on disease progression (aneurysm growth), complications (embolization, rupture, mass effect), or patient factors (worsening comorbidities) ● Independently initiates cross-sectional and duplex imaging and 3D reformatting to identify abnormal findings and plan an intervention ● Adapts the plan to changes in the presentation of a peripheral aneurysm, including changes in a patient's medical condition or presentation (distal embolization, thrombosis of aneurysm) ● Adapts the management plan based on a change in the patient's anatomy, including from endo to open		from endo to open intervention ● Communicates the relative risks and benefits of exam-specific radiation exposure to a patient and ensures colleagues and staff practice ALARA principles	

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THE AMERICAN BOARD OF SURGERY

Evaluation and Management of a Patient with a Symptomatic or Ruptured Aortoiliac Aneurysm

Description of the Activity	Vascular surgeons evaluate and treat patients with rapidly expanding or ruptured aortoiliac aneurysms. These surgeons should have a comprehensive understanding of the presentation, diagnostic techniques, and surgical management of this disease process, including selection criteria for intervention (or palliative care/hospice), type of intervention, and timing of intervention. Additionally, surgeons should understand perioperative management, including recognition and treatment of complications of surgical intervention, follow-up, and surveillance strategies.
Functions	❖ Nonoperative/Preoperative ➢ Synthesize essential information from a patient's referring providers, records, history, physical examination, and initial diagnostic evaluation to develop a differential diagnosis. ➢ Determine whether intervention is indicated, including discussion of nonoperative, expectant management in select patients. ➢ Synthesize a palliative care plan for a patient in whom intervention is not indicated. ➢ Select a surgical approach consistent with a patient's anatomy, comorbidities, and presentation. ➢ Obtain informed consent. Describe the indications, risks, benefits, alternatives, and potential complications of the planned operation, and ensure patient/caregiver understanding. ➢ Synthesize an operative plan that demonstrates understanding of the operative anatomy, physiology, indications, contraindications, risks, benefits, alternatives, and potential complications of: ▪ Open abdominal aortic aneurysm (AAA) repair via retroperitoneal approach ▪ Open AAA repair via transperitoneal approach ▪ Endovascular abdominal aortic aneurysm repair (EVAR) ❖ Intraoperative ➢ Perform the procedures required to manage symptomatic, ruptured, or inflammatory aortoiliac aneurysms ▪ Open ruptured AAA, retroperitoneal ▪ Open ruptured AAA, transperitoneal ▪ EVAR ➢ Integrate new information discovered intraoperatively to modify the surgical plan or technique as necessary, such as: ▪ Coagulopathy ▪ Difficult proximal control or inadequate proximal anastomosis ▪ Hemodynamically unstable patient ▪ Inability for a patient to ventilate and the need for laparotomy to relieve abdominal compartment syndrome ▪ Inability to cannulate the stent graft contralateral gate ▪ Inadvertent coverage of renal or hypogastric arteries during EVAR ▪ Inadvertent iliac rupture during EVAR ▪ Injury to iliac veins during distal control

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Evaluation and Management of a Patient with a Symptomatic or Ruptured Aortoiliac Aneurysm

	▪ Lack of femoral pulses or distal signals following repair ▪ Need for conversion to open repair ▪ Type I/III endoleak ➢ Work with anesthesia staff, nursing staff, and other perioperative health care professionals to create and maintain an intraoperative environment that promotes patient-centered care. ❖ Postoperative ➢ Initiate and oversee postoperative care, including postoperative disposition, resuscitation, appropriate medical therapy, and follow-up imaging and care. ➢ Communicate with the patient/caregiver(s) and members of the health care team to ensure understanding of postprocedure instructions and the patient's ability to carry out the resultant plan within the context of their life (eg, transportation, living situation, insurance, access to a pharmacy). ➢ Recognize, evaluate, and manage early and late complications following symptomatic, ruptured, or inflammatory abdominal aortic or iliac artery aneurysms. ➢ Identify a surveillance plan and indications for reintervention.
Scope	❖ In scope ➢ Inflammatory AAA ➢ Ruptured iliac artery aneurysm (including hypogastric) ➢ Ruptured infrarenal AAA ➢ Symptomatic (pain, rapidly expanding) aneurysm ❖ Out of scope ➢ Aortoenteric fistula (AEF) ➢ Mycotic aneurysm ➢ Patients with connective tissue disorders ➢ Pediatric patients ➢ Ruptured/symptomatic aneurysm related to prior aortic dissection ➢ Supra- or pararenal aneurysm

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THE AMERICAN BOARD OF SURGERY

Evaluation & Management of a Patient with a Symptomatic or Ruptured Aortoiliac Aneurysm

Level	Preoperative/Nonoperative	Intraoperative Open	Intraoperative Endovascular	Postoperative
1 **Limited Participation** Demonstrates understanding of information and has very basic skills **Framework:** What a learner directly out of medical school should know The attending can show and tell.	• Elicits a history and performs a vascular exam (abdominal pain, pulses), recognizing the critical nature of this presentation • Identifies the need for timely imaging with CTA • Communicates with the OR and preps the patient for the OR (labs, pulses/signals documented) • Broadly describes open and endo surgical approaches	• Demonstrates understanding of sharps safety, safe use of devices, and surgical field sterility • Efficiently performs basic surgical tasks, including suturing and knot-tying • Demonstrates basic surgical skills, including making an incision and closure • Describes potential crises during open repair of a symptomatic or rAAA, including failure to control hemorrhage, injury to adjacent structures, and colonic/lower extremity ischemia	• Demonstrates basic understanding of the anatomy of the aorta and iliac vessels • Recognizes the importance of maintaining wire position • Describes potential crises during EVAR (access issues, dissection, ruptured iliac, failure to control hemorrhage from rAAA)	• Identifies a straightforward postop problem (fever, pain, nausea, anemia) and initiates management with guidance • Maintains professional and effective communication with a patient/caregiver(s), the ICU, and other specialty teams • Communicates with a patient/caregiver(s) about changing conditions, providing routine information
2 **Direct Supervision** Demonstrates understanding of the steps of the operation but requires direction through principles and	• Orders vascular imaging studies (CTA) and interprets findings to diagnose a symptomatic or rAAA, including uploading any outside imaging • Communicates with the OR, preps the patient for the OR (labs,	• Demonstrates respect for tissues (gentle handling of vessels) and developing skill in instrument handling • Performs parts of distal anastomoses with frequent prompting and assistance	• Uses US to obtain vascular access; demonstrates basic catheter and wire-handling techniques • Describes findings during EVAR such as access issues, dissection, ruptured iliac artery, and failure to control hemorrhage	• Manages postop problems (eg, chest pain, respiratory distress), including ordering and interpreting additional tests • Actively listens to a patient/caregiver(s) to elicit preferences and manage expectations

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THE AMERICAN BOARD OF SURGERY

Evaluation & Management of a Patient with a Symptomatic or Ruptured Aortoiliac Aneurysm

Level	Preoperative/Nonoperative	Intraoperative Open	Intraoperative Endovascular	Postoperative
does not know the nuances of a basic case **Framework:** The learner can use the tools but may not know exactly what, where, or how to do it. The attending gives active help throughout the case to maintain forward progression.	pulses/signals, Foley, lines), and communicates with the OR and anesthesia teams about the operative plan • Ensures necessary imaging, equipment, and basic OR setup are available for urgent repair (open or endo) • Identifies whether a patient needs open or endo repair and the steps of these procedures	• Describes crises that could occur during the procedure (free rupture/acute hypotension) • Describes findings during open repair, such as failure to control hemorrhage, injury to adjacent structures, and colonic/lower extremity ischemia		• Communicates relevant operative events and the postop care plan to the ICU
3 **Indirect Supervision** Can do a basic operation but will not recognize abnormalities and does not understand the nuances of an advanced case **Framework:**	• Synthesizes patient data, including imaging, to determine a plan for endo or open treatment • Demonstrates understanding of preoperative hemodynamic management (eg, permissive hypotension) • Communicates with the OR and anesthesia teams regarding what	• Demonstrates efficient instrument handling and safe exposure, dissection, and control of vessels (supraceliac aortic control) • Performs a complete proximal and distal anastomosis with minimal prompting and passive assistance • Describes the approach to difficult exposure for proximal control or an inadequate proximal anastomosis and uses	• Performs a diagnostic angiogram • Obtains endo balloon control with assistance • Describes a technique to deal with an intraop crisis during EVAR (inability to cannulate contralateral gate, inadvertent coverage of renal or hypogastric artery, type I/III endoleak, inability to ventilate) • Describes the EVAR sequence and the necessary equipment	• Recognizes and manages a complex vascular critical care complication, identifying the need to return to the OR • Delivers complex and difficult information to a patient/caregiver(s) using shared decision-making • Communicates with the team efficiently and adapts to different team members' styles; provides feedback to the team, peers, and learners

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THE AMERICAN BOARD OF SURGERY

Evaluation & Management of a Patient with a Symptomatic or Ruptured Aortoiliac Aneurysm

Level	Preoperative/Nonoperative	Intraoperative Open	Intraoperative Endovascular	Postoperative
The learner can perform the operation in straightforward circumstances. The attending gives passive help. This help may be given while scrubbed for more complex cases or during a check-in for more routine cases.	lines are needed, the need to induce general anesthesia after the patient is prepped, and what blood products are available • Orders equipment (including devices for EVAR) and positions/drapes the patient • Decides on open or endo repair based on interpretation of CT imaging	adjuncts such as further dissection above the renal arteries or felt during open repair • Describes an algorithm for diagnosis and treatment when there are no pedal pulses during/after open repair • Identifies all critical steps of open repair and the equipment required; advances the procedure with minimal prompting		
4 **<u>Practice Ready</u>** Can manage more complex patient presentations and operations and take care of most cases **<u>Framework</u>:** The learner can treat all straightforward symptomatic or rAAA cases and has a strong understanding of	• Synthesizes patient data, including the acuity of the patient's condition, and formulates a plan for endo or operative intervention, including all relevant details for intervention • Obtains timely imaging with CTA; identifies a ruptured aneurysm; identifies subtle findings on relevant imaging studies (retroaortic renal vein, aortocaval fistula)	• Anticipates or expeditiously performs emergency supraceliac control of the aorta • Proficiently handles instruments and equipment, uses assistants, and guides the conduct of the operation; makes independent intraop decisions; anticipates when assistance is needed • Anticipates or recognizes a major open complication such as an aortocaval fistula, iliac vein injury, or	• Independently performs EVAR, including endo balloon occlusion of the aorta; troubleshoots and treats an endoleak (PC7 L4) • Anticipates or recognizes a major endo complication such as access vessel injury, renal artery coverage, iliac vein injury, or lack of femoral or distal pulses at the end of the case (MK5 L4) • Describes the EVAR sequence and equipment needs and identifies critical decision points (endoleak management, intraop complication) (MK4 L4)	• Leads the team and provides supervision in managing a complex postop problem, including vascular complications and palliative care • Facilitates a caregiver meeting or end-of-life discussion and negotiates a care management plan when interventions may be ineffective • Coordinates a caregiver meeting with the various health care teams for a goals-of-care or end-of-life discussion or transition of care

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THE AMERICAN BOARD OF SURGERY

Evaluation & Management of a Patient with a Symptomatic or Ruptured Aortoiliac Aneurysm

Level	Preoperative/Nonoperative	Intraoperative Open	Intraoperative Endovascular	Postoperative
surgical options and techniques for less common scenarios. The attending is available at the request of the learner but is not routinely needed for common presentations, though input may be needed for more complex presentations.	• Communicates with the OR and anesthesia teams regarding what hemodynamic adjuncts are needed and available (eg, cell saver, rapid transfuser) and the medications that will be needed intraoperatively (heparin, mannitol); verifies postop disposition (ICU bed) • Independently uses multidimensional imaging to determine eligibility for open or endo repair	difficult anastomotic site and responds to control the situation • Remains constantly aware of a patient's physiologic status and preemptively/efficiently communicates with the OR and anesthesia teams • Identifies all critical steps of the procedure and the equipment required; advances the procedure without prompting; recognizes critical decision points		

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THE AMERICAN BOARD OF SURGERY

Evaluation and Management of a Patient with Traumatic/Iatrogenic Vascular Injury

Description of the Activity	Vascular trauma and iatrogenic vascular injuries are encountered by all vascular surgeons, typically in the emergency setting. All vascular surgeons should be able to stabilize and treat a spectrum of vascular injuries and recognize the impact of other traumatic injuries on the timing and repair of vascular trauma. Vascular surgeons should also know the limitations of their scope of practice, depending on available resources, and understand when transfer to a higher level of care may be required.
Functions	❖ Nonoperative/Preoperative ➢ Synthesize essential information from a patient's records, prehospital providers, history, physical examination, and initial diagnostic evaluations as well as from the trauma (or other primary) team to identify the location and severity of the injury. ➢ Complete a rapid, evidence-based evaluation of the patient with vascular trauma or injury. ➢ Recognize vascular injuries requiring emergency operative intervention. ➢ Identify patients in whom operative intervention may be contraindicated, including: ▪ Patients with prohibitive surgical or anesthetic risk secondary to other injuries or patients with preexisting morbidity who are unlikely to benefit from vascular surgical intervention. ▪ Patients whose injuries or comorbidities exceed the capacity of the surgical environment. Transfer to a higher level of care should be discussed with the trauma team and the patient's caregiver(s). ▪ Patients whose vascular injuries are so severe that revascularization is not indicated and major amputation or palliative care is a better alternative. ➢ Select a surgical approach consistent with a patient's anatomy, comorbidities, acuity of presentation, location of presentation (e.g. trauma bay, intra-op), and local health system resources. ➢ Synthesize an operative plan that demonstrates understanding of the operative anatomy, comorbidities, indications, contraindications, risks, benefits, alternatives, and potential complications. ➢ Communicate a diagnosis and potential treatment options to the patient/caregiver(s) and the primary trauma team. ➢ Obtain informed consent, even in an emergency. Describe the indications, risks, benefits, alternatives, and potential complications of the planned operation, including nuances relevant to the patient's condition and comorbidities, and ensure patient/caregiver understanding. ➢ Communicate and coordinate the care of a patient with multisystem injury with the trauma team and other consultants ❖ Intraoperative ➢ Perform the procedures required to manage the spectrum of vascular trauma and iatrogenic injury across all anatomic distributions using both open and endovascular techniques consistent with published guidelines. ▪ Abdomen ▪ Cervical ▪ Chest ▪ Extremities ▪ Pelvis ➢ Recognize the need for remedial procedures secondary to vascular injury, such as fasciotomy and planned abdominal exploration.

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THE AMERICAN BOARD OF SURGERY

Evaluation and Management of a Patient with Traumatic/Iatrogenic Vascular Injury

	➢ Integrate new information discovered intraoperatively that requires modification of the surgical plan or technique, such as: ▪ Identification of new injuries ▪ Inadequate conduit for revascularization ▪ Inadequate vascular control ➢ Work with the trauma, anesthesia, and nursing teams and other perioperative health care professionals to create and maintain an intraoperative environment that promotes patient-centered care. ❖ Postoperative ➢ Provide postoperative management for a patient with vascular trauma in coordination with the trauma and other consulting teams, including appropriate medical management and follow-up. ➢ Communicate with the patient/caregiver(s) and members of the health care team to ensure understanding of postprocedure instructions and the patient's ability to carry out the resultant plan within the context of their life (eg, transportation, living situation, insurance, access to a pharmacy). ➢ Recognize, evaluate, and manage early and late complications related to vascular reconstruction. ▪ Abdominal compartment syndrome ▪ Bleeding ▪ Extremity and end-organ ischemia ▪ Extremity compartment syndrome ▪ Graft infection ▪ Graft thrombosis ▪ Neurologic deficit ➢ Identify a surveillance plan and indications for reintervention.
Scope	❖ In scope ➢ Intraoperative consultations for iatrogenic vascular injuries ➢ Penetrating and blunt injury to the abdomen, including the aorta, celiac artery, inferior vena cava, and superior mesenteric artery ➢ Penetrating and blunt injury to the pelvis, including the iliac arteries and veins ➢ Penetrating and blunt trauma to the chest, including the aorta and great vessels ➢ Penetrating and blunt trauma to the neck, including vertebral injuries ➢ Penetrating or blunt injury to the extremities, such as traumatic pseudoaneurysm, dissection, and transection, including the mangled or nonsalvageable extremity ➢ Periprocedural consultations for iatrogenic vascular injuries (eg, following vascular access for endovascular interventions) ❖ Out of scope ➢ Cardiac injuries

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Evaluation and Management of a Patient with Traumatic/Iatrogenic Vascular Injury

	➢ Intracranial vascular injuries ➢ Retrohepatic inferior vena cava injuries ❖ Special Population ➢ Older adult patients ➢ Pediatric patients ➢

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THE AMERICAN BOARD OF SURGERY

Evaluation & Management of a Patient with Vascular Trauma/Iatrogenic Vascular Injury

Level	Preoperative/Nonoperative	Intraoperative Open	Intraoperative Endovascular	Postoperative
1 **Limited Participation** Demonstrates understanding of information and has very basic skills **Framework:** What a learner directly out of medical school should know The attending can show and tell.	• Respectfully and professionally discusses a patient's care plan with other team members/consultants • Accurately documents all patient information relevant to the vascular injury and in a timely fashion • Elicits a history (mechanism of trauma, time course) and performs a relevant vascular exam • Communicates findings to the trauma/primary team and provides a hand-off of patient care	• Demonstrates basic surgical skills, including recognition of arterial and venous anatomy • Identifies open surgical options to treat a patient's injury and indications for the selected procedure • Identifies potential crises that could occur during the procedure	• Uses US to demonstrate anatomy for vascular access; recognizes the importance of maintaining wire position during wire and catheter exchanges • Identifies endo options to treat a patient's injury and indications for the selected procedure	• Communicates with health care teams in a respectful way • Accurately and efficiently documents all patient information relevant to a vascular injury and the intervention performed • Identifies critical data points for a postop hand-off (pulse/signal exam, anticoagulation plan)
2 **Direct Supervision** Demonstrates understanding of the steps of the operation but requires direction through principles and	• Clearly communicates basic facts about a patient's vascular injury to other health care teams • Orders and interprets diagnostic imaging (vascular lab, CTA) based on H&P findings; needs assistance to formulate an operative plan	• Demonstrates respect for tissues (gentle handling of vessels) and developing skill in instrument handling (using a Castroviejo needle driver) • Performs parts of vessel	• Uses US to obtain vascular access; demonstrates basic catheter and wire-handling techniques • Identifies most steps of the procedure and the equipment required; requires prompting to advance the procedure	• Communicates recommendations to primary, consulting, and palliative care teams during a patient care discussion • Coordinates the care of a trauma patient with the interprofessional team (trauma, nursing,

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Evaluation & Management of a Patient with Vascular Trauma/Iatrogenic Vascular Injury

Level	Preoperative/Nonoperative	Intraoperative Open	Intraoperative Endovascular	Postoperative
does not know the nuances of a basic case **Framework:** The learner can use the tools but may not know exactly what, where, or how to do it. The attending gives active help throughout the case to maintain forward progression.	• Promptly communicates test/imaging results and treatment plan options to a patient/caregiver(s) and the consulting team • Coordinates a plan of care with other teams managing the patient (need for anticoagulation, additional imaging)	repair/anastomosis with frequent prompting and assistance • Identifies most steps of the procedure (inflow/outflow control) and the equipment required; requires prompting to advance the procedure • Identifies intraop findings that could indicate an impending or transpiring crisis		pharmacy, PT, ICU) in a routine situation
3 **Indirect Supervision** Can do a basic operation but will not recognize abnormalities and does not understand the nuances of an advanced case	• Tailors communication regarding a treatment plan to other health care teams based on their level of expertise • Uses the EHR to communicate with a patient's health care team • Synthesizes a workup to determine a treatment plan (operative/nonoperative, endo/open) for a basic vascular trauma/injury	• Demonstrates safe and efficient instrument handling, exposure, dissection, and control of vessels • Performs a complete vessel repair/anastomosis with minimal prompting and passive assistance • Identifies all critical steps of the procedure	• Identifies all critical steps of the procedure and the equipment required; advances the procedure with minimal prompting • Performs and interprets a diagnostic angiogram; efficiently traverses an occlusion; delivers a stent/balloon/embolization material to the appropriate location	• Uses the EHR to communicate with a patient's health care team • Communicates with the team efficiently and adapts to different team members' styles; provides feedback to the team, peers, and learners • Coordinates the care of a trauma patient with multiple services in a

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THE AMERICAN BOARD OF SURGERY

Evaluation & Management of a Patient with Vascular Trauma/Iatrogenic Vascular Injury

Level	Preoperative/Nonoperative	Intraoperative Open	Intraoperative Endovascular	Postoperative
Framework: The learner can perform the operation in straightforward circumstances. The attending gives passive help. This help may be given while scrubbed for more complex cases or during a check-in for more routine cases.	• Coordinates a plan of care with other teams managing a patient in a complex situation (timing and order of interventions for a critically ill polytrauma patient)	and the equipment required; advances the procedure with minimal prompting • Responds to a crisis (regains manual inflow control) and identifies possible next steps with guidance • Identifies all critical steps of the procedure (eg, need for increased exposure and vessel control) and the equipment required; advances the procedure with minimal prompting		complex situation (need for take-back, polytrauma)
4 **Practice Ready** Can manage more complex patient presentations and operations and take care of most cases **Framework:** The learner can treat all straightforward	• Coordinates recommendations from all services to tailor a treatment plan for a patient; facilitates regular discussion with these services to optimize communication and patient care • Uses the EHR to obtain detailed information about a patient's history and test results from prior encounters and outside systems	• Proficiently handles instruments and equipment, uses assistants, guides the conduct of the operation, and makes independent intraoperative decisions; anticipates when assistance is needed • Identifies all critical steps of the procedure and the equipment	• Responds to a crisis (regains manual inflow control); identifies next steps; determines the course of action (balloon occlusion, angiography, conversion from endo to open) • Plans and performs an intervention, including control of hemorrhage, endo device selection and sizing, and alternate access	• Coordinates input from primary and consulting teams to optimize patient care • Ensures safe transition of care with other disciplines and specialties in a complex situation (undomiciled patient), including a long-term follow-up plan and surveillance imaging

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THE AMERICAN BOARD OF SURGERY

Evaluation & Management of a Patient with Vascular Trauma/Iatrogenic Vascular Injury

Level	Preoperative/Nonoperative	Intraoperative Open	Intraoperative Endovascular	Postoperative
vascular trauma/iatrogenic vascular injury cases and has a strong understanding of surgical options and techniques for less common scenarios. The attending is available at the request of the learner but is not routinely needed for common presentations, though input may be needed for more complex presentations.	• Synthesizes the workup to determine an optimal treatment plan, including open or endo approaches • Leads the coordination of patient-centered care among different disciplines and specialties in a complex situation	required; advances the procedure without prompting; recognizes critical decision points • Plans and performs repair, including proximal and distal control and repair/patch/bypass	• Identifies all critical steps of the procedure and the equipment required; advances the procedure without prompting; recognizes critical decision points	

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THE AMERICAN BOARD OF SURGERY

Evaluation and Management of a Patient with Type B Aortic Dissection

Description of the Activity	Vascular surgeons evaluate and treat patients with acute and chronic TBAD and should have a comprehensive understanding of the presentation, diagnostic techniques, and medical and surgical management of this disease process. This includes selection criteria and indications for intervention (or palliative care/hospice), type of intervention, and timing of intervention. Additionally, vascular surgeons should understand perioperative management, including recognition and treatment of complications of surgical intervention, needed follow-up, and surveillance strategies.
Functions	❖ Nonoperative/Preoperative ➢ Synthesize essential information from a patient's referring providers, records, history, physical examination, and initial diagnostic evaluation to develop a differential diagnosis. ➢ Determine whether intervention is indicated, including a discussion of nonoperative, medical management with anti-impulse therapy. ➢ Synthesize a palliative care plan for a patient in whom intervention is not indicated. ➢ Select a surgical approach consistent with a patient's anatomy, comorbidities, and presentation. ➢ Obtain informed consent. Describe the indications, risks, benefits, alternatives, and potential complications of the planned operation, and ensure patient/caregiver understanding. ➢ Synthesize an operative plan that demonstrates understanding of the operative anatomy, physiology, indications, contraindications, risks, benefits, alternatives, and potential complications of: ▪ Aortic arch debranching ▪ Thoracic endovascular aortic repair (TEVAR) ▪ Visceral and lower extremity open and endovascular revascularization ❖ Intraoperative ➢ Perform the procedures required to manage acute or chronic TBAD. ▪ TEVAR ▪ Thoracic branch endoprosthesis ▪ Aortic arch debranching ▪ Intravascular ultrasound (IVUS) ➢ Integrate new information discovered intraoperatively to modify the surgical plan or technique as necessary, such as: ▪ Hemodynamically unstable patient ▪ Inadvertent aortic rupture during TEVAR ▪ Inadvertent coverage of the great vessels or visceral vessels during TEVAR ▪ IVUS findings ▪ Lower extremity malperfusion ▪ Retrograde type A dissection ▪ Type I/III endoleak ▪ Visceral malperfusion ➢ Work with anesthesia staff, nursing staff, and other perioperative health care professionals to create and maintain an intraoperative environment that promotes patient-centered care.

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THE AMERICAN BOARD OF SURGERY

Evaluation and Management of a Patient with Type B Aortic Dissection

	❖ Postoperative ➢ Initiate and oversee postoperative care, including postoperative disposition, resuscitation, appropriate medical therapy, spinal drain management, and follow-up imaging and care. ➢ Communicate with the patient/caregiver(s) and members of the care team to ensure understanding of postprocedure instructions and the patient's ability to carry out the resultant plan within the context of their life (eg, transportation, living situation, insurance, access to a pharmacy). ➢ Recognize, evaluate, and manage early and late complications following acute or chronic TBAD. ➢ Identify a surveillance plan and indications for reintervention.
Scope	❖ In scope ➢ Intramural hematoma ➢ Penetrating aortic ulcer ➢ TBAD, complicated ➢ TBAD, uncomplicated ❖ Out of scope ➢ Patients with connective tissue disorders ➢ Type A dissection ❖ Spical Population ➢ Iatrogenic dissection ➢ Traumatic aortic dissection/injury

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THE AMERICAN BOARD OF SURGERY

Evaluation & Management of a Patient with Type B Aortic Dissection

Level	Preoperative/Nonoperative	Intraoperative	Postoperative
1 **Limited Participation** Demonstrates understanding of information and has very basic skills **Framework:** What a learner directly out of medical school should know The attending can show and tell.	• Elicits a history (onset of pain, BP) and performs a vascular exam (pulses, abdominal pain) • Identifies risk factors for disease development • Identifies a basic preop problem (eg, HTN) and initiates management (BP goals, anti-impulse therapy) with supervision • Identifies the various imaging modalities (CTA, IVUS) • Identifies the indications for intervention over medical management (eg, malperfusion) • Demonstrates knowledge of current guidelines in treating TBAD	• Uses US to demonstrate anatomy for vascular access; recognizes the importance of maintaining wire position during wire and catheter exchanges • Identifies the types of available procedures (TEVAR, debranching)	• Identifies a basic postop problem (hypo/hypertension, paraplegia, abdominal pain) and initiates management with supervision • Recognizes the need for long-term surveillance and risk factor modification
2 **Direct Supervision** Demonstrates understanding of the steps of the operation	• Forms a management plan for a straightforward presentation, recognizing acuity and need for intervention; requires help with decision-making and	• Uses US to obtain vascular access; demonstrates basic catheter and wire-handling techniques • Identifies most steps of the procedure and the equipment	• Manages a common postop problem (hypo/hypertension, paraplegia, access site complication), including

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Evaluation & Management of a Patient with Type B Aortic Dissection

Level	Preoperative/Nonoperative	Intraoperative	Postoperative
but requires direction through principles and does not know the nuances of a basic case **Framework:** The learner can use the tools but may not know exactly what, where, or how to do it. The attending gives active help throughout the case to maintain forward progression.	recognizing complicated TBAD ● Articulates clinical questions and elicits a patient's preferences when discussing treatments for TBAD	required; needs prompting to advance the procedure	ordering and interpreting additional tests ● Communicates standard postop instructions and describes basic evidence-based imaging and risk factor modification
3 **Indirect Supervision** Can do a basic operation but will not recognize abnormalities and does not understand the nuances of an advanced case **Framework:**	● Demonstrates thorough understanding of immediate optimization with medical management ● Recognizes the signs and symptoms of malperfusion and the need for immediate intervention ● Uses imaging findings to plan straightforward TEVAR vs alternatives; sizes a	● Performs a diagnostic angiogram ● Differentiates the true lumen from the false lumen ● Identifies all critical steps of the procedure (aortogram, IVUS) and the equipment required; advances the procedure with minimal prompting	● Recognizes and manages a complex postop complication (malperfusion, retrograde type A dissection), recognizing the need to return to the OR ● Recognizes the impact of disease progression (aneurysm formation) and complications (malperfusion, spinal cord

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THE AMERICAN BOARD OF SURGERY

Evaluation & Management of a Patient with Type B Aortic Dissection

Level	Preoperative/Nonoperative	Intraoperative	Postoperative
The learner can perform the operation in straightforward circumstances. The attending gives passive help. This help may be given while scrubbed for more complex cases or during a check-in for more routine cases.	patient for endo intervention • Develops a TEVAR plan and recognizes device limitations based on patient anatomy and device instructions for use • Identifies clinical practice guidelines for the management of TBAD and applies them independently		ischemia) on the longitudinal care plan
4 **<u>Practice Ready</u>** Can manage more complex patient presentations and operations and take care of most cases **<u>Framework</u>:** The learner can treat all straightforward TBAD cases and has a strong understanding of surgical options and	• Oversees the care of a complex patient and problem • Manages a complicated presentation (eg, malperfusion), leading the team and coordinating critical care and operative intervention • Identifies a dissection on imaging and elicits subtle findings (eg, arch extension) • Independently uses multidimensional imaging to	• Independently performs TEVAR, including IVUS, and troubleshoots and treats an endoleak • Recognizes when operative plan deviation is needed, including treating visceral malperfusion • Identifies all critical steps of the procedure and the equipment required; advances the procedure without prompting; recognizes critical decision points (need for visceral stenting or petticoat extension for malperfusion)	• Leads the team and provides supervision in managing a postop complication (spinal cord ischemia, malperfusion, retrograde type A dissection) • Independently alters longitudinal care based on disease progression (aneurysm formation) and complications (malperfusion, spinal cord ischemia)

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Evaluation & Management of a Patient with Type B Aortic Dissection

Level	Preoperative/Nonoperative	Intraoperative	Postoperative
techniques for less common scenarios. The attending is available at the request of the learner but is not routinely needed for common presentations, though input may be needed for more complex presentations.	determine eligibility for open or endo repair ● Adapts the management plan based on a change in a patient's condition (eg, malperfusion), including from endo to open ● Critically appraises and applies evidence about the management of TBAD and tailors it to a patient, even in the face of conflicting evidence	● Independently interprets completion imaging and determines the appropriate proximal seal and distal endpoint for adequate perfusion	

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Vascular EPA Behaviors and Functions Style Sheet 2/23/2024

Based on the American Medical Association Style Manual, 11th edition and Merriam-Webster's Dictionary, 11th edition

Avoid "and/or" and "etc"
Strip periods from eg, vs (Note: "ie" and "eg" are often unnecessary as parentheses can suffice)
Strip possessives from eponyms, ex. *Allen test*

Word list

cath (okay to shorten "catheter" in "cath lab")
decision-making (n, adj)
differential (keep shortened)
endo (keep shortened except in column heading)
exam (keep shortened, or shorten to H&P)
follow-up (n, adj); follow up (v)
handoff (n)
health care
intra-abdominal
intraop (keep shortened except in column heading)
non-narcotic
nonoperative
patient/caregiver(s)
post-thrombotic
postop (keep shortened except in column heading)
preop (keep shortened except in column heading)
rethrombosis
setup (n); set up (v)
straightforward
supraceliac
take-back
time-out
workup (n); work up (v)

Abbreviations (Note that in the Behavior documents, these abbreviations are not spelled out at first mention.)

3D = three-dimensional

AAA = abdominal aortic aneurysm
ABI = ankle-brachial index
ADLs = activities of daily living
AFib = atrial fibrillation
AKA = above-knee amputation
ALI = acute limb ischemia
AMI = acute myocardial infarction
ASA = aspirin
AV = arteriovenous
AVF = arteriovenous fistula
AVG = arteriovenous graft
BKA = below-knee amputation
BP = blood pressure
CAS = carotid artery stenting
cath = catheter
CEA = carotid endarterectomy
CHEST = American College of Chest Physicians
CLTI = chronic limb-threatening ischemia
CMI = chronic mesenteric ischemia
COPD = chronic obstructive cardiopulmonary disease
Cr = creatinine
CT = computed tomography
CTA = computed tomography angiography
CTO = chronic total occlusion
CTV = computed tomography venography
CVA = cerebrovascular accident
DAPT = dual antiplatelet therapy
DM = diabetes mellitus
DVT = deep vein thrombosis
ECG = electrocardiography, -gram
EEG = electroencephalography, -gram
EHR = electronic health record
endo = endovascular
ESRD = end-stage renal disease
EVAR = endovascular aneurysm repair
H&P = history and physical
HCP = health care provider
HD = hemodialysis

HTN = hypertension
IBE = iliac branch endoprosthesis
ICU = intensive care unit
IJ = internal jugular
IMA = inferior mesenteric artery
intraop = intraoperative
IVC = inferior vena cava
IVUS = intravascular ultrasound
MI = myocardial infarction
MRA = magnetic resonance imaging
MRV = magnetic resonance venography
NSAID = nonsteroidal anti-inflammatory drug
OR = operating room
PE = pulmonary embolism
periop = perioperative
postop = postoperative
preop = preoperative
PT = physical therapy
PTA = percutaneous transluminal angioplasty
PTS = post-thrombotic syndrome
R/L = right/left
rAAA = ruptured abdominal aortic aneurysm
rehab = rehabilitation
RFA = radiofrequency ablation
ROMS = retrograde open mesenteric stenting
SCM = sternocleidomastoid
SVS = Society for Vascular Surgery
TBAD = type B aortic dissection
TCAR = transcarotid artery revascularization
TEVAR = thoracic endovascular aortic repair
TFCAS = transfemoral carotid artery stenting
TMA = transmetarsal amputation
US = ultrasound
VI = venous insufficiency
vs = versus
VTE = venous thromboembolism