CIGNA MEDICAL COVERAGE POLICIES

Peripheral Vascular Intervention

Effective Date: January 24, 2025

Instructions for use

The following coverage policy applies to health benefit plans administered by Cigna. Coverage policies are intended to provide guidance in interpreting certain standard Cigna benefit plans and are used by medical directors and other health care professionals in making medical necessity and other coverage determinations. Please note the terms of a customer's particular benefit plan document may differ significantly from the standard benefit plans upon which these coverage policies are based. For example, a customer's benefit plan document may contain a specific exclusion related to a topic addressed in a coverage policy.

In the event of a conflict, a customer's benefit plan document always supersedes the information in the coverage policy. In the absence of federal or state coverage mandates, benefits are ultimately determined by the terms of the applicable benefit plan document. Coverage determinations in each specific instance require consideration of:

1. The terms of the applicable benefit plan document in effect on the date of service
2. Any applicable laws and regulations
3. Any relevant collateral source materials including coverage policies
4. The specific facts of the particular situation

Coverage policies relate exclusively to the administration of health benefit plans. Coverage policies are not recommendations for treatment and should never be used as treatment guidelines.

This evidence-based medical coverage policy has been developed by EviCore, Inc. Some information in this coverage policy may not apply to all benefit plans administered by Cigna.

These guidelines include procedures EviCore does not review for Cigna. Please refer to the **Cigna CPT code list** for the current list of high-tech imaging procedures that EviCore reviews for Cigna.

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Glossary

Terms and abbreviations

Aneurysm	Defined as a diameter 1.5x the normal arterial diameter.
Angioplasty	A procedure that utilizes a catheter with a balloon that is inflated to enlarge a stenotic area.
Ankle-Brachial Index (ABI)	Ratio of the systolic blood pressure (SBP) measured at the ankle to the brachial (arm) SBP.
Atherectomy	A procedure that utilizes a catheter with a sharp blade or laser on the end of the catheter to remove plaque from a blood vessel.
Crescendo TIA	Multiple recurrent episodes of TIA over hours to days.
Critical limb ischemia	Severe stenosis or occlusion in the vessels supplying the lower extremity such that limb loss will result without treatment. Symptoms of critical limb ischemia in the lower extremities include non-healing wounds, gangrene and ischemic rest pain.
Dissection	Disruption of the media layer of the aorta with bleeding within and along the wall of the aorta.
Graft	Synthetic material used to replace or repair a segment of an artery or bypass an occluded segment of artery.
High-grade stenosis	A high grade stenosis is defined as at least a 50% narrowing of an artery.
Ischemic rest pain	Pain arises from severe arterial occlusive disease in the lower extremities such that the patient experiences pain in the distal aspect of the foot and toes while the limb is in the supine position as would occur with sleep. The pain is relieved with the limb in the dependent position or "dangling from the bed" as the limb is depending on gravity to assist with perfusion.

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NASCET	North American Symptomatic Carotid Endarterectomy Trial
Pseudo-aneurysm	Outpouching of blood resulting from disruption of the arterial wall with extravasation of blood contained by periarterial connective tissue and not by the arterial wall layers.
PTA	Percutaneous transluminal angioplasty.
Spider veins	Enlarged, tortuous veins that are usually distributed in a web like cluster. These veins are typically ‹3mm in diameter.
Stent	A metal scaffold placed inside the artery to maintain patency.
Stent-graft	A metal scaffold covered by fabric material placed inside an artery.
Symptomatic carotid stenosis	Characterized by either a transient ischemic attack or cerebrovascular accident that is in the distribution of known severe carotid stenosis, e g. transient right sided upper and lower extremity paralysis in the setting of 70% left internal carotid artery stenosis.
Symptomatic aneurysm	Unrelenting non-positional back pain in the setting of a known abdominal or thoracic aortic aneurysm. Patients with a symptomatic aneurysm may or may not have evidence of a free or contained rupture. The presence of symptoms indicate impending rupture.
Varicose veins	Enlarged, tortuous veins often caused by incompetent valves. Veins are typically ≥3mm in diameter.
Velocity ratio (V1/V2)	Ratio of peak systolic velocity in the diseased segment of blood vessel demonstrating elevated flow velocities to the peak systolic velocity of blood flow in normal vessel just proximal to area of concern in arteries, or just distal in veins.

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Venous reflux	Characterized by incompetent or "leaky" valves that no longer function as one way valves facilitating the flow of blood from the lower extremities to the heart. This results in pooling of blood in the lower extremities leading to distended engorged veins when the lower extremities are in the dependent position as in sitting or standing.

Peripheral Vascular Intervention

Arterial Intervention Guidelines

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General Information for Arterial Intervention Requests

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General requirements

eviCore applies an evidence-based approach to evaluate the most appropriate medically necessary care for each individual. This evaluation requires submission of legible medical records pertinent to the test, treatment, or procedure requested by the provider.

Information to establish medical necessity

Medical necessity for the request cannot be established when the medical records provided cannot be read or do not include sufficiently detailed information to understand the individual's current clinical status.

Specific elements of an individual's medical records commonly required to establish medical necessity include, but are not limited to

- Recent (within 6 months) in-person clinical evaluation which includes a detailed history and physical examination
- Laboratory studies
- Imaging studies
- Pathology reports
- Procedure reports
- Reports from other providers participating in treatment of the relevant condition

Documentation requirements for arterial intervention requests

Documentation requirements needed to complete a prior authorization request for vascular surgery include **ALL** of the following:

- Procedure proposed
- Condition being treated
- Detailed documentation of provider-directed conservative treatment, duration and frequency of treatment, and the response to such treatments, if applicable
- Detailed documentation of location and size of aneurysmal disease, if present

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- Detailed documentation regarding nature of the critical limb ischemia: non-healing wound or ischemic rest pain, if applicable
- Recent (within 6 months) written reports of any of the following diagnostic imaging modalities acceptable for purposes of the Vascular Surgery guidelines:
  - Ankle-brachial indices, segmental pressures and pulse volume recordings as applicable
  - Arterial duplex ultrasound including carotid, lower extremity and abdominal
  - CTA abdomen/pelvis with or without lower extremity run-off
  - MRA abdomen/pelvis with or without lower extremity run-off
  - Angiogram
- Recent (within 6 months) clinical evaluation documenting:
  - Symptoms (if lifestyle-limiting, detailed documentation regarding quality of life parameters that are affected)
  - Physical exam findings

Emergent and urgent requests

Individuals being evaluated for vascular/endovascular surgery should be screened for the presence of a medical condition that warrants urgent/emergent definitive surgical treatment. Provider directed non-surgical management is **not** required when there is documentation, supported by imaging studies or clinical assessment, of any of the following urgent/emergent conditions:

- Critical limb ischemia
- Symptomatic carotid stenosis
- Crescendo TIA's (multiple recurrent episodes of TIA over hours to days)
- Symptomatic or ruptured aneurysms

An urgent/emergent request based on 2018 NCQA standards for utilization management occurs when the time frame for making routine or non-life threatening determinations on care **either**:

- Could seriously jeopardize the life, health, or safety of the member or others, due to the member's psychological state
- In the opinion of a practitioner with knowledge of the member's medical or behavioral condition, would subject the member to adverse health consequences without the care or treatment that is the subject of the request.

Procedures to treat arterial disease may be indicated on an intra-operative basis

Background and supporting information

Prior-authorization requests should be submitted at least two weeks prior to the anticipated date of an elective surgery.

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Cerebrovascular Endovascular Embolization and Stents

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Cerebrovascular Endovascular Embolization and Stents

Procedures

- Endovascular procedures may include:
  - Embolization (including coiling)
  - Balloon angioplasty
  - Stent placement
  - Flow diverters

Cerebrovascular Embolization and Stent

Procedure Description	CPT®
Transcatheter permanent occlusion or embolization (e.g. for tumor destruction, to achieve hemostasis, to occlude a vascular malformation), percutaneous, any method, central nervous system (intracranial, spinal cord)	61624
Balloon angioplasty, intracranial (e.g. atherosclerotic stenosis), percutaneous [not covered for prophylactic percutaneous transluminal angioplasty of intracranial arteries after aneurysmal subarachnoid hemorrhage] [dual diagnosis needed – subarachnoid hemorrhage and ischemia]	61630
Transcatheter placement of intravascular stent(s), intracranial (e.g. atherosclerotic stenosis), including balloon angioplasty if performed [not covered for prophylactic percutaneous transluminal angioplasty of intracranial arteries after aneurysmal subarachnoid hemorrhage] [dual diagnosis needed – subarachnoid hemorrhage and ischemia]	61635

Indications

- Endovascular treatment of intracerebral pathology is indicated when there is documentation of **any** of the following:

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- Unruptured Aneurysms: Treatment is indicated at >5mm
- Ruptured Aneurysms and/or Subarachnoid Hemorrhage at any size
- Arteriovenous Malformations for any size

Non-indications

- Endovascular treatment is not indicated for intracranial atherosclerosis

Background and supporting information

Cerebral aneurysm is a bulging, weakened area in the wall of a blood vessel resulting in an abnormal widening or ballooning greater than 50% of the vessel's normal diameter (width).

The causes of aneurysms are varied. They may be congenital or hereditary, or may be caused by other medical conditions or injury.

The risk of rupture for an asymptomatic aneurysm is 1% per year or less, this risk increases with size, size increase over time, family history, and history of prior subarachnoid hemorrhage (SAH). Endovascular treatment options for aneurysm include coil embolization, balloon remodeling, stent-assisted coil embolization, and/or flow diverters. Treatments for ruptured cerebral aneurysms include surgical clipping, endovascular coiling and/or use of flow diverters. Stenting of a ruptured aneurysm is associated with increased morbidity and mortality and is only considered when less risky options are not available. Cerebral angioplasty is reasonable in patients with symptomatic cerebral vasospasm, particularly those not responding to hypertensive therapy. Treatment should be done early to prevent re-rupture. With conservative management, the risk of aneurysm re-bleeding is 20% to 30% in the first month and then approximately 3% per year.

Most brain AVMs are sporadic and do not have an underlying genetic cause. Conservative management, endovascular embolization, radiation and operative resection are four modalities that can be considered in the treatment of brain AVM. These modalities may be performed either in isolation or in combination.

Intracranial atherosclerosis: Stroke or TIA (transient ischemic attack) can be caused by symptomatic intracranial atherosclerosis. For individuals with cerebral ischemia attributable to stenosis of an intracranial artery, the mainstay of treatment consists of risk factor modification and medications. Angioplasty and/or stenting is generally not recommended given the low rate of stroke on medical management and the inherent peri-procedural risk of endovascular treatment. Intervention may be considered on a case-by-case basis for failure of maximal medical therapy in complex scenarios.

References

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1. Chimowitz MI, Lynn MJ, Derdeyn CP, et al. Stenting versus aggressive medical therapy for intracranial arterial stenosis [published correction appears in *N Engl J Med*. 2012 Jul 5;367(1):93]. *N Engl J Med*. 2011;365(11):993-1003. doi:10.1056/NEJMoa1105335.
2. Chung DY, Abdalkader M, Nguyen TN. Aneurysmal Subarachnoid Hemorrhage. *Neurol Clin*. 2021;39(2):419-442. doi:10.1016/j.ncl.2021.02.006.
3. Connolly ES Jr, Rabinstein AA, Carhuapoma JR, et al. Guidelines for the management of aneurysmal subarachnoid hemorrhage: a guideline for healthcare professionals from the American Heart Association/ American Stroke Association. *Stroke*. 2012;43(6):1711-1737. doi:10.1161/STR.0b013e3182587839.
4. Etminan N, de Sousa DA, Tiseo C, et al. European Stroke Organization (ESO) guidelines on management of unruptured intracranial aneurysms. *Eur Stroke J*. 2022;7(3):V. doi:10.1177/23969873221099736.
5. Hoh BL, Ko NU, Amin-Hanjani S, et al. 2023 Guideline for the Management of Patients With Aneurysmal Subarachnoid Hemorrhage: A Guideline From the American Heart Association/American Stroke Association. *Stroke*. 2023;54(7):e314-e370. doi:10.1161/STR.0000000000000436.
6. Kernan WN, Ovbiagele B, Black HR, et al. Guidelines for the prevention of stroke in patients with stroke and transient ischemic attack: a guideline for healthcare professionals from the American Heart Association/ American Stroke Association [published correction appears in Stroke. 2015 Feb;46(2):e54]. *Stroke*. 2014;45(7):2160-2236. doi:10.1161/STR.0000000000000024.
7. Nguyen TN. Management of Unruptured Intracranial Aneurysms and Brain Arteriovenous Malformations. *Continuum (Minneap Minn)*. 2023;29(2):584-604. doi:10.1212/CON.0000000000001247.

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Carotid and Vertebral Revascularization

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Coding

Procedures indicated for carotid revascularization	CPT®
Carotid Angioplasty/Stent	
Transcatheter placement of intravascular stent(s), cervical carotid artery, open or percutaneous, including angioplasty, when performed, and radiological S&I; with distal embolic protection	37215
Transcatheter placement of intravascular stent(s), cervical carotid artery, open or percutaneous, including angioplasty, when performed, and radiological supervision and interpretation; without distal embolic protection	37216
Transcatheter placement of intravascular stent(s), intrathoracic common carotid artery or innominate artery, open or percutaneous antegrade approach, including angioplasty, when performed, and radiological supervision and interpretation	37218
Transcatheter placement of extracranial vertebral artery stent(s), including radiologic supervision and interpretation, open or percutaneous; initial vessel	0075T
Transcarotid Stenting with Dynamic Flow Reversal (TCAR)	
Transcatheter placement cervical carotid open or percutaneous with embolic protection	37215

Carotid revascularization - Criteria

General information

The determination of medical necessity for the performance of carotid revascularization is always made on a case-by-case basis based on the following information:

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- For prior authorization requirements, see **General Information for Arterial Intervention Requests**
- The presence of urgent/emergent indications/conditions warrants definitive surgical/endovascular treatment in lieu of provider-directed non-surgical management. Urgent/emergent conditions for carotid revascularization include **any** of the following:
  - Crescendo TIA's
  - Transient monocular blindness, amaurosis fugax
  - Free-floating thrombus
  - Enlarging carotid pseudoaneurysm
  - Infection of carotid patch placed during prior carotid endarterectomy
  - Recent CVA or TIA
- Confirmatory imaging studies and clinical notes are required

Carotid angioplasty or stent

Carotid stenting (CAS)

Carotid stenting (CAS) for atherosclerotic disease is medically necessary when the individual has documentation of **all** of the following:

- Indications for CEA have been met with **either** of the following:
  - Symptomatic carotid stenosis (as documented by clinical notes) demonstrated to be ≥70% via carotid duplex ultrasound, CTA or MRA or angiography within six months and any of the following:
    - Transient ischemic attack (TIA)
    - Focal cerebral ischemia producing a non-disabling stroke
    - Transient monocular blindness (amaurosis fugax)
  - Asymptomatic carotid stenosis (as documented by clinical notes) >80% demonstrated via CTA, MRA or angiography within six months (carotid stenosis documented by duplex ultrasound must be confirmed by angiography prior to performing the procedure)
- Individual is considered **high risk** for CEA due to a documented history of **any** of the following significant comorbidities or anatomic risk factors:
  - Significant comorbid conditions:
    - Congestive heart failure (CHF) class III/IV
    - Left ventricular ejection fraction (LVEF) <30 %
    - Unstable angina
    - Angina with known >2 vessel CAD
    - Severe COPD
    - ESRD
    - Age 75 or older

        - Recent (within the last six months) myocardial infarction (MI)
    - Anatomic risk factors include:
        - Recurrent stenosis in the setting of a previous CEA at any time
        - Prior radiation treatment to the neck
        - Previous radical neck dissection at any time
        - Permanent contralateral cranial nerve injury
        - Contralateral carotid occlusion
        - Tandem high grade stenosis on the same side
        - High cervical carotid stenosis above C2 vertebral body
- Carotid artery stenosis shall be measured by carotid duplex ultrasound, CT or MR imaging or angiography and recorded in the patient's medical records (carotid stenosis documented by duplex ultrasound must be confirmed by angiography prior to performing the procedure)
    - If the stenosis is measured by ultrasound prior to the procedure, then the degree of stenosis must be confirmed by angiography at the start of the procedure. Angiography can be performed at the time of the planned intervention.

Transcarotid stenting (TCAR)

- TCAR is considered medically necessary when criteria for CEA has been met AND
    - Has one high risk criteria for CEA (see above), AND
    - No anatomical or technical contraindications to performing the procedure are documented by intervention in addition to all of the following:
        - CCA is at least 6 mm diameter
        - No prior CCA intervention including stenting
        - No concern for contralateral vagus or recurrent laryngeal nerve injury
        - CCA length of at least 5 cm prior to bifurcation

Carotid revascularization non-indications

Carotid revascularization (CEA or CAS) is not medically necessary in individuals who have had a disabling stroke (modified Rankin scale ≥ 3)

Asymptomatic carotid individuals should have an adequate life expectancy to benefit from a carotid intervention.

Extracranial vertebral artery stenosis

Treatment of extracranial vertebral artery stenosis

Extracranial vertebral artery angioplasty with stent placement is considered medically necessary when **all** of the following criteria are met:

- Failure of antiplatelet therapy or anticoagulation therapy
- One of the following recurrent symptoms after treatment of non-vascular etiologies:
  - Dizziness
  - Unilateral limb weakness
  - Dysarthria
  - Recurrent headache
  - Recurrent nausea/vomiting
  - Recurrent posterior circulation embolic stroke
- One of the following criteria are met:
  - 60-99% bilateral extracranial vertebral artery stenosis
  - 60-99% unilateral extracranial vertebral artery stenosis in the setting of **any** of the following:
    - A dominant vertebral and hypoplastic contralateral vertebral artery
    - Contralateral vertebral artery ends in posteroinferior cerebellar
    - Contralateral vertebral artery is occluded

Non-indications

- Extracranial vertebral artery angioplasty with stent placement is considered experimental, investigational, or unproven for treatment of **any** other indication, including asymptomatic vertebral artery stenosis

Background and supporting information

Carotid Angioplasty and Stenting and TCAR

Carotid angioplasty/stenting form of carotid revascularization for atherosclerotic disease in which a stent and more often than not a balloon prior to that are placed over a wire through the lesion of interest to dilate and resolve a stenosis. Since threading a wire through plaque can potentially lead to fracturing and embolization of the plaque into the distal intracranial circulation, an embolic protection device is generally employed during carotid stenting. Carotid stenting is also indicated to treat aneurysmal disease involving the carotid artery. Carotid stenting is an option for patients who are considered high risk for CEA and is offered as an alternative to CEA.

CMS has determined that CAS with embolic protection is reasonable and necessary only if performed in facilities that have been determined to be competent in performing the evaluation, procedure and follow-up necessary to ensure optimal patient outcomes. Standards to determine competency include specific physician training standards, facility support requirements and data collection to evaluate outcomes during a required re-evaluation.

TCAR is a method of deploying a transcarotid stent under reverse carotid flow to reduce the incidence of cerebral embolization. This offers low procedural stroke rates in individuals who are considered high risk.

References

1. Müller MD, Lyrer P, Brown MM, Bonati LH. Carotid artery stenting versus endarterectomy for treatment of carotid artery stenosis. *Cochrane Database of Systematic Reviews*. 2020. doi:10.1002/14651858.cd000515.pub5.
2. Müller MD, Lyrer PA, Brown MM, Bonati LH. Carotid Artery Stenting Versus Endarterectomy for Treatment of Carotid Artery Stenosis. *Stroke*. 2021;52(1). doi:10.1161/strokeaha.120.030521.
3. Brooks WH, Jones MR, Gisler P, et al. Carotid Angioplasty with Stenting Versus Endarterectomy. *JACC Cardiovasc Interv*. 2014;7(2):163-168. doi:10.1016/j.jcin.2013.09.010.
4. Mas JL, Arquizan C, Calvet D. Long-Term Follow-Up Study of Endarterectomy Versus Angioplasty in Patients with Symptomatic Severe Carotid Stenosis Trial. *J Vas Surg*. 2015;61(2):568-569. doi:10.1016/j.jvs.2014.12.036.
5. Mas JL, Arquizan C, Calvet D, Viguier A, Albucher JF, Piquet P, EVA-3S Investigators. Long-term follow-up study of endarterectomy versus angioplasty in patients with symptomatic severe carotid stenosis trial. *Stroke*. 2014; 45:2750–2756.
6. Eckstein HH, Ringleb P, Allenberg JR, et al. Results of the Stent-Protected Angioplasty versus Carotid Endarterectomy (SPACE) study to treat symptomatic stenoses at 2 years: a multinational, prospective, randomised trial. *Lancet Neuro*. 2008;7(10):893-902. doi:10.1016/s1474-4422(08)70196-0.
7. Bonati LH, Dobson J, Featherstone RL. Long-Term Outcomes After Stenting Versus Endarterectomy for Treatment of Symptomatic Carotid Stenosis: The International Carotid Stenting Study (ICSS) Randomised Trial. *J Vasc Surg*. 2015;62(5):1368. doi:10.1016/j.jvs.2015.09.007.
8. Brott TG, Howard G, Roubin GS, et al. Long-Term Results of Stenting versus Endarterectomy for Carotid-Artery Stenosis. *N Engl J Med*. 2016;374(11):1021-1031. doi:10.1056/nejmoa1505215.
9. Alfson DB, Ham SW. Type B Aortic Dissections. *Cardiol Clin*. 2017;35(3):387-410. doi:10.1016/j.ccl.2017.03.007.
10. Kwolek CJ, Jaff MR, Leal JI, et al. Results of the ROADSTER multicenter trial of transcarotid stenting with dynamic flow reversal. *J Vasc Surg*. 2015;62(5):1227-1234. doi:10.1016/j.jvs.2015.04.460.
11. Silver FL, Mackey A, Clark WM, et al. Safety of stenting and endarterectomy by symptomatic status in the Carotid Revascularization Endarterectomy Versus Stenting Trial (CREST). *Stroke*. 2011;42(3):675-680. doi:10.1161/STROKEAHA.110.610212.
12. Mayberg MR, Winn HR. Endarterectomy for asymptomatic carotid artery stenosis. Resolving the controversy. *JAMA*. 1995;273(18):1459-1461.
13. AbuRahma AF, Avgerinos ED, Chang RW, et al. Society for Vascular Surgery clinical practice guidelines for management of extracranial cerebrovascular disease. *J Vasc Surg*. 2022;75(1S):4S-22S. doi:10.1016/j.jvs.2021.04.073.
14. Naylor R, Rantner B, Ancetti S, et al. Editor's Choice - European Society for Vascular Surgery (ESVS) 2023 Clinical Practice Guidelines on the Management of Atherosclerotic Carotid and Vertebral Artery Disease. *Eur J Vasc Endovasc Surg*. 2023;65(1):7-111. doi:10.1016/j.ejvs.2022.04.011
15. Brott TG, Halperin JL, Abbara S, et al. 2011 ASA/ACCF/AHA/AANN/AANS/ACR/ASNR/CNS/SAIP/SCAI/SIR/SNIS/SVM/SVS guideline on the management of patients with extracranial carotid and vertebral artery disease: executive summary. A report of the American College of Cardiology Foundation/American Heart Association Task Force on Practice Guidelines, and the American Stroke Association, American Association of Neuroscience Nurses, American Association of Neurological Surgeons, American College of Radiology, American Society of Neuroradiology, Congress of Neurological Surgeons, Society of Atherosclerosis Imaging and Prevention, Society for Cardiovascular Angiography and Interventions, Society of Interventional Radiology, Society of NeuroInterventional Surgery, Society for Vascular Medicine, and Society for Vascular Surgery [published correction appears in Circulation. 2011 Jul 26;124(4):e145. Dosage error in article text]. *Circulation*. 2011;124(4):489-532. doi:10.1161/CIR.0b013e31820d8d78.

Peripheral Vascular, Non-coronary Stents

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General information

Atherosclerosis is a systemic disease and individuals will often present with multi-level disease. Intraoperative decision making may lead to changes in the original procedure requested. Sequential procedures may also be indicated during the procedure to maintain or re-establish patency. These additional procedures are necessary because the initial approach was unsuccessful or only partially successful with regard to patency of the target vessel.

Procedures for peripheral atherosclerosis can include:

- Surgery, including surgical exposure of vessels, endarterectomy or bypass
- Open or percutaneous thrombectomy
- Open or percutaneous embolectomy
- Atherectomy
- Catheter directed thrombolysis
- Additional PTA or stent placement

Coding

Procedures

Peripheral vascular non-coronary stent procedures	CPT®
Revascularization, endovascular, open or percutaneous, iliac artery, unilateral, initial vessel; with transluminal angioplasty	37220
Revascularization, endovascular, open or percutaneous, iliac artery, unilateral, initial vessel; with transluminal stent placement(s), includes angioplasty within the same vessel, when performed	37221
Revascularization, endovascular, open or percutaneous, iliac artery, each additional ipsilateral iliac vessel; with transluminal angioplasty (List separately in addition to code for primary procedure)	37222

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Peripheral vascular non-coronary stent procedures	CPT®
Revascularization, endovascular, open or percutaneous, iliac artery, each additional ipsilateral iliac vessel; with transluminal stent placement(s), includes angioplasty within the same vessel, when performed (List separately in addition to code for primary procedure)	37223
Revascularization, endovascular, open or percutaneous, femoral, popliteal artery(s), unilateral; with transluminal angioplasty	37224
Revascularization, endovascular, open or percutaneous, femoral, popliteal artery(s), unilateral; with atherectomy, includes angioplasty within the same vessel, when performed	37225
Revascularization, endovascular, open or percutaneous, femoral, popliteal artery(s), unilateral; with transluminal stent placement(s), includes angioplasty within the same vessel, when performed	37226
Revascularization, endovascular, open or percutaneous, femoral, popliteal artery(s), unilateral; with transluminal stent placement(s) and atherectomy, includes angioplasty within the same vessel, when performed	37227
Revascularization, endovascular, open or percutaneous, tibial, peroneal artery, unilateral, initial vessel; with transluminal angioplasty	37228
Revascularization, endovascular, open or percutaneous, tibial, peroneal artery, unilateral, initial vessel; with atherectomy, includes angioplasty within the same vessel, when performed	37229
Revascularization, endovascular, open or percutaneous, tibial, peroneal artery, unilateral, initial vessel; with transluminal stent placement(s), includes angioplasty within the same vessel, when performed	37230
Revascularization, endovascular, open or percutaneous, tibial, peroneal artery, unilateral, initial vessel; with transluminal stent placement(s) and atherectomy, includes angioplasty within the same vessel, when performed	37231
Revascularization, endovascular, open or percutaneous, tibial/ peroneal artery, unilateral, each additional vessel; with transluminal angioplasty (List separately in addition to code for primary procedure)	37232

Peripheral vascular non-coronary stent procedures	CPT®
Revascularization, endovascular, open or percutaneous, tibial/ peroneal artery, unilateral, each additional vessel; with atherectomy, includes angioplasty within the same vessel, when performed (List separately in addition to code for primary procedure)	37233
Revascularization, endovascular, open or percutaneous, tibial/ peroneal artery, unilateral, each additional vessel; with transluminal stent placement(s), includes angioplasty within the same vessel, when performed (List separately in addition to code for primary procedure)	37234
Revascularization, endovascular, open or percutaneous, tibial/ peroneal artery, unilateral, each additional vessel; with transluminal stent placement(s) and atherectomy, includes angioplasty within the same vessel, when performed (List separately in addition to code for primary procedure)	37235
Transcatheter placement of an intravascular stent(s), open or percutaneous, including radiological supervision and interpretation and including angioplasty within the same vessel, when performed; initial vein	37238
Vascular embolization or occlusion, inclusive of all radiological supervision and interpretation, intraprocedural roadmapping, and imaging guidance necessary to complete the intervention; venous, other than hemorrhage (e.g., congenital or acquired venous malformations, venous and capillary hemangiomas, varices, varicoceles)	37241
Vascular embolization or occlusion, inclusive of all radiological supervision and interpretation, intraprocedural roadmapping, and imaging guidance necessary to complete the intervention; arterial, other than hemorrhage or tumor (e.g., congenital or acquired arterial malformations, arteriovenous malformations, arteriovenous fistulas, aneurysms, pseudoaneurysms)	37242
Vascular embolization or occlusion, inclusive of all radiological supervision and interpretation, intraprocedural roadmapping, and imaging guidance necessary to complete the intervention; for tumors, organ ischemia, or infarction	37243

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Peripheral vascular non-coronary stent procedures	CPT®
Vascular embolization or occlusion, inclusive of all radiological supervision and interpretation, intraprocedural roadmapping, and imaging guidance necessary to complete the intervention; for arterial or venous hemorrhage or lymphatic extravasation	37244

Peripheral vascular, non-coronary stent - criteria

General Guidelines

It is expected that all lesions needing treatment will be addressed in one procedure. Staging of interventions is **not** indicated unless there is justification in the medical record. Valid reasons include any of the following:

- Patient instability
- Fluoroscopy use in excess of what is widely considered a safe radiation dosage
- A need to convert to general anesthesia but resources are not available
- Contrast volume given is greater than 200 ml

Primary stenting is medically necessary when Percutaneous Transluminal Angioplasty (PTA) alone is not expected to provide a durable result for individuals with **either** of the following:

- Arterial occlusions that carry a high risk for distal embolization or rapid recurrence
- Occlusive lesions such as significantly calcified lesions, eccentric lesions, lesions related to external compression, and ostial lesions.

Upper extremity and other peripheral artery indications

Brachiocephalic arteries

PTA and stenting is medically necessary for treatment of **any** of the following documented conditions:

- Symptomatic subclavian steal syndrome documented by **all** of the following:
  - Episodic dizziness
  - High grade stenosis or occlusion of the proximal subclavian artery demonstrated on advanced imaging
  - Presence of reversal of flow in the left vertebral artery on carotid/subclavian duplex ultrasound
- Upper extremity claudication when there is documentation of fatigue with exertion of the arm and **both** of the following:
  - Symptoms are relieved with rest

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  - Symptoms recur with activity at predictable intervals
- Ischemic rest pain of the arm and hand when **one** of the following criteria is met:
  - Objective measurements demonstrate severe ischemia on noninvasive studies
  - High-grade stenosis seen on advanced imaging
- Non-healing tissue ulceration or focal gangrene of the digits.
- Stenotic inflow arteries of an arteriovenous fistula when the inflow arteries, such as the innominate or brachiocephalic arteries are demonstrated on advanced imaging to have a high grade stenosis.

Renal artery

PTA and stenting for renal artery stenosis (RAS) is considered medically necessary when there is documentation of **any** of the following:

- Renal artery dissection
- Renal artery aneurysm ≥3.0cm
- Renal artery atherosclerosis greater than 50% in a transplanted kidney
- In instances of severe hypertension leading to flash pulmonary edema or acute coronary syndrome
- Resistant or uncontrolled HTN (≥180SBP or ≥120DBP) with failure of maximally tolerated doses of at least three antihypertensive agents, one of which is a thiazide diuretic, or intolerance to medications
- Ischemic nephropathy with chronic kidney disease (CKD) with eGFR <45 cc/min

PTA and stenting is **not** medically necessary for RAS under the following conditions:

- Unilateral, solitary or bilateral RAS with controlled BP and normal renal function
- Unilateral, solitary, or bilateral RAS with kidney size <7cm in pole-to-pole length
- Unilateral, solitary, or bilateral RAS with chronic end stage renal disease on hemodialysis ≥3 months
- Unilateral, solitary, or bilateral renal artery chronic total occlusion

Mesenteric vessels

This includes chronic mesenteric ischemia. Documentation detailing the previous workup for the GI symptoms may include endoscopy, angiography or advanced radiographic imaging. Treatment of the mesenteric vessels is indicated when there is documentation of **both** of the following:

- Symptoms that are felt to be a manifestation of chronic arterial insufficiency including **any** of the following:
  - Postprandial abdominal pain or bloating
  - Diarrhea
  - Food fear
  - Weight loss

- Prior imaging demonstrates **at least two** mesenteric vessels with critical high grade stenosis or occlusion

Lower extremity arterial indications

Initial treatment

Treatment of stenotic or occluded arteries perfusing the lower extremities (aorto-iliac, superficial femoral, popliteal and infra-popliteal arteries) is considered medical necessary when **all** of the following are met:

- Clinical history documents **one** of the following conditions:
  - Critical limb ischemia documented in the clinical note by **any** of the following:
    - Non-healing ischemic wounds present for ≥two weeks despite ongoing provider-directed wound care of at least two weeks
    - Gangrene where revascularization is felt to be needed to allow for minor amputation
    - Ischemic rest pain demonstrated by:
      - Symptomatology suggestive of rest pain (e.g., pain in the foot while recumbent that is relieved when foot is dependent) present ≥2 weeks and **either**:
        - Objective evidence of ABI's <0.5 in non-diabetics
        - Monophasic waveforms at the feet on noninvasive studies in individuals noted to have noncompressible vessels on ABI such as diabetics or individuals with end-stage renal disease
  - Lifestyle-limiting claudication when there is documentation of **all** of the following:
    - A failed trial of three months of provider directed conservative therapy which includes structured exercise walking program.
    - Functional limitations that significantly impact the quality of life and/or occupation of the individual
    - Risk factor modification including smoking cessation, optimization of lipids, and glycemic control are part of the medical evaluation and management
    - Symptoms correspond with the location of arterial insufficiency
      - aorto-iliac -lower back, hip, buttock, or thigh
      - superficial femoral - claudication in the calf muscle area
      - popliteal - calf or foot
      - infra - popliteal arteries- ankle and foot
- Imaging performed prior to the planned procedure confirms location and degree of stenosis (≥50%) by objective criteria
- Treatment of target lesion will allow inline flow to the foot, with at least one run-off vessel

Note:

Intervention for below knee vessels is unsupported for the treatment of claudication

Non-indications

- Intervention for below knee vessels is **not** considered medically necessary for the treatment of claudication.
- Stent placement in infra-popliteal vessels is **not** considered medically necessary (rationale for stent placement must be thoroughly explained in the record in these cases)

Repeat intervention

- Re-intervention in an individual who has previously undergone angioplasty/stenting or bypass in the lower extremity arteries (aorto-iliac, superficial femoral and infra-popliteal arteries) for critical limb ischemia is considered medically necessary for any **one** of the following:
  - Previous Endovascular Intervention: Drop in ABI of ≥0.15 on routine surveillance or duplex ultrasound finding of peak systolic velocity (PSV) ≥190 cm/s or Velocity ratio ≥1.5 and **one** of the following:
    - Recurrence of rest pain and/or claudication as documented by clinical notes
    - Progression of wound as defined by any increase in size of the wound, new infection or lack of 50% area reduction in 4 weeks
  - Previous Lower Extremity Bypass: Drop in ABI of ≥0.15 on routine surveillance and **one** of the following:
    - Recurrence of rest pain and/or claudication as documented by clinical notes
    - Progression of wound as defined by any increase in size of the wound, new infection or lack of 50% area reduction in 4 weeks OR
    - If Vein bypass: PSV ≥180 cm/s or Velocity ratio ≥2, or end diastolic velocity (EDV) <45 cm/s
    - If Prosthetic bypass: low graft velocity <45 cm/s
- Re-intervention in a patient who has previously undergone angioplasty/stenting for claudication is appropriate when there is recurrent symptomatology in the setting of noninvasive studies demonstrating any of the following:
  - Drop in ABI of ≥0.15 or a drop from a normal ABI back to an abnormal ABI (<0.9)
  - Recurrent lesion seen on recent duplex ultrasound (within three months)
  - New lesion seen on recent duplex ultrasound (within three months)
- Stent placement in infra-popliteal vessels is almost never indicated and in those cases, the rationale for stent placement must be thoroughly explained in the record
- In asymptomatic individuals:
  - If Vein bypass: PSV ≥180 cm/s or Velocity ratio ≥2, or EDV <45 cm/s

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- If Prosthetic bypass: low graft velocity <45 cm/s
- Stent with high grade stenosis defined as PSV ≥275 cm/s or Velocity ratio ≥3.5

Atherectomy

Critical limb ischemia

Atherectomy is indicated for critical limb ischemia, including tissue loss and ischemic rest pain, AND the individual would otherwise satisfy criteria for intervention

Claudication

Atherectomy is indicated for claudication as an adjunct to angioplasty prior to stenting when all of the following are met:

- Criteria for intervention have been met
- Lesions result in ≥70% stenosis caused by a highly calcified eccentric plaque
- • Treatment of target lesion will establish inline flow to the foot, with at least 1 runoff vessel
- Lesion is 20cm or less in length
- Debulking to <30% diameter stenosis is attainable

Peripheral vascular, non-coronary stents non-indications

Stent placement in infrapopliteal vessels is not medically necessary except in rare cases where it is deemed necessary intraoperatively.

PTA or stent is **not** considered medically necessary in **either**:

- Individuals who are asymptomatic
- Lesions that are not high-grade or critical (≥50%)

Intravascular lithotripsy

Coding

Intravascular lithotripsy procedures	CPT®
Revascularization, endovascular, open or percutaneous, lower extremity artery(ies), except tibial/peroneal; with intravascular lithotripsy, includes angioplasty within the same vessel(s)	C9764

Intravascular lithotripsy procedures	CPT®
Revascularization, endovascular, open or percutaneous, lower extremity artery(ies), except tibial/peroneal; with intravascular lithotripsy and transluminal stent placement(s), and atherectomy, includes angioplasty within the same vessel(s)	C9767
Revascularization, endovascular, open or percutaneous, tibial/peroneal artery(ies), with intravascular lithotripsy, includes angioplasty within the same vessel (s), when performed	C9772

Intravascular lithotripsy non-indications

There is insufficient evidence to support the routine use of intravascular lithotripsy. It is considered to be investigational, experimental, or unproven.

Background and supporting information

Atherosclerotic plaque can lead to stenosis and even occlusion of the peripheral vasculature. High-grade stenosis can lead to chronic ischemia of the end tissue, with resultant symptoms of arterial insufficiency. In the lower extremities, this can lead to claudication and/or critical limb ischemia. Treatment of stenotic or occlusive lesions can be performed with angioplasty alone which involves placing a balloon through a wire across the lesion and dilating the lesion to residual stenosis of <30%. Stenting involves placing a metal stent permanent implant across a lesion dilating it with a balloon and leaving it in place effectively crushing and fixing the plaque against the arterial wall. Angioplasty can be performed alone or in conjunction with stenting. A stent may be placed as a planned adjunct to PTA rather than in response to a sub-optimal or failed PTA (so-called primary stent deployment).

Coverage for non-coronary vascular stents depends on the use of an FDA-approved stent for an FDA approved indication

Evidence Discussion

Failure of medical therapy to control hypertension in addition to duplex or CT/MR imaging that confirms renal artery stenosis is an indication for intervention. Some additional scenarios including fibromuscular dysplasia, renal artery dissection, acute renal failure due to flow-limiting lesions or renal artery stenosis associated with a transplanted kidney may also warrant intervention and are generally considered on a case-by-case basis. Endovascular techniques are the most common approach

for treatment of renal artery stenosis. Intervention is not indicated in the absence of uncontrolled hypertension. Additionally, findings consistent with advanced renal disease including hemodialysis and chronic renal artery occlusion are not recommended for intervention.

Peripheral arterial disease (PAD)

Peripheral arterial disease (PAD) is defined as chronic, atherosclerotic occlusive disease of the lower extremities. The vast majority of patients with PAD are asymptomatic. A much smaller group has symptomatic PAD, consisting of intermittent claudication(IC), rest pain or tissue loss.

The natural history of PAD for asymptomatic and IC patients is relatively benign. It is estimated that 7% (4%–11%) of asymptomatic patients deteriorate to IC over a 5-year period. Multiple studies have established that patients with IC are at very low risk of major amputation (<1% per year).

For these reasons, the first line of treatment for patient with IC is risk factor reduction/ modification and exercise therapy. A meta-analysis of 1200 patients determined that exercise therapy, compared with placebo or usual care, provides an overall improvement in walking ability of 50% to 200%, with improvements maintained for up to 2 years. Additionally, with intensive medical management, <5% of patients will develop symptoms of advanced ischemia, such as ischemic rest pain, tissue loss, or require amputation.

Indications for intervention

- Treatment of stenotic or occluded arteries perfusing the lower extremities for critical limb ischemia or intermittent claudication is medically necessary when **all** the following criteria are met for each indication:
  - Critical limb ischemia:
    - Documentation of non-healing wounds, gangrene or ischemic rest pain
    - Rest pain must be supported with ABI's <0.5 or monophasic waveforms on duplex studies
    - Imaging studies must confirm the location of disease and degree of stenosis (≥70%)
  - Intermittent claudication:
    - Failed three month trial of provider directed conservative therapy including structured walking program
    - Risk factor modification (smoking cessation, lipid and glycemic control)
    - Symptoms must correspond to the location of arterial insufficiency
    - Imaging confirms the location of disease, and degree of stenosis (>70%)

References

1. Almasri J, Adusumalli J, Asi N, et al. A systematic review and meta-analysis of revascularization outcomes of infrainguinal chronic limb-threatening ischemia. *J Vasc Surg*. 2018 Aug;68(2):624-633. doi:10.1016/j.jvs.2018.01.066.
2. Copelan AZ, Kapoor BS, AbuRahma AF, et al. ACR Appropriateness Criteria® Iliac Artery Occlusive Disease. *J Am Coll Radiol*. 2017;14(11). doi:10.1016/j.jacr.2017.08.039.
3. Frans FA, Bipat S, Reekers JA, Legemate DA, Koelemay MJ; SUPER Study Collaborators. SUPERvised exercise therapy or immediate PTA for intermittent claudication in patients with an iliac artery obstruction--a multicentre randomised controlled trial; SUPER study design and rationale. *Eur J Vasc Endovasc Surg*. 2012 Apr;43(4):466-71. doi:10.1016/j.ejvs.2012.01.014.
4. Huber TS, Björck M, Chandra A, et al. Chronic mesenteric ischemia: Clinical practice guidelines from the Society for Vascular Surgery. *J Vasc Surg*. 2021;73(1). doi:10.1016/j.jvs.2020.10.029.
5. Jaff MR, White CJ, Hiatt WR, et al. An update on methods for revascularization and expansion of the TASC lesion classification to include below-the-knee arteries: A supplement to the inter-society consensus for the management of peripheral arterial disease (TASC II): The TASC steering committee. *Catheter Cardiovasc Interv*. 2015 Oct;86(4):611-25. doi:10.1002/ccd.26122.
6. Parikh SA, Shishehbor MH, Gray BH, White CJ, Jaff MR. SCAI expert consensus statement for renal artery stenting appropriate use. *Catheter Cardiovasc Interv*. 2014 Dec 1;84(7):1163-71. doi:10.1002/ccd.25559.
7. Patel MR, Conte MS, Cutlip DE, et al. Evaluation and Treatment of Patients With Lower Extremity Peripheral Artery Disease. *J Am Coll Cardiol*. 2015;65(9):931-941. doi:10.1016/j.jacc.2014.12.036.
8. Prince M, Tafur JD, White CJ. When and How Should We Revascularize Patients With Atherosclerotic Renal Artery Stenosis? *JACC Cardiovasc Interv*. 2019 Mar 25;12(6):505-517. doi:10.1016/j.jcin.2018.10.023.
9. Usai MV, Bosiers MJ, Bisdas T, et al. Surgical versus endovascular revascularization of subclavian artery arteriosclerotic disease. *J Cardiovasc Surg* (Torino). 2020;61(1). doi:10.23736/s0021-9509.18.10144-3.
10. R. Eugene Zierler, MD et al. The Society for Vascular Surgery practice guidelines on follow-up after vascular surgery arterial procedures. J Vasc Surg 2018;68:256-84.
11. McKinsey JF, Zeller T, Rocha-Singh KJ, Jaff MR, Garcia LA. Lower extremity revascularization using directional atherectomy: 12-month prospective results of the DEFINITIVE LE study. JACC Cardiovasc Interv 2014;7:923-33
12. Dattilo R, Himmelstein SI, Cuff RF. The COMPLIANCE 360° Trial: a randomized, prospective, multicenter, pilot study comparing acute and long-term results of orbital atherectomy to balloon angioplasty for calcified femoropopliteal disease. *J Invasive Cardiol* 2014;26:355-60.
13. Tepe G, Brodmann M, Werner M, et al. Intravascular Lithotripsy for Peripheral Artery Calcification: 30-Day Outcomes From the Randomized Disrupt PAD III Trial. *JACC Cardiovasc Interv*. 2021;14(12):1352-1361. doi:10.1016/j.jcin.2021.04.010.
14. Tepe G, Brodmann M, Bachinsky W, et al. Intravascular Lithotripsy for Peripheral Artery Calcification: Mid-term Outcomes From the Randomized Disrupt PAD III Trial. *J Soc Cardiovasc Angiogr Interv*. Published online May 2022:100341. doi:10.1016/j.jscai.2022.100341.
15. Madhavan MV, Shahim B, Mena-Hurtado C, et al. Efficacy and safety of intravascular lithotripsy for the treatment of peripheral arterial disease: An individual patient-level pooled data analysis. *Catheter Cardiovasc Interv*. 2020;95(5):959-968. doi:10.1002/ccd.28729.
16. Adams G, Shammas N, Mangalmurti S, et al. Intravascular Lithotripsy for Treatment of Calcified Lower Extremity Arterial Stenosis: Initial Analysis of the Disrupt PAD III Study. *J Endovasc Ther.* 2020;27(3):473-480. doi:10.1177/1526602820914598.
17. Secemsky E, Mosarla RC, Rosenfield K, et al. Appropriate Use of Intravascular Ultrasound During Arterial and Venous Lower Extremity Interventions. *JACC Cardiovasc Interv*. 2022 Aug 8;15(15):1558-1568.
18. Kawaji Q, Dun C, Walsh C, et al. Index atherectomy peripheral vascular interventions performed for claudication are associated with more reinterventions than nonatherectomy interventions. *J Vasc Surg*. 2022;76(2):489-498.e4. doi:10.1016/j.jvs.2022.02.034.
19. Chowdhury M, Secemsky EA. Atherectomy vs Other Modalities for Treatment During Peripheral Vascular Intervention. *Curr Cardiol Rep*. 2022;24(7)869-877. doi10.1007s11886-022-01709-1.
20. Quevedo HC, Arain SA, Ali G, Abi Rafeh N. A critical view of the peripheral atherectomy data in the treatment of infrainguinal arterial disease. *J Invasive Cardiol*. 2014;26(1):22-29.

21. Neves PJ, Malgor EA, Kabeil M, Sobreira ML, Malgor RD. Atherectomy to treat femoropopliteal atherosclerotic disease. *J Cardiovasc Surg (Torino).* 2023;64(2):184-198. doi:10.23736/S0021-9509.23.12544-4.
22. Benfor B, Sinha K, Lumsden AB, Roy TL. Scoping review of atherectomy and intravascular lithotripsy with or without balloon angioplasty in below-the-knee lesions. *J Vasc Surg Cases Innov Tech*. 2023;9(2):101185. Published 2023 May 3. doi:10.1016/j.jvscit.2023.101185.
23. Cho S, Han A, Ahn S, et al. Directional Atherectomy for Treating In-Stent Restenosis of the Superficial Femoral Artery. *Vasc Specialist Int*. 2020;36(3):136-143. doi:10.5758/vsi.200017.
24. Bailey SR, Beckman JA, Dao TD, et al. ACC/AHA/SCAI/SIR/SVM 2018 Appropriate Use Criteria for Peripheral Artery Intervention: A Report of the American College of Cardiology Appropriate Use Criteria Task Force, American Heart Association, Society for Cardiovascular Angiography and Interventions, Society of Interventional Radiology, and Society for Vascular Medicine. *J Am Coll Cardiol*. 2019;73(2):214-237. doi:10.1016/j.jacc.2018.10.002.
25. Feldman DN, Armstrong EJ, Aronow HD, et al. SCAI consensus guidelines for device selection in femoral-popliteal arterial interventions. *Catheter Cardiovasc Interv.* 2018;92(1):124-140. doi:10.1002/ccd.27635.
26. Chaer RA, Abularrage CJ, Coleman DM, et al. The Society for Vascular Surgery clinical practice guidelines on the management of visceral aneurysms. J Vasc Surg. 2020;72(1S):3S-39S. doi:10.1016/j.jvs.2020.01.039.
27. Belkin N, Jackson BM, Foley PJ, et al. The use of intravascular ultrasound in the treatment of type B aortic dissection with thoracic endovascular aneurysm repair is associated with improved long-term survival. *J Vasc Surg*. 2020;72(2):490-497. doi:10.1016/j.jvs.2019.10.073.
28. McLafferty RB. The role of intravascular ultrasound in venous thromboembolism. *Semin Intervent Radiol*. 2012;29(1):10-15. doi:10.1055/s-0032-1302446.
29. Shammas NW, Radaideh Q, Shammas WJ, at al. The role of precise imaging with intravascular ultrasound in coronary and peripheral interventions. *Vasc Health Risk Manag*. 2019;15:283-290. Published 2019 Aug 7. doi:10.2147/VHRM.S210928.
30. Mahnken AH, Thomson K, de Haan M, O'Sullivan GJ. CIRSE Standards of Practice Guidelines on Iliocaval Stenting. Cardiovasc Intervent Radiol (2014) 37:889–897.
31. Taha MAH, et al. A clinical guide to deep venous stenting for chronic iliofemoral venous obstruction. J Vasc Surg Venous Lymphat Disord 2022. PMID: 34020107 Review.
32. Jayaraj A, Buck W, Knight A, Johns B and Raju S. Impact of degree of stenosis in May-Thurner syndrome on iliac vein stenting. *JVLS*. 2019 . 7(2):195-202
33. Echefu G, Stowe I, Lukan A, et al. Central vein stenosis in hemodialysis vascular access: clinical manifestations and contemporary management strategies. *Front Nephrol*. 2023 Nov 9;3:1280666. doi: 10.3389/fneph.2023.1280666.
34. Gloviczki P, Comerota AJ, Dalsing MC, et al. Society for Vascular Surgery; American Venous Forum. The care of patients with varicose veins and associated chronic venous diseases: clinical practice guidelines of the Society for Vascular Surgery and the American Venous Forum. *J Vasc Surg*. 2011 May;53(5 Suppl):2S-48S. doi: 10.1016/j.jvs.2011.01.079
35. Gloviczki P, Lawrence PF, Wasan SM, et al. The 2023 Society for Vascular Surgery, American Venous Forum, and American Vein and Lymphatic Society clinical practice guidelines for the management of varicose veins of the lower extremities. Part II: Endorsed by the Society of Interventional Radiology and the Society for Vascular Medicine. *J Vasc Surg Venous Lymphat Disord*. 2024 Jan;12(1):101670. doi: 10.1016/j.jvsv.2023.08.011. Epub 2023 Aug 29. PMID: 37652254
36. Sen I, Kalra M, Gloviczki P. Interventions for superior vena cava syndrome. J Cardiovasc Surg (Torino). 2022 Dec;63(6):674-681. doi: 10.23736/S0021-9509.22.12448-1. PMID: 36469045.
37. Aung EY, Khan M, Williams N, Raja U, Hamady M. Endovascular Stenting in Superior Vena Cava Syndrome: A Systematic Review and Meta-analysis. *Cardiovasc Intervent Radiol*. 2022 Sep;45(9):1236-1254. doi: 10.1007/s00270-022-03178-z.
38. Erben Y, Gloviczki P, Kalra M, et al. Treatment of nutcracker syndrome with open and endovascular interventions. *J Vasc Surg Venous Lymphat Disord*. 2015 Oct;3(4):389-396. doi: 10.1016/j.jvsv.2015.04.003.
39. Singhania P, Das TC, Bose C, et al. Toe brachial index and not ankle brachial index is appropriate in initial evaluation of peripheral arterial disease in type 2 diabetes. *Diabetol Metab Syndr*. 2024;16(1):52. Published 2024 Feb 27. doi:10.1186/s13098-024-01291-2.
40. Gerhard-Herman MD, Gornik HL, Barrett C, et al. 2016 AHA/ACC Guideline on the Management of Patients With Lower Extremity Peripheral Artery Disease: A Report of the American College of Cardiology/American

Heart Association Task Force on Clinical Practice Guidelines [published correction appears in *Circulation*. 2017 Mar 21;135(12):e791-e792. doi: 10.1161/CIR.0000000000000502].

41. Sigvant B, Lundin F, Wahlberg E. The Risk of Disease Progression in Peripheral Arterial Disease is Higher than Expected: A Meta-Analysis of Mortality and Disease Progression in Peripheral Arterial Disease. *Eur J Vasc Endovasc Surg*. 2016;51(3):395-403. doi:10.1016/j.ejvs.2015.10.022.
42. Conte MS, Pomposelli FB, Clair DG, et al. Society for Vascular Surgery practice guidelines for atherosclerotic occlusive disease of the lower extremities: management of asymptomatic disease and claudication [published correction appears in *J Vasc Surg*. 2015 May;61(5):1382]. *J Vasc Surg.* 2015;61(3 Suppl):2S-41S. doi:10.1016/j.jvs.2014.12.009.
43. Zierler RE, Jordan WD, Lal BK, et al. The Society for Vascular Surgery practice guidelines on follow-up after vascular surgery arterial procedures [published correction appears in *J Vasc Surg*. 2018 Nov;68(5):1623. doi: 10.1016/j.jvs.2018.09.019]. *J Vasc Surg*. 2018;68(1):256-284. doi:10.1016/j.jvs.2018.04.018.

Peripheral Vascular Intervention

Venous Intervention Guidelines

Guideline Page

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General Information for Venous Intervention Requests

PVI.200.A
v1.0.2024

General requirements

eviCore applies an evidence-based approach to evaluate the most appropriate medically necessary care for each patient. This evaluation requires submission of legible medical records pertinent to the test, treatment, or procedure requested by the provider.

Information to establish medical necessity

Medical necessity for the request cannot be established when the medical records provided cannot be read or do not include sufficiently detailed information to understand the individual's current clinical status.

Specific elements of an individual's medical records commonly required to establish medical necessity include, but are not limited to

- Recent (within 6 months) in-person clinical evaluation which includes a detailed history and physical examination
- Laboratory studies
- Imaging studies
- Pathology reports
- Procedure reports
- Reports from other providers participating in treatment of the relevant condition

Documentation requirements for venous intervention requests

Documentation requirements needed to complete a prior authorization request for vascular surgery include **ALL** of the following:

- Procedure proposed
- Condition being treated
- Detailed documentation of provider-directed conservative treatment, duration and frequency of treatment, as well as subjective results of the conservative therapy, and the response to such treatments

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- Recent (within 6 months) written reports (interpreted by an independent radiologist) of any of the following diagnostic imaging modalities acceptable for purposes of the Vascular Surgery guidelines:
  - Venous duplex ultrasound
  - CTV abdomen/pelvis
  - MRV abdomen/pelvis
  - Venogram
  - IVUS – intravascular ultrasound
- Recent (within 6 months) clinical evaluation documenting:
  - Patient symptoms
  - Physical exam findings

Background and supporting information

Prior-authorization requests should be submitted at least two weeks prior to the anticipated date of an elective venous surgery.

Multiple procedures may be indicated in a patient to treat venous disease. They can be performed simultaneously or sequentially. In general, the larger veins are treated first with the expectation that it might limit the amount of smaller procedures performed. However, the more symptomatic veins can be treated first.

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Treatment of Saphenovenous Reflux

PVI.201.C
v1.0.2024

General information

This section applies to the treatment of the following veins

- Greater saphenous vein
- Short saphenous vein
- Anterior Accessory Saphenous Vein
- Posterior Accessory Saphenous Vein

Endovenous ablation (thermal or non-thermal) or high ligation and stripping can be approved for the treatment of saphenovenous reflux

Coding

Procedures

Treatment options for saphenous vein ablation	CPT®
Thermal options	
Endovenous ablation therapy of incompetent vein, extremity, inclusive of all imaging guidance and monitoring, percutaneous, radiofrequency; first vein treated	36475
Endovenous ablation therapy of incompetent vein, extremity, inclusive of all imaging guidance and monitoring, percutaneous, radiofrequency; subsequent vein(s) treated in a single extremity, each through separate access sites (List separately in addition to code for primary procedure)	36476
Endovenous ablation therapy of incompetent vein, extremity, inclusive of all imaging guidance and monitoring, percutaneous, laser; first vein treated	36478
Endovenous ablation therapy of incompetent vein, extremity, inclusive of all imaging guidance and monitoring, percutaneous, laser; subsequent vein(s) treated in a single extremity, each through separate access sites (List separately in addition to code for primary procedure)	36479

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Treatment options for saphenous vein ablation	CPT®
Non-thermal options	
Endovenous ablation therapy of incompetent vein, extremity, by transcatheter delivery of a chemical adhesive (eg, cyanoacrylate) remote from the access site, inclusive of all imaging guidance and monitoring, percutaneous; first vein treated	36482
Endovenous ablation therapy of incompetent vein, extremity, by transcatheter delivery of a chemical adhesive (eg, cyanoacrylate) remote from the access site, inclusive of all imaging guidance and monitoring, percutaneous; subsequent vein(s) treated in a single extremity, each through separate access sites (List separately in addition to code for primary procedure)	36483
Endovenous ablation therapy of incompetent vein, extremity, inclusive of all imaging guidance and monitoring, percutaneous, mechanochemical; first vein treated	36473
Endovenous ablation therapy of incompetent vein, extremity, inclusive of all imaging guidance and monitoring, percutaneous, mechanochemical; subsequent vein(s) treated in a single extremity, each through separate access sites (List separately in addition to code for primary procedure)	36474
Injection of non-compounded foam sclerosant with ultrasound compression maneuvers to guide dispersion of the injectate, inclusive of all imaging guidance and monitoring; single incompetent extremity truncal vein (eg, great saphenous vein, accessory saphenous vein)	36465
Injection of non-compounded foam sclerosant with ultrasound compression maneuvers to guide dispersion of the injectate, inclusive of all imaging guidance and monitoring; multiple incompetent truncal veins (eg, great saphenous vein, accessory saphenous vein), same leg	36466
High ligation and stripping of the saphenous vein	
Ligation and division long saphenous vein at saphenofemoral junction, or distal interruptions	37700
Ligation, division, and stripping, short saphenous vein	37718

Treatment options for saphenous vein ablation	CPT®
Ligation, division, and stripping, long (greater) saphenous veins from saphenofemoral junction to knee or below	37722
Ligation and division and complete stripping of long or short saphenous veins with radical excision of ulcer and skin graft and/or interruption of communicating veins of lower leg with excision of deep fascia	37735
Ligation and division of short saphenous vein at saphenopopliteal junction (separate procedure)	37780

Saphenovenous Reflux Treatment- Criteria

Endovenous ablation is the preferred treatment for saphenovenous reflux. High ligation and stripping can be considered when prior imaging demonstrates a **relative contraindication** to endovenous ablation including any of the following:

- Tortuous saphenous vein
- Aneurysmal saphenous vein (>20mm)
- Presence of intraluminal calcified valves precluding placement of catheter

Treatment of saphenovenous reflux **is not** medically necessary for an asymptomatic state or for purposes of cosmesis.

Treatment of saphenovenous reflux is **medically necessary** when **both** of the following apply:

- Symptoms of venous reflux are documented by **one** of the following:
  - Venous ulcer of the lower leg
  - Bleeding
  - Superficial phlebitis
  - Documentation of **both** of the following:
    - Any of the following symptoms of venous reflux:
      - Significant pain, heaviness, achiness, fatigue, or throbbing of the lower extremity after prolonged standing
      - Refractory venous edema that interferes with activities of daily living (when other causes of lower extremity swelling have been excluded)
      - Stasis dermatitis
    - Trial of 8 weeks of conservative therapy, including graded compression stockings **and any** of the following (exercise, periodic elevation, and weight loss (if applicable)), was unsuccessful due to **any** of the following reasons:
      - No resolution of symptoms

  - Minimal improvement but continued lifestyle-limiting symptoms
  - Symptoms worsened with conservative treatment and was stopped
- Results of a recent venous duplex ultrasound (within 6 months before planned procedure) demonstrates **all** of the following:
  - Presence of significant pathologic reflux measuring at least 500ms within **any** of the following veins to be treated:
    - great saphenous vein
    - lesser saphenous vein
    - anterior accessory saphenous
    - posterior accessory saphenous vein
  - Absence of DVT

Background and supporting information

Endovenous ablation has been developed as a minimally invasive alternative to saphenous vein ligation and stripping. The procedure is designed to damage the intimal wall of the vein, resulting in fibrosis and subsequent obliteration of the lumen of a segment of the vessel thus eliminating reflux. Laser or radiofrequency ablation is performed by means of a specially designed catheter inserted through a small incision in the distal vein directed under ultrasound guidance to within 2 cm of the saphenofemoral junction. Laser or radiofrequency fibers on the tip of the catheter cause direct heating of the vessel wall, causing the vein to close as the catheter is slowly withdrawn.

Cyanoacrylate (VenaSeal™) closure is performed in a similar fashion, with small aliquots of glue placed along the course of the vein under ultrasound guidance, occluding the vein. Mechanochemical ablation is performed with the use of an oscillating catheter to disrupt the intima in conjunction with a sclerosant. Ablation with Varithena™ (polidocanol injectable foam) 1% is performed via injection of a non-compounded sclerosant into the vein via injection through a sheath or butterfly needle.

Since endovenous ablation via whatever method carries a 1% complication risk of DVT, a venous duplex ultrasound (CPT® 93970, 93971) to rule out an acute DVT can be approved within seven days of the procedure.

High ligation and stripping is a more invasive method of treating saphenous vein reflux than endovenous ablation and has been declining in frequency. This surgery involves tying off the great or small saphenous vein at its junction with the deep system and stripping all or a large segment of the vein essentially removing the dysfunctional vein from the body. High ligation and stripping of the saphenous vein can also be accompanied by phlebectomy of individual varicose vein tributaries.

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High ligation of the saphenous vein WITHOUT stripping should NOT be performed in the absence of stripping. High ligation of the saphenous vein in the absence of stripping has been shown to have a high rate or recurrence.

Peripheral Vascular Intervention

Treatment of Varicose Saphenous Vein Tributaries

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General Information

Saphenous vein tributaries and unnamed varicose veins ≥3mm with pathologic reflux ≥500ms include:

- Ambulatory phlebectomy – removal of the vein directly via small incisions
- Sclerotherapy – injection of a sclerosant agent, including non-compounded foam (Varithena), directly into the veins

Coding

Procedures indicated for treatment of saphenous vein tributaries and unnamed varicose veins	CPT®
Phlebectomy	
Stab phlebectomy of varicose veins, 1 extremity; 10-20 stab incisions	37765
Stab phlebectomy of varicose veins, 1 extremity; more than 20 incisions	37766
Ligation, division, and/or excision of varicose vein cluster(s), 1 leg	37785
Unlisted code, other arteries and vein	37799
Sclerotherapy	
Injection of non-compounded foam sclerosant with ultrasound compression maneuvers to guide dispersion of the injectate, inclusive of all imaging guidance and monitoring; single incompetent extremity truncal vein (eg, great saphenous vein, accessory saphenous vein)	36465

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Procedures indicated for treatment of saphenous vein tributaries and unnamed varicose veins	CPT®
Injection of non-compounded foam sclerosant with ultrasound compression maneuvers to guide dispersion of the injectate, inclusive of all imaging guidance and monitoring; multiple incompetent truncal veins (eg, great saphenous vein, accessory saphenous vein), same leg	36466
Injection(s) of sclerosant for spider veins (telangiectasia), limb or trunk	36468
Injection of sclerosant; single incompetent vein (other than telangiectasia)	36470
Injection of sclerosant; multiple incompetent veins (other than telangiectasia), same leg	36471

Treatment of varicose veins - criteria

Treatment is indicated when **all** of the following have been met:

- Results of a recent venous duplex ultrasound (completed within 6 months prior to date of scheduled procedure) demonstrate refluxing varicosities to be (**both**):
  - ≥3mm in size
  - With ≥500ms of reflux
- Documented symptoms/clinical findings of venous reflux include **any** of the following:
  - Significant pain, heaviness, achiness, fatigue, throbbing of the lower extremity after prolonged standing despite conservative therapy of ≥8 weeks
  - Refractory venous edema that interferes with activities of daily living with exclusion of other causes of lower extremity swelling
- Documentation includes history of **one** or more of the following:
  - Venous ulcer of the lower leg
  - Bleeding associated with varicosities of the lower extremities
  - Superficial phlebitis
  - Recent (within the last 6 months) trial of provider-directed 8 weeks of conservative therapy has failed due to (**any**):
    - No resolution of symptoms
    - Minimal improvement but continued lifestyle-limiting symptoms
    - Symptoms worsened and conservative treatment was stopped

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Individuals who have both documented axial vein reflux in the saphenous veins as well as non-saphenous varicose veins, treatment of the varicose veins (phlebectomy or sclerotherapy) is indicated **either**:

- Concurrently at time of treatment of the saphenous vein reflux
- After 6 weeks of observation if symptoms have failed to resolve (conservative therapy is not required)

Ambulatory phlebectomy and/or sclerotherapy <6 weeks after endovenous ablation is **not** considered medically necessary

Sclerotherapy of veins <3mm is indicated in certain cases as follows:

- The spider/reticular vein is symptomatic with spontaneous bleeding episodes
- Documented signs and symptoms of venous stasis disease ulceration and exhibits corona phlebectatica (spider veins at the ankle, predominantly the medial malleolus)

Background and supporting information

Phlebectomy involves the removal of individual varicose veins via small incisions in the skin and either via tying off or avulsing the vein. When saphenous vein reflux is present, this should be treated prior to phlebectomy.

Sclerotherapy treatment destroys the lining of the affected vein by injecting an irritant solution (either a detergent, osmotic solution, or a chemical irritant) directly into the vessel resulting in obliteration of the vessel. Types of sclerotherapy include liquid sclerotherapy with hypertonic saline, polidocanol or sotradecol or non compounded foam sclerotherapy (Varithena).

Post procedure assessment by imaging techniques is inappropriate to confirm efficacy or outcome of phlebectomy or sclerotherapy.

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References

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1. Biemans AAM, Kockaert M, Akkersdijk GP, et al. Comparing endovenous laser ablation, foam sclerotherapy, and conventional surgery for great saphenous varicose veins. *J Vasc Surg*. 2013; 58: 727-734.
2. Brittenden J, Cotton SC, Elders A, et al. A randomized trial comparing treatments for varicose veins. *N Engl J Med*. 2014; 371(13): 1218-1227. doi:10.1056/NEJMoa1400781.
3. Brittenden J, Cotton SC, Elders A, et al. Clinical effectiveness and cost-effectiveness of foam sclerotherapy, endovenous laser ablation and surgery for varicose veins: results from the Comparison of LAser, Surgery and foam Sclerotherapy (CLASS) randomised controlled trial. *Health Technol Assess*. 2015; 19(27): 1-342.
4. Gibson K, Kabnick L; Varithena® 013 Investigator Group. Gibson K, et al. A multicenter, randomized, placebo-controlled study to evaluate the efficacy and safety of Varithena® (polidocanol endovenous microfoam 1%) for symptomatic, visible varicose veins with saphenofemoral junction incompetence. *Phlebology*. 2017 Apr;32(3):185-193.
5. Harlander-Locke M, Lawrence PF, Alktaifi A, et.al. The impact of ablation of incompetent superficial and perforator veins on ulcer healing rates. *J Vasc Surg*, 2012 February.
6. Khilnani NM, Grassi CJ, Kundu S, et. al. Mulit-society Consensus Quality Improvement Guidelines for the Treatment of Lower-extremity Superficial Venous Insufficiency with Endovenous Thermal Ablation from the Society of Internventional Radiology, Cardiovascular Interventional Radiological Society of Europe, American College of Phlebology, and Canadian Interventional Radiology Association. *J Vasc Interv Radio*l, 2010; 21:14-31.
7. King JT, O'Byrne M, Vasquez M, for the VANISH-1 Investigator Group. Treatment of Truncal Incompetence and Varicose Veins with a Single Administration of a New Polidocanol Endovenous Microfoam Preparation Improves Symptoms and Appearance. *Eur J Vasc Endovasc Surg*. 2015; 50(6): 784-793.
8. Kugler NW and Brown KR. An update on the currently available nonthermal ablative options in the management of superficial venous disease. *J Vasc Surg: Venous and Lym Dis*. 2017; 5:422-429.
9. Min RJ, Khilnani N, Zimmet SE. Endovenous laser treatment of saphenous vein reflux: long-term results. *J Vasc Interv Radiol*. 2003; 14:991-6.
10. Myers KA, Jolley D, Clough A, et al. Outcome of ultrasound-guided sclerotherapy for varicose veins: medium-term results assessed by ultrasound surveillance. *Eur J Vasc Endovasc Surg*. 2007; 33: 116-121.
11. Nayak L, Vedantham S. Multifaceted Management of the Post Thrombotic Syndrome. *Seminars in Interventional Radiology*. 2012: 29:1.
12. Nesbitt C, Bedenis R, Bhattacharya V, et al. Endovenous ablation (radiofrequency and laser) and foam sclerotherapy versus open surgery for great saphenous vein varices (Review). *Cochrane Database of Systematic Reviews*. 2014; Issue 7. Art. No.CD005624.
13. Peden E, Lumsden A. Radiofrequency Ablation of Incompetent Perforator Veins. *Perspectives in Vascular Surgery and Endovascular Therapy* 2007; 19; 73-77.
14. Proebstle TM, Alm BJ, Göckeritz, et al. Five-year results from the prospective European multicenter cohort study on radiofrequency segmental thermal ablation for incompetent great saphenous veins. *BJS*. 2015; 102: 212-218.
15. Rasmussen L, Lawaetz M, Serup J, et al. Randomized clinical trial comparing endovenous laser ablation, radiofrequency ablation, foam sclerotherapy and surgical stripping for great saphenous varicose veins with 3-year follow-up. *J Vasc Surg: Venous and Lym Dis*. 2013; 1:349-356.
16. Star P, Connor DE, Parsi K. Star P, et al. Novel developments in foam sclerotherapy: Focus on Varithena® (polidocanol endovenous microfoam) in the management of varicose veins. *Phlebology.* 2018 Apr;33(3):150-162.
17. Tisi PV, Beverley C, Rees A. Injection sclerotherapy for varicose veins. *Cochrane Database Syst Rev*. 2006; 4:CD00132.

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18. Todd KL and Wright DI for the VANISH-2 Investigator Group. Durability of treatment effect with polidocanol endovenous microfoam on varicose vein symptoms and appearance (VANISH-2). *J Vasc Surg*. 2015; 3: 258-264.
19. Washington State Health Care Authority. Selected Treatments for Varicose Veins, A Health Technology Assessment. Prepared by Hayes, Inc. Final Report: April 2017.
20. van der Velden SK, Biemans AA, De Maeseneer MG, et al. Five-year results of a randomized clinical trial of conventional surgery, endovenous laser ablation and ultrasound-guided foam sclerotherapy in patients with great saphenous varicose veins. *Br J Surg*. 2015; 102(10): 1184-1194.
21. Weiss RA, Weiss MA, Eimpunth S, et al. Comparative Outcomes of Different Endovenous Thermal Ablation Systems on Great and Small Saphenous Vein Insufficiency: Long-Term Results. *Lasers in Surgery and Medicine*. 2015; 47: 156-160.
22. Van Eekeren RRJP, Boersma D, Elias S, et al. Endovenous Mechanochemical Ablation of Great Saphenous Vein Incompetence Using the ClariVein Device: A Safety Study. *J Endovasc Ther*, 2011; 18: 328-3334.
23. Van Eekeren RRJP, Boersma D, Holewijn S, et al. Mechanochemical endovenous ablation for the treatment of great saphenous vein insufficiency. *J Vasc Surg: Venous and Lym Dis*., Volume 2; 3, 282-288.
24. Van Eekeren RRJP, Boersma D, Konijn V, et al. Postoperative pain and early quality of life after radiofrequency ablation and mechanochemical endovenous ablation of incompetent great saphenous veins. *J VascSurg*, February 2013, Volume 57; 2, 445-450
25. Venermo M, Saarinen J, Eskelinen E, et al. Randomized clinical trial comparing surgery, endovenous laser ablation and ultrasound-guided foam sclerotherapy for the treatment of great saphenous varicose veins. *BJS*. 2016; 103:1438-1444.
26. Vun SV, Rashid ST, Blest NC, Spark JI. Lower pain and faster treatment with mechanico-chemical endovenous ablation using ClariVein®. *Phlebology*. 2015;30(10):688-692. doi:10.1177/0268355514553693.
27. Gloviczki P, Lawrence PF, Wasan SM, et al. The 2023 Society for Vascular Surgery, American Venous Forum, and American Vein and Lymphatic Society clinical practice guidelines for the management of varicose veins of the lower extremities. Part II: Endorsed by the Society of Interventional Radiology and the Society for Vascular Medicine. *J Vasc Surg Venous Lymphat Disord*. 2024 Jan;12(1):101670. doi: 10.1016/j.jvsv.2023.08.011.
28. Sen I, Kalra M, Gloviczki P. Interventions for superior vena cava syndrome. J Cardiovasc Surg (Torino). 2022 Dec;63(6):674-681. doi: 10.23736/S0021-9509.22.12448-1.
29. Aung EY, Khan M, Williams N, Raja U, Hamady M. Endovascular Stenting in Superior Vena Cava Syndrome: A Systematic Review and Meta-analysis. *Cardiovasc Intervent Radiol*. 2022 Sep;45(9):1236-1254. doi: 10.1007/s00270-022-03178-z.
30. Erben Y, Gloviczki P, Kalra M, et al. Treatment of nutcracker syndrome with open and endovascular interventions. *J Vasc Surg Venous Lymphat Disord*. 2015 Oct;3(4):389-396. doi: 10.1016/j.jvsv.2015.04.003.
31. Madden N, Calligaro KD, Dougherty MJ, Maloni K, Troutman DA. Evolving strategies for the management of venous thoracic outlet syndrome. J Vasc Surg Venous Lymphat Disord. 2019 Nov;7(6):839-844. doi:10.1016/j.jvsv.2019.05.012.
32. de Boer M, Shiraev T, Saha P, Dubenec S. Medium Term Outcomes of Deep Venous Stenting in the Management of Venous Thoracic Outlet Syndrome. *Eur J Vasc Endovasc Surg*. 2022 Dec;64(6):712-718. doi: 10.1016/j.ejvs.2022.08.019.
33. Hu X, Li B, Mao J, Hu X, et al. Hemodialysis Arteriovenous Fistula Dysfunction: Retrospective Comparison of Post-thrombotic Percutaneous Endovascular Interventions with Pre-emptive Angioplasty. *Ann Vasc Surg*. 2022 Aug;84:286-297. doi: 10.1016/j.avsg.2022.01.023.
34. Mahnken AH, Thomson K, de Haan M, O'Sullivan GJ. CIRSE Standards of Practice Guidelines on Iliocaval Stenting. *Cardiovasc Intervent Radiol* (2014) 37:889–897.
35. Taha MAH, et al. A clinical guide to deep venous stenting for chronic iliofemoral venous obstruction. *J Vasc Surg Venous Lymphat Disord* 2022.
36. Jayaraj A, Buck W, Knight A, Johns B and Raju S. Impact of degree of stenosis in May-Thurner syndrome on iliac vein stenting. *JVLS*. 2019 . 7(2):195-202.
37. Desai KR, Sabri SS, Elias S, et al. Consensus Statement on the Management of Nonthrombotic Iliac Vein Lesions From the VIVA Foundation, the American Venous Forum, and the American Vein and Lymphatic Society. *Circ Cardiovasc Interv*. 2024 Aug;17(8):e014160. doi:10.1161/CIRCINTERVENTIONS.124.014160.

Treatment of Pathologic Perforators

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General information

Perforator veins perforate the deep fascia to connect superficial veins to deep veins.

Treatment of pathologic perforators (≥3.5 mm in size with ≥500 ms of pathologic reflux) is via

- Endovenous ablation – insertion of a catheter emitting radiofrequency or laser that ablates the perforator
- Sub-fascial endoscopic perforator surgery – a minimally invasive procedure that involves ligating pathologic perforators
- US guided sclerotherapy

Coding

Procedures Treatment of pathologic perforators	CPT®
Endovenous Ablation	
Injection of non-compounded foam sclerosant with ultrasound compression maneuvers to guide dispersion of the injectate, inclusive of all imaging guidance and monitoring; single incompetent extremity truncal vein (e.g., great saphenous vein, accessory saphenous vein)	36465
Injection of non-compounded foam sclerosant with ultrasound compression maneuvers to guide dispersion of the injectate, inclusive of all imaging guidance and monitoring; multiple incompetent truncal veins (e.g., great saphenous vein, accessory saphenous vein), same leg	36466
Endovenous ablation therapy of incompetent vein, extremity, inclusive of all imaging guidance and monitoring, percutaneous, radiofrequency; first vein treated	36475
Endovenous ablation therapy of incompetent vein, extremity, inclusive of all imaging guidance and monitoring, percutaneous, radiofrequency; subsequent vein(s) treated in a single extremity, each through separate access sites (List separately in addition to code for primary procedure)	36476
Endovenous ablation therapy of incompetent vein, extremity, inclusive of all imaging guidance and monitoring, percutaneous, laser; first vein treated	36478

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Procedures Treatment of pathologic perforators	CPT®
Endovenous ablation therapy of incompetent vein, extremity, inclusive of all imaging guidance and monitoring, percutaneous, laser; subsequent vein(s) treated in a single extremity, each through separate access sites (List separately in addition to code for primary procedure)	36479
Endovenous ablation therapy of incompetent vein, extremity, by transcatheter delivery of a chemical adhesive (e.g., cyanoacrylate) remote from the access site, inclusive of all imaging guidance and monitoring, percutaneous; first vein treated	36482
Endovenous ablation therapy of incompetent vein, extremity, by transcatheter delivery of a chemical adhesive (e.g., cyanoacrylate) remote from the access site, inclusive of all imaging guidance and monitoring, percutaneous; subsequent vein(s) treated in a single extremity, each through separate access sites (List separately in addition to code for primary procedure)	36483
Endovenous ablation therapy of incompetent vein, extremity, inclusive of all imaging guidance and monitoring, percutaneous, mechanochemical; first vein treated	36473
Endovenous ablation therapy of incompetent vein, extremity, inclusive of all imaging guidance and monitoring, percutaneous, mechanochemical; subsequent vein(s) treated in a single extremity, each through separate access sites (List separately in addition to code for primary procedure)	36474
Sub-fascial endoscopic perforator surgery (SEPS)	
Vascular endoscopy, surgical, with ligation of perforator veins, subfascial (SEPS)	37500
Unlisted vascular endoscopy procedure	37501
Ligation of perforator veins	
Ligation of perforator veins, subfascial, radical (Linton type), including skin graft, when performed, open, 1 leg	37760
Ligation of perforator vein(s), subfascial, open, including ultrasound guidance, when performed, 1 leg	37761

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Treatment of pathologic perforators- criteria

Indications

Treatment of pathologic perforators is medically necessary when there is documentation of **all** of the following:

- Venous stasis ulcer
- A recent duplex US performed within past 6 months demonstrates signs of perforator vein incompetence with **both**:
  - Reflux ≥500ms
  - Vein diameter ≥3.5 mm
- Perforator vein is located in the vicinity of an active ulcer
- Superficial refluxing saphenous veins have been previously eliminated or do not exhibit pathologic reflux

Background and supporting

Treatment of pathologic perforators

Perforating veins extend medially to laterally in a horizontal fashion and are located at numerous locations throughout the lower extremity and directly connect the superficial system to the deep system. Perforating veins usually penetrate the musculature to connect the superficial and deep venous systems. Pathologic perforators located directly under the wound bed of a non-healing ulcer can cause delays in wound healing and treatment can expedite closure of the wound. Treatment of pathologic perforators is not medically necessary for any other pathology other than active venous stasis ulcer.

Sub-fascial endoscopic perforator surgery (SEPS) is a procedure used to ameliorate the venous hypertension that contributes to the formation and delayed healing of venous stasis ulcers. Via an endoscope through a small incision, an instrument is used to either ablate or ligate the pathologic perforator.

References

1. Grover G, Tanase A, Elstone A, Ashley S. Chronic venous leg ulcers: Effects of foam sclerotherapy on healing and recurrence. *Phlebology*. 2016;31(1):34-41. doi:10.1177/0268355514557854.
2. Lawrence PF, Alktaifi A, Rigberg D, DeRubertis B, Gelabert H, Jimenez JC. Endovenous ablation of incompetent perforating veins is effective treatment for recalcitrant venous ulcers. *J Vasc Surg*. 2011;54(3):737-742. doi:10.1016/j.jvs.2011.02.068.
3. de Rijcke PA, Hop WC, Wittens CH. Subfascial endoscopic perforating vein surgery as treatment for lateral perforating vein incompetence and venous ulceration. *J Vasc Surg*. 2003;38(4):799-803. doi:10.1016/s0741-5214(03)00430-0.

4. Giannopoulos S, Rodriguez L, Chau M, et al. A systematic review of the outcomes of percutaneous treatment modalities for pathologic saphenous and perforating veins. *J* Vasc Surg Venous Lymphat Disord. 2022;10(5):1172-1183.e5. doi:10.1016/j.jvsv.2022.03.005.
5. Ho VT, Adkar SS, Harris EJ Jr. Systematic review and meta-analysis of management of incompetent perforators in patients with chronic venous insufficiency. *J Vasc Surg Venous Lymphat Disord*. 2022;10(4):955-964.e5. doi:10.1016/j.jvsv.2021.12.088.
6. Montminy ML, Jayaraj A, Raju S. A systematic review of the efficacy and limitations of venous intervention in stasis ulceration. *J Vasc Surg Venous Lymphat Disord*. 2018;6(3):376-398.e1. doi:10.1016/j.jvsv.2017.11.007.
7. Gloviczki P, Lawrence PF, Wasan SM, et al. The 2022 Society for Vascular Surgery, American Venous Forum, and American Vein and Lymphatic Society clinical practice guidelines for the management of varicose veins of the lower extremities. Part I. Duplex Scanning and Treatment of Superficial Truncal Reflux: Endorsed by the Society for Vascular Medicine and the International Union of Phlebology. *J Vasc Surg Venous Lymphat Disord*. 2023;11(2):231-261.e6. doi:10.1016/j.jvsv.2022.09.004.

Peripheral Vascular Intervention

Treatment of Venous Compression Syndromes

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General information

Conditions treated

- Iliac vein stenosis/occlusion secondary to chronic DVT, stricture, or compression with May-Thurner
- Thoracic Outlet Syndrome (TOS)
- Catheter or cardiac device related Venous outflow obstruction
- Pulmonary Vein Stenosis
- Superior Vena Cava Syndrome
- Left Renal Vein Compression (Nutcracker Syndrome)
- Hepatic Vein Thrombosis (Budd-Chiari)

Coding

Procedures performed for iliac vein stenosis/occlusion/compression

Iliac vein angioplasty/stenting	CPT®
Transcatheter placement of an intravascular stent(s), open or percutaneous, including radiological supervision and interpretation and including angioplasty within the same vessel, when performed; initial vein	37238
Transcatheter placement of an intravascular stent(s), open or percutaneous, including radiological supervision and interpretation and including angioplasty within the same vessel, when performed; each additional vein (List separately in addition to code for primary procedure)	37239
Transluminal balloon angioplasty (except dialysis circuit), open or percutaneous, including all imaging and radiological supervision and interpretation necessary to perform the angioplasty within the same vein; initial vein	37248

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Iliac vein angioplasty/stenting	CPT®
Transluminal balloon angioplasty (except dialysis circuit), open or percutaneous, including all imaging and radiological supervision and interpretation necessary to perform the angioplasty within the same vein; each additional vein (List separately in addition to code for primary procedure)	37249

Iliac vein and Inferior Vena Cava (IVC) angioplasty/stenting (including May-Thurner)

Indications

- Iliac vein angioplasty/stenting is indicated when there is documentation of the presence of one of the following conditions:
  - Acute lower extremity iliofemoral DVT with underlying iliac vein or Inferior Vena Cava (IVC) compression with ≥50% residual stenosis following thrombolysis or mechanical thrombectomy
  - Non-thrombotic iliac vein or IVC stenosis of ≥50% area reduction or >60% diameter stenosis with presence of venous collaterals when there is documentation of either venous stasis ulceration or advanced stasis dermatitis
  - Venous claudication or lifestyle-limiting asymmetric lower extremity edema when there is documentation of **both** of the following:
    - No identifiable underlying non-vascular cause
    - Failed 8 weeks trial of conservative therapy including graded compression stockings, weight loss (if applicable) as evidenced by (any) of the following:
      - No improvement
      - Worsening of symptoms
      - Limited improvement with continued lifestyle-limiting symptoms

Upper Extremity Venous angioplasty/stenting for Venous Occlusive Disease Thoracic Outlet Syndrome (TOS)

Axillary vein and/or subclavian Vein angioplasty/stenting is indicated when there is documentation of the presence of one of the following conditions:

- Acute Axillary and/or subclavian vein DVT with axillary or subclavian vein compression with 50% residual stenosis following thrombolysis and decompression for treatment of associated musculoskeletal abnormality such as first rib resection, cervical rib resection and/or scalenectomy

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- Non-thrombotic axillary vein or subclavian vein stenosis of 50% or more with presence of venous collaterals, following treatment of associated musculoskeletal abnormality such as first rib resection, cervical rib resection and/or scalenectomy

Catheter or cardiac device related Venous outflow obstruction

Venous angioplasty of upper extremity outflow veins is indicated when there is documentation of >50% stenosis of the outflow vein or ipsilateral central venous stenosis under the following conditions:

- Presence of ipsilateral arm edema and/or venous claudication

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Note:

Venous stenting should be avoided in cases with an indwelling device present in vein

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Pulmonary vein stenosis

Thrombotic obstruction of major pulmonary veins is medically necessary when >50% stenosis is identified on venogram or IVUS.

Superior Vena Cava Syndrome

Venous angioplasty and stenting is indicated when there is evidence of >50% stenosis in the superior vena cava under the following conditions:

- Palliative care when SVC syndrome is secondary to advanced malignancy
- Non-malignant SVC syndrome when **both** of the following are met:
  - Presence of lifestyle-limiting signs or symptoms such as any of the following:
    - Orthopnea
    - Swelling of head and neck
    - Dizziness
    - Blurring of vision
  - Failure of symptoms to resolve with conservative therapy including **any** of the following:
    - Elevation of head of bed
    - Diuretic therapy
    - Anticoagulation therapy

Left Renal Vein Compression (Nutcracker Syndrome)

Angioplasty or stenting of the left renal vein for primary treatment of nutcracker syndrome is **not** indicated.

Initial treatment of left renal vein compression prior to surgical decompression is **not** indicated.

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Angioplasty and/or stenting is indicated for **re-intervention** when there is recurrent, symptomatic left renal vein compression following surgical treatment.

Hepatic vein thrombosis

Thrombotic obstruction of major hepatic veins or Vena Cava (Budd-Chiari Syndrome) is medically necessary when there is a >50% stenosis identified on venogram or IVUS.

Idiopathic intracranial hypertension

Treatment of idiopathic intracranial hypertension with venous angioplasty and/or stenting is considered not medically necessary.

Background and supporting information

Individuals with incompletely lysed or residual DVT can develop post-thrombotic syndrome that can be characterized as chronic edema, venous stasis changes, pain and, in advanced cases venous stasis ulceration.

Incompletely lysed DVT can cause luminal narrowing of the vein restricting venous outflow leading to stenosis or occlusion and /or can lead to valve dysfunction resulting in reflux of venous blood retrograde towards gravity. Both pathologies ultimately lead to chronic edema which can cause chronic pain and venous stasis disease. The mainstay of treatment for chronic deep venous thrombosis is compression stockings. Individuals whose symptoms are not relieved with conservative therapy may be a candidates for iliac vein angioplasty/stenting.

Iliac vein compression is an entity known as May-Thurner syndrome and affects the left iliac vein which can lead to chronic edema, varicose veins and venous stasis ulceration. In approximately 25% of people, the right iliac artery overlies the left iliac vein over the fifth lumbar vertebra and its pulsations can compress the vein increasing the risk of DVT in the left extremity. Treatment is with iliac vein angioplasty/stenting for both acute and chronic left-sided DVT. Prophylactic treatment of May-Thurner syndrome in the absence of acute or chronic DVT OR chronic left lower extremity edema and its sequelae such as varicose veins or venous stasis ulcers is NOT considered medically necessary.

Venous thoracic outlet syndrome occurs due to compression of the axillo-subclavian vein secondary to musculoskeletal compression at the thoracic outlet. This may be due to congenital factors such as cervical ribs, secondary to prior trauma or due to hypertrophy of the scalene muscles from repetitive use or weightlifting activities. This may lead to acute thrombosis or chronic pain and edema with use of the extremity. Management consists of treatment for the acute DVT if present followed by surgical correction of the musculoskeletal issue by rib resection and/or scalenectomy. There is often intraluminal scarring within the vein that is treated by balloon angioplasty. Stenting

is rarely medically necessary except for persistent stenosis that is resistant to balloon angioplasty.

Catheter or cardiac device related stenosis may occur secondary to inflammation within the vein due to the indwelling foreign body. Significant stenosis resulting in arm edema, pain and DVT may occur. Balloon angioplasty may be performed to treat a significant stenosis. Stenting should be avoided as the stent may impede removal or exchange of the catheter or device at a later date.

Pulmonary vein stenosis may occur as a congenital defect in children or following catheter based interventions such as radiofrequency ablation for cardiac arrhythmia in children or adults. Balloon angioplasty is the initial treatment and often will need to be repeated due to high rates of recurrent stenosis.

Superior vena cava syndrome may occur secondary to compression by an intrathoracic malignancy or secondary to benign causes of compression or stenosis. The subsequent venous hypertension may result in intracranial symptoms and orthopnea with edema of the head, face and upper extremities. Balloon angioplasty is the initial treatment with stenting often being required for palliation in cases of malignancy or recurrent stenosis.

Left renal vein compression (Nutcracker Syndrome) occurs secondary to an anatomically compression of the left renal vein between the superior mesenteric artery and the aorta. This may lead to venous congestion within the left kidney due to the impaired outflow. Symptoms and signs include flank pain, hematuria and proteinuria. Significant stenosis may be identified on ultrasound, CT, MRI or venogram. Primary treatment is surgical correction via renal vein transposition or bypass. Catheter based interventions such as balloon angioplasty and stenting are reserved for cases of recurrent stenosis following surgical correction

Hepatic vein thrombosis may occur secondary to malignancies, acquired prothrombotic disorders, infection or inherited thrombophilias. The resulting outflow obstruction from the liver may result in severe portal hypertension or liver failure. Balloon angioplasty is associated with good outcomes and low morbidity in cases with hepatic vein stenosis.

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References

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1. Biemans AAM, Kockaert M, Akkersdijk GP, et al. Comparing endovenous laser ablation, foam sclerotherapy, and conventional surgery for great saphenous varicose veins. *J Vasc Surg*. 2013; 58: 727-734.
2. Brittenden J, Cotton SC, Elders A, et al. A randomized trial comparing treatments for varicose veins. *N Engl J Med*. 2014; 371(13): 1218-1227. doi:10.1056/NEJMoa1400781.
3. Brittenden J, Cotton SC, Elders A, et al. Clinical effectiveness and cost-effectiveness of foam sclerotherapy, endovenous laser ablation and surgery for varicose veins: results from the Comparison of LAser, Surgery and foam Sclerotherapy (CLASS) randomised controlled trial. *Health Technol Assess*. 2015; 19(27): 1-342.
4. Gibson K, Kabnick L; Varithena® 013 Investigator Group. Gibson K, et al. A multicenter, randomized, placebo-controlled study to evaluate the efficacy and safety of Varithena® (polidocanol endovenous microfoam 1%) for symptomatic, visible varicose veins with saphenofemoral junction incompetence. *Phlebology*. 2017 Apr;32(3):185-193.
5. Harlander-Locke M, Lawrence PF, Alktaifi A, et.al. The impact of ablation of incompetent superficial and perforator veins on ulcer healing rates. *J Vasc Surg*, 2012 February.
6. Khilnani NM, Grassi CJ, Kundu S, et. al. Mulit-society Consensus Quality Improvement Guidelines for the Treatment of Lower-extremity Superficial Venous Insufficiency with Endovenous Thermal Ablation from the Society of Internventional Radiology, Cardiovascular Interventional Radiological Society of Europe, American College of Phlebology, and Canadian Interventional Radiology Association. *J Vasc Interv Radio*l, 2010; 21:14-31.
7. King JT, O'Byrne M, Vasquez M, for the VANISH-1 Investigator Group. Treatment of Truncal Incompetence and Varicose Veins with a Single Administration of a New Polidocanol Endovenous Microfoam Preparation Improves Symptoms and Appearance. *Eur J Vasc Endovasc Surg*. 2015; 50(6): 784-793.
8. Kugler NW and Brown KR. An update on the currently available nonthermal ablative options in the management of superficial venous disease. *J Vasc Surg: Venous and Lym Dis*. 2017; 5:422-429.
9. Min RJ, Khilnani N, Zimmet SE. Endovenous laser treatment of saphenous vein reflux: long-term results. *J Vasc Interv Radiol*. 2003; 14:991-6.
10. Myers KA, Jolley D, Clough A, et al. Outcome of ultrasound-guided sclerotherapy for varicose veins: medium-term results assessed by ultrasound surveillance. *Eur J Vasc Endovasc Surg*. 2007; 33: 116-121.
11. Nayak L, Vedantham S. Multifaceted Management of the Post Thrombotic Syndrome. *Seminars in Interventional Radiology*. 2012: 29:1.
12. Nesbitt C, Bedenis R, Bhattacharya V, et al. Endovenous ablation (radiofrequency and laser) and foam sclerotherapy versus open surgery for great saphenous vein varices (Review). *Cochrane Database of Systematic Reviews*. 2014; Issue 7. Art. No.CD005624.
13. Peden E, Lumsden A. Radiofrequency Ablation of Incompetent Perforator Veins. *Perspectives in Vascular Surgery and Endovascular Therapy* 2007; 19; 73-77.
14. Proebstle TM, Alm BJ, Göckeritz, et al. Five-year results from the prospective European multicenter cohort study on radiofrequency segmental thermal ablation for incompetent great saphenous veins. *BJS*. 2015; 102: 212-218.
15. Rasmussen L, Lawaetz M, Serup J, et al. Randomized clinical trial comparing endovenous laser ablation, radiofrequency ablation, foam sclerotherapy and surgical stripping for great saphenous varicose veins with 3-year follow-up. *J Vasc Surg: Venous and Lym Dis*. 2013; 1:349-356.
16. Star P, Connor DE, Parsi K. Star P, et al. Novel developments in foam sclerotherapy: Focus on Varithena® (polidocanol endovenous microfoam) in the management of varicose veins. *Phlebology.* 2018 Apr;33(3):150-162.
17. Tisi PV, Beverley C, Rees A. Injection sclerotherapy for varicose veins. *Cochrane Database Syst Rev*. 2006; 4:CD00132.

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18. Todd KL and Wright DI for the VANISH-2 Investigator Group. Durability of treatment effect with polidocanol endovenous microfoam on varicose vein symptoms and appearance (VANISH-2). *J Vasc Surg*. 2015; 3: 258-264.
19. Washington State Health Care Authority. Selected Treatments for Varicose Veins, A Health Technology Assessment. Prepared by Hayes, Inc. Final Report: April 2017.
20. van der Velden SK, Biemans AA, De Maeseneer MG, et al. Five-year results of a randomized clinical trial of conventional surgery, endovenous laser ablation and ultrasound-guided foam sclerotherapy in patients with great saphenous varicose veins. *Br J Surg*. 2015; 102(10): 1184-1194.
21. Weiss RA, Weiss MA, Eimpunth S, et al. Comparative Outcomes of Different Endovenous Thermal Ablation Systems on Great and Small Saphenous Vein Insufficiency: Long-Term Results. *Lasers in Surgery and Medicine*. 2015; 47: 156-160.
22. Van Eekeren RRJP, Boersma D, Elias S, et al. Endovenous Mechanochemical Ablation of Great Saphenous Vein Incompetence Using the ClariVein Device: A Safety Study. *J Endovasc Ther*, 2011; 18: 328-3334.
23. Van Eekeren RRJP, Boersma D, Holewijn S, et al. Mechanochemical endovenous ablation for the treatment of great saphenous vein insufficiency. *J Vasc Surg: Venous and Lym Dis*., Volume 2; 3, 282-288.
24. Van Eekeren RRJP, Boersma D, Konijn V, et al. Postoperative pain and early quality of life after radiofrequency ablation and mechanochemical endovenous ablation of incompetent great saphenous veins. *J VascSurg*, February 2013, Volume 57; 2, 445-450
25. Venermo M, Saarinen J, Eskelinen E, et al. Randomized clinical trial comparing surgery, endovenous laser ablation and ultrasound-guided foam sclerotherapy for the treatment of great saphenous varicose veins. *BJS*. 2016; 103:1438-1444.
26. Vun SV, Rashid ST, Blest NC, Spark JI. Lower pain and faster treatment with mechanico-chemical endovenous ablation using ClariVein®. *Phlebology*. 2015;30(10):688-692. doi:10.1177/0268355514553693.
27. Gloviczki P, Lawrence PF, Wasan SM, et al. The 2023 Society for Vascular Surgery, American Venous Forum, and American Vein and Lymphatic Society clinical practice guidelines for the management of varicose veins of the lower extremities. Part II: Endorsed by the Society of Interventional Radiology and the Society for Vascular Medicine. *J Vasc Surg Venous Lymphat Disord*. 2024 Jan;12(1):101670. doi: 10.1016/j.jvsv.2023.08.011.
28. Sen I, Kalra M, Gloviczki P. Interventions for superior vena cava syndrome. J Cardiovasc Surg (Torino). 2022 Dec;63(6):674-681. doi: 10.23736/S0021-9509.22.12448-1.
29. Aung EY, Khan M, Williams N, Raja U, Hamady M. Endovascular Stenting in Superior Vena Cava Syndrome: A Systematic Review and Meta-analysis. *Cardiovasc Intervent Radiol*. 2022 Sep;45(9):1236-1254. doi: 10.1007/s00270-022-03178-z.
30. Erben Y, Gloviczki P, Kalra M, et al. Treatment of nutcracker syndrome with open and endovascular interventions. *J Vasc Surg Venous Lymphat Disord*. 2015 Oct;3(4):389-396. doi: 10.1016/j.jvsv.2015.04.003.
31. Madden N, Calligaro KD, Dougherty MJ, Maloni K, Troutman DA. Evolving strategies for the management of venous thoracic outlet syndrome. J Vasc Surg Venous Lymphat Disord. 2019 Nov;7(6):839-844. doi:10.1016/j.jvsv.2019.05.012.
32. de Boer M, Shiraev T, Saha P, Dubenec S. Medium Term Outcomes of Deep Venous Stenting in the Management of Venous Thoracic Outlet Syndrome. *Eur J Vasc Endovasc Surg*. 2022 Dec;64(6):712-718. doi: 10.1016/j.ejvs.2022.08.019.
33. Hu X, Li B, Mao J, Hu X, et al. Hemodialysis Arteriovenous Fistula Dysfunction: Retrospective Comparison of Post-thrombotic Percutaneous Endovascular Interventions with Pre-emptive Angioplasty. *Ann Vasc Surg*. 2022 Aug;84:286-297. doi: 10.1016/j.avsg.2022.01.023.
34. Mahnken AH, Thomson K, de Haan M, O'Sullivan GJ. CIRSE Standards of Practice Guidelines on Iliocaval Stenting. *Cardiovasc Intervent Radiol* (2014) 37:889–897.
35. Taha MAH, et al. A clinical guide to deep venous stenting for chronic iliofemoral venous obstruction. *J Vasc Surg Venous Lymphat Disord* 2022.
36. Jayaraj A, Buck W, Knight A, Johns B and Raju S. Impact of degree of stenosis in May-Thurner syndrome on iliac vein stenting. *JVLS*. 2019 . 7(2):195-202.
37. Desai KR, Sabri SS, Elias S, et al. Consensus Statement on the Management of Nonthrombotic Iliac Vein Lesions From the VIVA Foundation, the American Venous Forum, and the American Vein and Lymphatic Society. *Circ Cardiovasc Interv*. 2024 Aug;17(8):e014160. doi:10.1161/CIRCINTERVENTIONS.124.014160.

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Vascular Embolization

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Vascular Embolization

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Coding

Vascular embolization codes	CPT®
Vascular embolization or occlusion, inclusive of all radiological supervision and interpretation, intraprocedural roadmapping, and imaging guidance necessary to complete the intervention; venous, other than hemorrhage (e.g., congenital or acquired venous malformations, venous and capillary hemangiomas, varices, varicoceles)	37241
Vascular embolization or occlusion, inclusive of all radiological supervision and interpretation, intraprocedural roadmapping, and imaging guidance necessary to complete the intervention; arterial, other than hemorrhage or tumor (e.g., congenital or acquired arterial malformations, arteriovenous malformations, arteriovenous fistulas, aneurysms, pseudoaneurysms)	37242
Vascular embolization or occlusion, inclusive of all radiological supervision and interpretation, intraprocedural roadmapping, and imaging guidance necessary to complete the intervention; for tumors, organ ischemia, or infarction	37243
Vascular embolization or occlusion, inclusive of all radiological supervision and interpretation, intraprocedural roadmapping, and imaging guidance necessary to complete the intervention; for arterial or venous hemorrhage or lymphatic extravasation	37244

Arteriovenous Malformations

Vascular embolization/occlusion of cutaneous and/or deep tissue hemangioma or other vascular malformation (e.g., venous, arteriovenous, lymphatic) is considered medically necessary for **any** of these indications:

- Prior to planned scheduled surgery or SRS (Stereotactic radiosurgery)
- The lesion is affecting a vital structure (e.g., nose, eyes, ears, lips, or larynx)
- The lesion results in **any** of the following:
  - Bleeding
  - High output heart failure

- Pain
- Repeated infection
- Interferes with activities of daily living

Uterine Artery Embolization

Uterine artery embolization is considered medically necessary to treat **any** of the following conditions:

- Uterine hemorrhage in the presence of any of the following conditions:
  - Abnormal placental implantation (e.g., placenta accreta or increta)
  - Postpartum hemorrhage, after failure of pharmacologic uterotonic measures, surgical treatments, or uterine massage
  - Uterine arteriovenous malformation
- Uterine leiomyomas documented on prior imaging (US, MRI) with **any** of the following signs or symptoms:
  - Abnormal uterine bleeding such as atypical bleeding pattern or volume, anemia or hemorrhage with a normal recent endometrial sampling biopsy
  - Dysmenorrhea unresponsive to analgesics causing impairment in ability to carry out daily activities
  - Dyspareunia greater than 6 months not attributable to other pathology
  - Urinary symptoms secondary to mass effect from fibroid disease

Urologic Conditions

Prostatic Artery Embolization (PAE) for Benign prostatic hyperplasia (BPH)

Prostate artery embolization is considered medically necessary in individuals with BPH and lower urinary tract symptoms (LUTS) who have failed or could not tolerate medical therapy such as Alpha-1 blockers or 5-alpha-reductase inhibitors and have documentation of any of the following:

- Hematuria of prostatic origin
- Acute or chronic urinary retention with preserved bladder function to achieve catheter independence
- Moderate to severe LUTS and a very large prostate (> 80 cm^3)
- Identified as not a surgical candidate for any of the following reasons:
  - Advanced age
  - Multiple comorbidities
  - Coagulopathy or inability to stop anticoagulation or antiplatelet therapy.

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Indications for Varicocele Embolization

Venous embolization of a varicocele documented on physical exam or ultrasound imaging is considered medically necessary for **either** of the following clinical scenarios:

- Management of infertility with palpable varicocele
- Recurrent varicocele

Evidence Discussion

Initially, PAE was used in patients with hematuria secondary to prostatic origin with significant success. Over the past 20 years, several trials have been performed to look at prostatic artery embolization for BPH/LUTS. The majority of the studies compared PAE to TURP with some initial trials comparing PAE to SHAM for efficacy. All trials showed improvement in symptoms compared to baseline as confirmed in the SHAM trials. When comparing PAE to TURP, several randomized, controlled studies showed the outcomes are similar for symptom relief of symptoms with better volume reduction and long-term outcomes with TURP. However, TURP is also associated with higher rates of incontinence and sexual dysfunction including erectile dysfunction and ejaculatory issues. In 2024 the AUA released an amendment to their guidelines stating that PAE may be offered as be offered for the treatment of LUTS/BPH. They noted that continued evaluation of PAE in trials is need but there is evidence for its use in select patients.

Varicocele development may occur in all age groups and may lead to pain, testicular swelling and may have an impact on fertility. Management of varicoceles for male infertility remains somewhat controversial based on a recent global survey by Shah et al in 2022. The majority are still being managed by surgical technique with only 2.6% of respondents citing embolization or sclerotherapy as their preferred repair technique. The risk of hydrocele and spermatic artery injury are associated with surgical repair and eliminated with embolization procedures. A review of the available guidelines included a meta-analysis of varicocele and fertility studies in 2016 and a more recent study by Sheehan et al, both showed a positive impact in sperm concentration, motility and morphology after varicocele embolization. These findings would support an improvement in male fertility following embolization. This is also supported in the AUA/ASRM guideline on infertility in Men published in 2021. Venous embolization of varicoceles has been shown to be effective in decreasing pain with durability of symptom relief over 4 years. The American Vein and Lymphatic Society working group on pelvic venous disorders include varicocele in their definition of pelvic venous disorders (PeVD) as result of extra pelvic varices that may result from pelvic origins (V_3a) along with vulvar varices in 2021. Pelvic vein embolization is supported for the management of V_3a varices.

Oncologic Indications

Vascular embolization is medically necessary for treatment of **any** of the following conditions:

- In the setting of malignancy for chemoembolization or cessation of bleeding
- Hepatocellular carcinoma
- Hepatic metastases from colorectal and neuroendocrine tumors
- Renal cell carcinoma
- Localized resectable giant cell tumor of the bone and/or unresectable axial lesions
- Metastatic follicular, Hurthle cell, or papillary thyroid carcinoma when these tumors are not amenable to radioactive iodine therapy
- Medullary thyroid cancer with symptomatic distant metastases
- Highly vascular tumors for treatment purposes

Non-indications

- Transcatheter arterial chemoembolization or transcatheter arterial embolization for malignant lesions outside of the liver is **not** considered medically necessary

Aneurysms

Visceral Artery Aneurysm or Pseudoaneurysm (PSA)

- Coil embolization is medically necessary to treat visceral artery aneurysm or pseudoaneurysm (PSA) when diagnostic imaging (CTA, MRA, US, angiogram) documents **any** of the following:
  - hepatic artery aneurysm ≥2.0cm
  - celiac artery aneurysm ≥2.0cm and any size celiac artery PSA
  - colic artery aneurysm any size
  - gastric and gastroepiploic artery aneurysm of any size
  - jejunal and ileal artery aneurysm ≥2.0cm
  - superior mesenteric artery (SMA) aneurysm of any size
  - pancreaticoduodenal and gastroduodenal artery aneurysm of any size
  - splenic artery aneurysm ≥3.0cm and any size splenic artery PSA
  - renal artery aneurysm ≥3.0cm

Post EVAR

Embolization of aortic side branches or aortic sac is medically necessary to treat a Type 2 endoleak when there is documentation of **either**:

- sac enlargement

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- stable sac size when **both** of the following apply
  - sac size is ≥5cm
  - Type 2 endoleak is present ≥two years

Embolization as an adjunct to EVAR

- Internal iliac (hypogastric) artery embolization prior to EVAR is considered medically necessary when a common iliac artery aneurysm requiring stenting to the level of the external iliac artery is identified pre-operatively.
- Embolization of aortic side branches is medically necessary in individuals with a Type 2 endoleak with sac enlargement.

Non-indications

- Embolization of aortic side branches prior to EVAR for the purpose of preventing Type 2 endoleak is **not** medically necessary. This includes but is not limited to the embolization of lumbar arteries and internal mesenteric arteries.

Ovarian vein embolization

Ovarian Vein Embolization is medically necessary for the treatment of pelvic congestion syndrome when **all** of the following apply:

- Chronic pelvic pain of more than six months duration accompanied by any of the following criteria:
  - Pain exacerbated by walking, standing, and fatigue
  - Post coital ache
  - Dysmenorrhea
  - Dyspareunia
  - Bladder irritability and rectal discomfort
  - Recurrent lower extremity varicosities
- No evidence of inflammatory disease
- Pelvic congestion syndrome is supported by **either** of the following imaging results:
  - Ultrasound demonstrates **one** of the following:
    - Tortuous pelvic veins diameter of >6mm
    - Slow blood flow <3 cm/sec or reversed caudal flow
    - Dilated arcuate veins in the myometrium communicating between bilateral pelvic varicose veins
    - Polycystic changes in the ovaries
  - CT or MR of the pelvis demonstrates **one** of the following:
    - Four ipsilateral tortuous para-uterine veins with a diameter of >4mm
    - An ovarian vein diameter of >8mm

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Non-indications

Due to the lack of evidence supporting the clinical benefit over other treatments, the following indications for vascular embolization are considered to be not medically necessary:

- Genicular Artery Embolization (GAE)
- Hemorrhoidal embolization
- All other indications not listed in this guideline

Evidence Discussion

Embolization for Hemorrhoid Disease

Catheter directed hemorrhoidal embolization for rectal bleeding due to hemorrhoids has shown promise as a safe and minimally invasive technique in several small studies. Clinical success rates have ranged between 63 and 97% in small studies. Large studies have not been completed and long-term follow-up beyond a year is limited. A 2023 study by DeGregario et al reviewed a Spanish emborrhoid registry of 80 patients treated with embolization for Grade 1-3 hemorrhoids. Technical success was 100% but 31% of patients had recurrence of rectal bleeding at 1 year and 21% required repeat embolization with 5% having open hemorrhoidectomy. In 2021, Talaie et all reviewed the available studies and concluded that " Hemorrhoid embolization can preserve the anal tone and maintain the hemorrhoidal tissue in place requiring minimal local wound care on an outpatient basis. However, due to the paucity of high-quality trials, further research is warranted to evaluate its long-term outcomes, compare its efficacy with other treatment modalities, and full assess its role in the treatment of hemorrhoid." The Italian Society of colorectal surgery (SICCR) consensus statement in 2020 noted weak evidence (2C) for embolization in the management of hemorrhoids except in controlling bleeding in patients with contraindications for conventional surgery (1C). In May 2024, the American Society of Colon and Rectal Surgeons Clinical Practice Guidelines for the management of Hemorrhoids, did not include embolization as part of the recommended management options.

Recommendation

There is not enough evidence to support routine use of arterial embolization for hemorrhoidal disease management.

Geniculate Artery Embolization

Osteoarthritis is a common and potentially debilitating disease affecting 10-18% of the population above the age of 60. A chronic, low-grade inflammatory response

causes progressive damage resulting in pain, disability and quality of life issues. Early stage management consists of anti-inflammatories, weight loss and physical therapy to maintain function. Additional therapies including injections of anti-inflammatories, lubricants and ultimately total knee arthroplasty (TKA) are used as the disease progresses.

In 2014, Okuno et al identified the role of hypertrophied synovium and joint hyper-vascularization in nociception. Subsequently they conducted a small study on 14 patients. They found that by treating this hyper-vascular inflammation with geniculate artery embolization, all 14 patients experienced significant decrease in their mean WOMAC total pain scores at one month with additional improvements by 4 months. These improvements were maintained in most patients on follow-up examination at a mean interval of 12 months. The mean overall VAS scores also significantly decreased at 1 week, 1 month and 4 months as well.

In 2020, Bagla et al published on of the first randomized sham-controlled studies of GAE. Fourteen patients were treated with GAE and seven were in the sham control group. At one month VAS and WOMAC scores showed statistically significant improvements compared with the sham procedure and all 7 control patients crossed over to the treatment arm.

In 2021, The Society of Interventional Radiology Research Consensus Panel reported the need for ongoing trials to assess the effectiveness of GAE for osteoarthritis and that these be conducted as sham trials to insure appropriate results. It was noted that placebo effect in prior OA trials may be as high as 40%.

Bhatia et al published a systematic review in 2023 for short-to-midterm outcomes of GAE for mild to moderate osteoarthritis. A total of 13 studies and 399 knees were included in their review. They concluded that GAE was a safe and effective procedure for early and low-grade osteoarthritis in the short and medium term (1-24 months) but more robust evidence is needed to confirm its role.

Limited data is available regarding patients with severe osteoarthritis but data suggest a non-durable response.

There are currently no societal guidelines that support geniculate artery embolization for primary treatment of knee osteoarthritis.

Recommendation

Although geniculate artery embolization shows promise for short-to-midterm outcomes for pain control and quality of life improvement in mild-to-moderate knee osteoarthritis, further evaluation is needed to determine long-term efficacy and appropriate patient selection.

Geniculate artery embolization for treatment of osteoarthritis of the knee is not supported at this time.

References

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1. American College of Obstetricians and Gynecologists' Committee on Practice Bulletins-Gynecology. Management of symptomatic uterine leiomyomas: ACOG practice bulletin, number 228. *Obstetrics & Gynecology* 2021;137(6):e100-e115.
2. Barrionuevo P, Malas MB, Nejim B, et al. A systematic review and meta-analysis of the management of visceral artery aneurysms. *J Vasc Surg.* 2019. 72(1):40S-45S.
3. Farion, AT, Falso R, Speziali S, et al. Results of current endovascular treatments for visceral artery aneurysms. *J Vasc Surg.* 2023. 78(2):387-93.
4. Bosanquet DC, Wilcox C, Whitehurt L, et al. Systematic Review and Meta-analysis of the Effect of Internal Iliac Artery Exclusion for Patients Undergoing EVAR. *European Journal of Vascular and Endovascular Surgery.* 2017 (53):4 534-8.
5. Dariushnia SR, Nikolic B, Stokes LS, Spies JB; Society of Interventional Radiology Standards of Practice Committee. Quality improvement guidelines for uterine artery embolization for symptomatic leiomyomata. *J Vasc Interv Radiol*. 2014;25(11):1737-1747. doi:10.1016/j.jvir.2014.08.029.
6. Yu YH, LIndstom D, Wanhainen A, et al. Systematic review and meta-analysis of prophylactic aortic side branch embolization to prevent type II endoleaks.*J Vasc Surg*. 2020 Nov;72(5):1783-1792.
7. National Comprehensive Cancer Network (NCCN). Bone Cancer Version 2.2023. Revised September 27, 2022. Referenced with permission from the NCCN Clinical Practice Guidelines in Oncology (NCCN Guidelines™) for Bone Cancer Version 2.2023. ©2023 National Comprehensive Cancer Network, Inc. All rights reserved. The NCCN Guidelines™ and illustrations herein may not be reproduced in any form for any purpose without the express written permission of the NCCN. To view the most recent and complete version of the NCCN Guidelines™, go online to NCCN.org
8. National Comprehensive Cancer Network (NCCN). Head and Neck Cancer Version 1.2023. Revised December 20, 2022. Referenced with permission from the NCCN Clinical Practice Guidelines in Oncology (NCCN Guidelines™) for Head and Neck Cancer Version 1.2023. ©2023 National Comprehensive Cancer Network, Inc. All rights reserved. The NCCN Guidelines™ and illustrations herein may not be reproduced in any form for any purpose without the express written permission of the NCCN. To view the most recent and complete version of the NCCN Guidelines™, go online to NCCN.org.
9. National Comprehensive Cancer Network (NCCN). Kidney Cancer Version 4.2023. Revised January 18, 2023. Referenced with permission from the NCCN Clinical Practice Guidelines in Oncology (NCCN Guidelines™) for Kidney Cancer Version 4.2023. ©2023 National Comprehensive Cancer Network, Inc. All rights reserved. The NCCN Guidelines™ and illustrations herein may not be reproduced in any form for any purpose without the express written permission of the NCCN. To view the most recent and complete version of the NCCN Guidelines™, go online to NCCN.org.
10. National Comprehensive Cancer Network (NCCN). Pancreatic Adenocarcinoma Version 2.2022. Revised December 6, 2022. Referenced with permission from the NCCN Clinical Practice Guidelines in Oncology (NCCN Guidelines™) for Pancreatic Adenocarcinoma Version 2.2022. ©2023 National Comprehensive Cancer Network, Inc. All rights reserved. The NCCN Guidelines™ and illustrations herein may not be reproduced in any form for any purpose without the express written permission of the NCCN. To view the most recent and complete version of the NCCN Guidelines™, go online to NCCN.org.
11. National Comprehensive Cancer Network (NCCN). Thyroid Carcinoma Version 3.2022. Revised November 1, 2022. Referenced with permission from the NCCN Clinical Practice Guidelines in Oncology (NCCN Guidelines™) for Thyroid Carcinoma Version 3.2022. ©2023 National Comprehensive Cancer Network, Inc. All rights reserved. The NCCN Guidelines™ and illustrations herein may not be reproduced in any form for any purpose without the express written permission of the NCCN. To view the most recent and complete version of the NCCN Guidelines™, go online to NCCN.org.
12. Martin NA, Khanna R, Doberstein C, Bentson J. Therapeutic embolization of arteriovenous malformations: the case for and against. *Clin Neurosurg*. 2000;46:295-318.

13. Kashef E, Evans E, Patel N, Agrawal D, Hemingway AP. Pelvic venous congestion syndrome: female venous congestive syndromes and endovascular treatment options. *CVIR Endovasc*. 2023;6(1):25. Published 2023 Apr 20. doi:10.1186/s42155-023-00365-y.
14. Greuner DA, DeMarco D. Current Clinical Management of Pelvic Congestion Syndrome. *Vascular Disease Management.* 2020;17(2):E23-E28.
15. Gloviczki P, Lawrence PF, Wasan SM, et al. The 2023 Society for Vascular Surgery, American Venous Forum, and American Vein and Lymphatic Society clinical practice guidelines for the management of varicose veins of the lower extremities. Part II: Endorsed by the Society of Interventional Radiology and the Society for Vascular Medicine. *J Vasc Surg Venous Lymphat Disord*. 2024;12(1):101670. doi:10.1016/j.jvsv.2023.08.011.
16. Shah R, Agarwal A, Kavoussi P, et al, Global Andrology Forum. Consensus and Diversity in the Management of Varicocele for Male Infertility: Results of a Global Practice Survey and Comparison with Guidelines and Recommendations. *World J Mens Health*. 2023 Jan;41(1):164-197.doi:10.5534/wjmh.220048.
17. Shridharani A, Owen RC, Elkelany OO, Kim ED. The significance of clinical practice guidelines on adult varicocele detection and management. *Asian J Androl.* 2016 Mar-Apr;18(2):269-75. doi: 10.4103/1008-682X.172641.
18. Sheehan M, Briody H, O'Neill DC, et al. Pain relief after varicocele embolization: The patient's perspective. *J Med Imaging Radiat Oncol*. 2020 Apr;64(2):215-219. doi: 10.1111/1754-9485.1300.
19. Wong S, Vigneswaran G, Maclean D, et al. 10-year experience of Paediatric varicocele embolization in a tertiary centre with long-term follow-up. *J Pediatr Urol*. 2022 Apr;18(2):113.e1-113.e6. doi: 10.1016/j.jpurol.2021.12.0131.
20. Meissner MH, Khilnani NM, Labropoulos N, et al. The Symptoms-Varices-Pathophysiology classification of pelvic venous disorders: A report of the American Vein & Lymphatic Society International Working Group on Pelvic Venous Disorders. *J Vasc Surg Venous Lymphat Disord*. 2021 May;9(3):568-584. doi: 10.1016/j.jvsv.2020.12.084.
21. Qamhawi Z, Little MW. The State of Evidence in Prostate Artery Embolization. *Semin Intervent Radiol*. 2022 Dec 20;39(6):571-576. doi: 10.1055/s-0042-1759733. PMID: 36561795; PMCID: PMC9767761.
22. Ini' C, Vasile T, Foti PV, Timpanaro C, Castiglione DG, Libra F, Falsaperla D, Tiralongo F, Giurazza F, Mosconi C, David E, Palmucci S, Lavalle S, Venturini M, Basile A. Prostate Artery Embolization as Minimally Invasive Treatment for Benign Prostatic Hyperplasia: An Updated Systematic Review. *J Clin Med.* 2024 Apr 25;13(9):2530. doi: 10.3390/jcm13092530.
23. Sandhu JS, Bixler BR, Dahm P, et al. Management of Lower Urinary Tract Symptoms Attributed to Benign Prostatic Hyperplasia (BPH): AUA Guideline Amendment 2023. *Journal of Urology* [Internet]. 2024 Jan 1 [cited 2024 Nov 11];211(1):11–9. doi:10.1097/JU.000000000000369.
24. McWilliams JP, Bilhim TA, Carnevale FC, et al. Society of Interventional Radiology Multisociety Consensus Position Statement on Prostatic Artery Embolization for Treatment of Lower Urinary Tract Symptoms Attributed to Benign Prostatic Hyperplasia: From the Society of Interventional Radiology, the Cardiovascular and Interventional Radiological Society of Europe, Société Française de Radiologie, and the British Society of Interventional Radiology: Endorsed by the Asia Pacific Society of Cardiovascular and Interventional Radiology, Canadian Association for Interventional Radiology, Chinese College of Interventionalists, Interventional Radiology Society of Australasia, Japanese Society of Interventional Radiology, and Korean Society of Interventional Radiology. *J Vasc Interv Radiol.* 2019;30(5):627-637.e1. doi:10.1016/j.jvir.2019.02.013.
25. Rebonato A, Maiettini D, Patriti A, et al. Hemorrhoids Embolization: State of the Art and Future Directions. J Clin Med. 2021 Aug 12;10(16):3537. doi: 10.3390/jcm10163537.
26. Lee L, Epelboym Y. Review of genicular artery embolization, radiofrequency ablation, and cryoneurolysis in the management of osteoarthritis-related knee pain. Diagn Interv Radiol. 2023 Jul 20;29(4):614-620. doi: 10.4274/dir.2022.221288.
27. Sajan A, Bagla S, Isaacson A. Musculoskeletal Interventions: A Review on Genicular Artery Embolization. *Semin Intervent Radiol*. 2021 Nov 24;38(5):511-514. doi:10.1055/s-0041-1736529.
28. Rebonato A, Maiettini D, Patriti A, et al. Hemorrhoids Embolization: State of the Art and Future Directions. *J Clin Med*. 2021 Aug 12;10(16):3537. doi:10.3390/jcm10163537.
29. De Gregorio MA, Guirola JA, Serrano-Casorran C, et al. Catheter-directed hemorrhoidal embolization for rectal bleeding due to hemorrhoids (Goligher grade I-III): prospective outcomes from a Spanish emborrhoid registry. *Eur Radiol*. 2023 Dec;33(12):8754-8763. doi:10.1007/s00330-023-09923-3.

30. Talaie R, Torkian P, Moghadam AD, et al. Hemorrhoid embolization: A review of current evidences. *Diagn Interv Imaging*. 2022 Jan;103(1):3-11. doi:10.1016/j.diii.2021.07.001.
31. Gallo G, Martellucci J, Sturiale A, et al. Consensus statement of the Italian society of colorectal surgery (SICCR): management and treatment of hemorrhoidal disease. *Tech Coloproctol*. 2020 Feb;24(2):145-164. doi:10.1007/s10151-020-02149-1.
32. Hawkins AT, Davis BR, Bhama AR, et al. The American Society of Colon and Rectal Surgeons Clinical Practice Guidelines for the Management of Hemorrhoids. *Dis Colon Rectum*. 2024 May;67(5):p 614-623. doi:10.1097/DCR.0000000000003276.
33. Bhatia A, Bhatia S. The short-to-midterm outcomes of geniculate artery embolization for mild-to-moderate osteoarthritis of the knee: a systematic review. J Orthop. 2023 Apr 5;39:30-41. doi: 10.1016/j.jor.2023.03.009. PMID: 37089623; PMCID: PMC10114183.
34. Okuno, Y., Korchi, A.M., Shinjo, T. et al. Transcatheter Arterial Embolization as a Treatment for Medial Knee Pain in Patients with Mild to Moderate Osteoarthritis. Cardiovasc Intervent Radiol 38, 336–343 (2015). https://doi.org/10.1007/s00270-014-0944-8.
35. Hindsø L, Hölmich P, Petersen MM, Nielsen MB, Heerwagen S, Taudorf M, Lönn L. Transarterial Embolization of Geniculate Arteries Reduces Pain and Improves Physical Function in Knee Osteoarthritis-A Prospective Cohort Study. Diagnostics (Basel). 2024 Jul 27;14(15):1627. doi: 10.3390/diagnostics14151627. PMID: 39125502; PMCID: PMC11311436.
36. Tyagi R, Ahmed SS, Koethe Y, Raskind A, Ahmed O. Genicular Artery Embolization for Primary Knee Osteoarthritis. Semin Intervent Radiol. 2022 Jun 30;39(2):125-129. doi: 10.1055/s-0042-1745798. PMID: 35782001; PMCID: PMC9246485.
37. Bagla S, Piechowiak R, Hartman T, et al. 3:00 PM Abstract No. 3. DISTINGUISHED ABSTRACT multicenter prospective, randomized, sham-controlled study of genicular artery embolization. JVasc Interv Radiol 2020;31(03):S6
38. Ahmed O, Block J, Mautner K, Plancher K, Anitescu M, Isaacson A, Filippiadis DK, Epelboym Y, Bercu Z, Mitchell JW, Cristescu M, White SB, Prologo JD. Percutaneous Management of Osteoarthritis in the Knee: Proceedings from the Society of Interventional Radiology Research Consensus Panel. J Vasc Interv Radiol. 2021 Jun;32(6):919.e1-919.e6. doi: 10.1016/j.jvir.2021.03.409. Epub 2021 Mar 6. PMID: 33689834.
39. Casadaban LC, Mandell JC, Epelboym Y. Genicular Artery Embolization for Osteoarthritis Related Knee Pain: A Systematic Review and Qualitative Analysis of Clinical Outcomes. Cardiovasc Intervent Radiol. 2021 Jan;44(1):1-9. doi: 10.1007/s00270-020-02687-z. Epub 2020 Nov 1. PMID: 33135117; PMCID: PMC8025891.

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