Medica Central Utilization Management Policy

Policy Name:	**Varicose Vein and Venous Insufficiency Treatments of Lower Extremities MP9241 (III-SUR.26)**
Effective Date:	**12/01/2024**

This policy was developed with input from specialists in general surgery, vascular surgery and interventional radiology, and endorsed by the Medical Policy Committee.

IMPORTANT INFORMATION – PLEASE READ BEFORE USING THIS POLICY

These services may or may not be covered by all Medica Central plans. Coverage is subject to requirements in applicable federal or state laws. Please refer to the member's plan document for other specific coverage information. If there is a difference between this general information and the member's plan document, the member's plan document will be used to determine coverage. With respect to Medicare, Medicaid, and other government programs, this policy will apply unless these programs require different coverage.

Members may contact Medica Customer Service at the phone number listed on their member identification card to discuss their benefits more specifically. Providers with questions may call the Provider Service Center. Please use the Quick Reference Guide on the Provider Communications page for the appropriate phone number. https://mo-central.medica.com/Providers/SSM-employee-health-plan-for-IL-MO-OK-providers

Medica Central coverage policies are not medical advice. Members should consult with appropriate health care providers to obtain needed medical advice, care, and treatment.

PURPOSE

To promote consistency between utilization management reviewers by providing the criteria that determines the medical necessity.

BACKGROUND

Definitions:

A. **Cyanoacrylate adhesive closure** of symptomatic varicose veins is a minimally invasive procedure that uses a specially formulated medical adhesive (glue) that is injected into the vein using the VenaSeal™ closure system. The cyanoacrylate adhesive permanently closes the diseased vein.
B. **Duplex ultrasonography/Doppler ultrasound** are two imaging modalities done sequentially to outline anatomical structure of blood vessels(duplex) and to detect flow, direction of flow and flow velocity of the blood through vessels. Doppler ultrasounds are frequently used to map anatomy while duplex ultrasounds are used to check for evidence of thrombus.
C. **Endovenous radiofrequency** (RF) **ablation and endovenous laser ablation** are treatments intended as less invasive alternatives to traditional vein ligation and stripping for symptomatic varicosities of the great (greater) or small (lesser) saphenous vein. These procedures are often performed using percutaneous tumescent anesthesia. A catheter is inserted through a small incision (usually near the knee) into the affected vein and advanced up to the saphenofemoral junction. Proper placement

is confirmed by Duplex ultrasound imaging. The RF electrodes or the laser are slowly withdrawn, occluding the vein as the energy is applied. These procedures are also referred to as endoluminal or endovascular ablation. If more than one vein on the same leg needs to be ablated, they may be treated during the same visit.

D. **Giacomini** vein is a thigh extension of the short saphenous vein, arising just above the saphenopopliteal junction and extending into the thigh.
E. **Hyperpigmentation** is an excess of pigment in a tissue or body part; one cause is venous insufficiency.
F. **Phlebectomy** is the surgical removal of segments of varicose veins. The procedures for removal may be known as ambulatory phlebectomy, stab phlebectomy, stab avulsion, microextraction, hook phlebectomy, or transilluminated powered phlebectomy (TIPP).
G. **Reticular veins** are defined as permanently dilated bluish intradermal veins usually from 1 to less than 3 mm in diameter; they may be tortuous.
H. **Sclerotherapy** is the injection of a chemical solution (sclerosant) into a vein that damages the endothelial lining of the treated vein, causing vessel occlusion and the development of fibrous tissue, with resultant obliteration of the targeted vein.
I. **Stasis dermatitis** is cutaneous inflammation resulting in erythema, scaling, and edema of the lower extremities due to impaired venous circulation.
J. **Surgical procedures** include ligation/stripping, endovenous radiofrequency ablation, and endovenous laser ablation.
K. **Telangiectasias** are dilated superficial blood vessels in the skin. This is often synonymous with the term “thread veins” or “spider veins.”
L. **Ultrasound-guided foam sclerotherapy** (USG): also known as echosclerotherapy, is a real-time ultrasound-guided injection procedure for treatment of varicose veins.
M. **Varicose veins** are tortuous, dilated veins often associated with incompetent valves. Symptoms of varicose veins that are due to venous hypertension may be relieved by elevation and graduated compression hosiery. Symptoms unrelieved by elevation and compression hosiery, especially overnight in bed, must be investigated for other causes.
N. **Vein ligation** is a surgical procedure consisting of the tying off of varicose veins.
O. **Vein stripping** is a surgical procedure to remove a vein or portion of a vein.
P. **Venous insufficiency** occurs when incompetent valves allow blood leakage or reflux, leading to elevated ambulatory venous pressure and capillary damage with extravasation of red blood cells and serum. This may lead to signs and symptoms such as edema, hyperpigmentation, stasis dermatitis, spider veins, varicosities, and ulceration.

BENEFIT CONSIDERATIONS

1. Prior authorization **is required** for varicose vein and venous insufficiency treatments. Please see the prior authorization list for product specific prior authorization requirements.
2. Coverage of sclerotherapy is limited to two visits per leg within a six-month period. Additional visits require medical director review for medical necessity.
3. Coverage of radiofrequency/laser ablation therapy is limited to one visit per leg within a six-month period. Additional visits require medical director for medical necessity.
4. The following services are *investigative and therefore not covered*:
   - Sclerotherapy for previously untreated great and/or small saphenous veins, (including Varithena®)
   - Mechanochemical ablation (MOCA), i.e., ClariVein®, for the treatment of varicose veins
   - Medical adhesive (e.g., cyanoacrylate adhesive, VenaSeal™) treatment of all other veins

not specifically mentioned in the Medical Necessity Criteria section
- Pelvic vein embolization.

5. Treatment for superficial veins, also referred to as telangiectasia, thread, reticular or spider veins *is excluded* from coverage in most plans.
6. Coverage may vary according to the terms of the member's plan document.
7. Cosmetic surgery/procedures are generally an exclusion in the member's plan document. Treatment of asymptomatic varicosities is considered cosmetic.
8. If medical necessity criteria are not met as defined in this policy, any associated procedures will not be covered. This includes, but is not limited to, facility and anesthesia services, professional fees, and associated supplies.
9. If the Medical Necessity Criteria and Benefit Considerations are met, The Health Plan will authorize benefits within the limits in the member's plan document.
10. If it appears that the Medical Necessity Criteria and Benefit Considerations are not met, the individual's case will be submitted to the medical director or external review for individual consideration. Practitioners are advised of the appeal process in their Administrative Manual.

MEDICAL NECESSITY CRITERIA

I. Treatment of the **great saphenous vein (GSV), small saphenous vein (SSV**), **accessory saphenous veins** (posterior, anterior, or Giacomini veins) **or perforator veins** with ligation/stripping/phlebectomy, endovenous radiofrequency ablation, endovenous laser ablation, or cyanoacrylate adhesive (e.g., VenaSeal™) is medically necessary when documentation in the medical records indicates that **all of the following** criteria are met:

Note: Sclerotherapy for previously untreated great and/or small saphenous veins is investigative. However, sclerotherapy for small segments of residual reflux in GSV/SSV (after previous ablation) is medically necessary if all of the following criteria are met.

Note: Cyanoacrylate adhesive (e.g., VenaSeal™) is considered investigative and therefore not covered for perforator veins.

A. A patent deep venous system in the affected extremity as evidenced by results of a duplex ultrasonography, performed within the past six months.
B. Diameter of veins to be treated is at least 3 mm in size.
C. Reflux duration meets the following parameters:
   1. Reflux duration for GSV, SSV or accessary saphenous veins is greater than or equal to 0.5 seconds
   2. Reflux duration for perforator veins must be greater than 0.35 seconds.
D. GSV, SSV, accessory saphenous veins or perforator veins to be treated correlate anatomically with the location of clinically significant symptoms and include documentation of **one of the following** functional impairments:
   1. Recurrent superficial thrombophlebitis
   2. Venous stasis dermatitis (including refractory dependent edema, erythema, scaling, and brown discoloration of the ankle)
   3. External hemorrhage of the varicose vein
   4. Venous ulceration

5. Moderate to severe pain resulting in functional impairment that interferes with activities of daily living (e.g., inability to perform household chores, prolonged standing, or essential job functions).

E. Written documentation from the medical record including **all of the following** information is required:
   1. Detailed clinical history
   2. Duplex ultrasonography report results demonstrating reflux and duration of reflux for affected extremities with correlation to functional impairment
   3. For patients with thrombophlebitis, dermatitis, ulceration or hemorrhage, adequate photographs, taken in the provider's office under the provider's direction, documenting skin changes that account for functional impairment.
      Note: For individuals whose only indication is pain, photographs are not required.

II. Treatment of **significant small varicose veins** (sometimes called small tributary veins, pudendal, or branch veins), **accessory saphenous veins** (posterior, anterior, or Giacomini veins) **or perforator veins** with ultrasound-guided foam sclerotherapy (e.g., Varithena®) or phlebectomy is medically necessary when documentation in the medical record indicates that **all of the following** criteria are met:

A. **One of the following** is met:
   1. Will be treated as a stand-alone procedure (with no previous GSV or SSV treatment)
   2. At the same time as the GSV or SSV
   3. At least 3 months after the last GSV or SSV treatment.

B. Venous duplex scan, performed after the latest vein procedure, or within the last year if no previous vein surgery occurred, demonstrates **no** GSV or SSV reflux/incompetence (with the exception of small segments of GSV/SSV showing residual reflux after previous ablation procedure), or the incompetent GSV and/or SSV will be treated at the same time as the requested procedure.

C. Diameter of the veins to be treated is at least 3 mm in size.

D. Reflux duration meets the following parameters:
   1. Reflux duration for the accessary saphenous veins is greater than or equal to 0.5 seconds
   2. Reflux duration for the perforator veins must be greater than 0.35 seconds
   3. Reflux not required for significant small varicose veins.

E. Small varicose, accessory saphenous or perforator veins to be treated correlate anatomically with the location of clinically significant symptoms and include documentation of **one of the following** functional impairments:
   1. Recurrent superficial thrombophlebitis
   2. Venous stasis dermatitis (including refractory dependent edema, erythema, scaling, and brown discoloration of the ankle)
   3. External hemorrhage of the varicose vein
   4. Venous ulceration
   5. Moderate to severe pain resulting in functional impairment that interferes with activities of daily living (e.g., inability to perform household chores, prolonged standing, or essential job functions).

F. Written documentation from the medical record including **all of the following** information is required:
   1. Detailed clinical history
   2. Duplex ultrasonography report results demonstrating reflux and duration of reflux for affected extremities with correlation to functional impairment.
   3. For patients with thrombophlebitis, dermatitis, ulceration or hemorrhage, adequate photographs, taken in the provider's office, under the provider's direction, documenting skin changes that account for functional impairment.
      Note: For individuals whose only indication is pain, photographs are not required.

Medica Central Utilization Management Policy

CENTERS FOR MEDICARE & MEDICAID SERVICES (CMS)

- For Medicare members, refer to the following, as applicable at: https://www.cms.gov/medicare-coverage-database/search.aspx

	Committee/Source	Date(s)
Document Created:	Medical Policy Committee/Health Services Division	February 20, 2019
Revised:	Medical Policy Committee/Health Services Division	February 19, 2020
	Medical Policy Committee/Health Services Division	May 20, 2020
	Medical Policy Committee/Health Services Division	May 18, 2022
	Medical Policy Committee/Health Services Division	August 17, 2022
	Medical Policy Committee/Health Services Division	May 17, 2023
Reviewed:	Medical Policy Committee/Health Services Division	February 19, 2020
	Medical Policy Committee/Health Services Division	May 20, 2020
	Medical Policy Committee/Health Services Division	May 19, 2021
	Medical Policy Committee/Health Services Division	May 18, 2022
	Medical Policy Committee/Health Services Division	August 17, 2022
	Medical Policy Committee/Health Services Division	May 17, 2023

DOCUMENT HISTORY

Original Effective Date	April 1, 2001 (III-SUR.19); April 1, 2004 (III-SUR.26)
MPC Endorsement Date(s)	01/2001 (III-SUR.19); 01/2002, 12/2002, 12/2003, 01/2004 (III-SUR/26); 11/2004,06/2005 (III-SUR.26), 11/2005, 11/2006, 11/2007, 11/2008, 11/2009, 11/2010 (III- SUR.26 Not Posted), 02/2011 (III-SUR.26), 11/2011, 04/2012, 11/2012, 11/2013, 11/2014, 11/2015, 11/2016, 11/2017, 11/2018, 11/2019, 02/2020, 06/2020, 11/2020, 11/2021, 06/08/2022, 11/2022, 11/2023, 09/2024
Administrative Updates	05/01/2017, 08/15/2022, 04/10/2023

Published: 12/01/2024
Effective: 12/01/2024

References:

Pre-11/2015 Medical Policy Committee (MPC):

1. American College of Phlebology. *Guidelines for Varicose Vein Surgery*. http://www.phlebology.org/resources/Varicose-Vein-Rx-Guidelines.pdf. July 2008. Accessed September 17, 2014.
2. American Society for Dermatologic Surgery. *Foam Sclerotherapy*. http://www.asds.net/TechnologyReportFoamSclerotherapy.aspx#. July 2008. Accessed September 17, 2014.
3. Belcaro G. Foam-sclerotherapy, surgery, sclerotherapy, and combined treatment for varicose veins: a 10 year, prospective, randomized, controlled trial (VEDICO trial). *Angiology*. 2003;54(3):307-315.
4. Bergan JJ, Schmid-Schonbein GW, Coleridge PD, et al. Mechanisms of disease: chronic venous disease. *N Engl J Med*. August 2006;355:488-498.
5. Bhayani R, Lippitz J. Varicose veins. *Dis Mon*. 2009;55:212-222.
6. Blaise S, Bosson JL, Diamand JM. Ultrasound-guided sclerotherapy of the great saphenous vein with 1% vs. 3% polidocanol foam: a multicentre double-blind randomised trials with 3 year follow-up. *Eur J Vasc Endovasc.* June 2010;39(6):779-786.
7. Bourtouroglou DG, Azzam M, Kakkos SK, et al. Ultrasound-guided foam sclerotherapy combined with sapheno- femoral ligation compared to surgical treatment of varicose veins: early results of a randomised controlled trial. *Eur J Vasc Endovasc Sur*. 2006;(31):93-100.
8. Brittenden J, Cotton SC, Elders A, et al. A randomized trial comparing treatments for varicose veins. *N Engl J Med.* September 2014;371:1218-1227.
9. Carradice D, Mekako AI, Harfield J, Chetter IC. Randomized clinical trial of concomitant or sequential phlebectomy after endovenous laser therapy for varicose veins. *Br J Surg.* 2009;96:369-375.
10. Chandler JG, Pichot O, Sessa C, et al. Treatment of primary venous insufficiency by endovenous saphenous vein obliteration. *Vasc Surg*. 2000;34(3):201-214.
11. Chen CH, Chiu CS, Yang CH. Ultrasound-guided foam sclerotherapy for treating incompetent great saphenous veins – results of 5 years of analysis and morphologic evolvement study. *Dermatol Surg*. 2012:38(6):851-857.
12. Chetter IC, Mylankal KJ, Hughes H, Fitridge R. Randomized clinical trial comparing multiple stab incision phlebectomy and transilluminated powered phlebectomy for varicose veins. *Br J Surg*. 2006;93(2):169-174.
13. Corabian P, Harstall C. Sclerotherapy for leg varicose veins. *Alberta Heritage Foundation for Medical Research. Technology Assessment*. IP-19 Information Paper. http://www.ihe.ca/documents/ip19.pdf. May 2004. Accessed September 17, 2014.
14. ECRI Institute. *ECRI Custom Hotline Report: Ultrasound-guided Sclerotherapy for Treatment of Varicose Veins*. July 2011. Plymouth Meeting, PA.
15. ECRI Institute. *ECRI Custom Hotline Report: Endovenous Treatment of the Small Saphenous Vein and Perforator Veins*. April 2011. Plymouth Meeting, PA.
16. ECRI Institute. *ECRI Custom Hotline Report: Surgical Ligation and Stripping of Varicose Veins.* September 2010. Plymouth Meeting, PA.
17. ECRI Institute. *ECRI Custom Hotline Report: Transilluminated Power Phlebectomy (TIPP) for Varicose Veins.* September, 2011. Plymouth Meeting, PA.
18. ECRI Institute. *ECRI Custom Hotline Report: Visual Sclerotherapy for the Treatment of Varicose Veins.* March 2010. Plymouth Meeting, PA.
19. ECRI Institute. *ECRI Emerging Technology Evidence Report: Transilluminated Powered Phlebectomy (TIPP) for Varicose Veins*. April 2008. [Archived]. Plymouth Meeting, PA.
20. ECRI Institute. *ECRI Windows on Medical Technology: Endovenous Laser Ablation of the Greater Saphenous Vein*. December 2004. Plymouth Meeting, PA.
21. ECRI Institute. *ECRI Windows on Medical Technology: Endovenous Radio-frequency*

Ablation (VNUS Closure® System) for the Treatment of Varicose Veins. August 2006. Plymouth Meeting, PA.
22. Einarsson E, Eklof B, Neglen P. Sclerotherapy or surgery as treatment for varicose veins: a prospective randomized study. *Phlebology*.1993;8:22-26.
23. Franz RW, Knapp ED. Transilluminated powered phlebectomy surgery for varicose veins: a review of 339 consecutive patients. *Ann Vasc Surg*. 2009;23(3):303-309.
24. Giswold ME, Moneta GL. Non-operative treatment of chronic venous insufficiency. In: Rutherford RB. ed.
Rutherford's Vascular Surgery. 5th ed. Philadelphia, PA:Saunders & Co;2005:Chap.156.
25. Gloviczki P, Comerota AJ, Dalsing MC, et al. 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;53:2S-48S.
26. Golan JF, Glenn DM. Laser and radiofrequency endovenous ablation of venous reflux. *Perspect Vasc Surg Endovasc Ther.* 2008;20(1):75-79.
27. Green D. Sclerotherapy for the permanent eradication of varicose veins: theoretical and practical considerations. *J Amer Acad Derm*.1998;38(3):461-475.
28. Hamper UM, DeJong MR, Scoutt LM. Ultrasound evaluation of the lower extremity veins. *Radiol Clin N Am.*
2007;45:525-547.
29. Harris EJ. Endovascular obliteration of saphenous vein reflux: a perspective. *J Vasc Surg.* June 2002;35:1292- 1294.
30. Harris EJ. Radiofrequency ablation of the long saphenous vein without high ligation versus high ligation and stripping for primary varicose veins: pros and cons. *Sem Vasc Surg*. March 2002;15(1):34-38.
31. Hayes, Inc. *Hayes Technology Brief: Ultrasound-Guided Foam Sclerotherapy (UGFS) for Varicose Veins.*
November 2012. Last Annual Review December 2013. Lansdale, PA.
32. Hayes, Inc. *Hayes Medical Technology Directory: Endoluminal Radiofrequency Ablation for Varicose Veins of the Leg.* May 2006. Search last updated June 2009. [Archived June 2011]. Lansdale, PA.
33. Hayes, Inc. *Hayes Medical Technology Directory: Endovenous Laser Therapy for Varicose Veins due to Great Saphenous Vein Reflux*. February 2009. Search last updated February 2013. [Archived March 2014]. Lansdale, PA.
34. Hayes, Inc. *Hayes Medical Technology Directory: Endovenous Laser Therapy for Varicose Veins Due to Small Saphenous Vein Reflux*. March 2009. Search last updated February 2013. [Archived April 2014]. Lansdale, PA.
35. Hayes, Inc. *Hayes Medical Technology Directory: Sclerotherapy for Symptomatic Varicose Veins*. December 2004. Search last updated January 2009. [Archived January 2010]. Lansdale, PA.
36. Hayes, Inc. *Hayes Medical Technology Directory: Transilluminated Powered Phlebectomy for Symptomatic Varicose Vein.* May 2002. Last updated April 2007. [Archived January 2008]. Lansdale, PA.
37. Hayes, Inc. *Hayes Search & Summary: Endovenous Radiofrequency Ablation (EVRFA) for Incompetent Perforator Veins.* February 14, 2013. [Archived April 2014]. Lansdale, PA.
38. Hayes, Inc. *Hayes Search & Summary: Ultrasound-Guided Sclerotherapy for Varicose Veins*. April 2011. [Archived November 2011]. Lansdale, PA.
39. Hingorani AP, Ascher E, Markevich, et al. Deep venous thrombosis after radiofrequency ablation of greater saphenous vein: a word of caution. *J Vasc Surg*. 2004;40(3):500-504.
40. Hirsch SA, Dillavou E. Options in the management of varicose veins, 2008. *J Cardiovasc Surg.* 2008;49:19-26.
41. Jamieson W. State of the art venous investigation and treatment. *Can J Sur*. 1993;36:119-128.
42. Jones RH, Carek PJ. Management of varicose veins. *Am Fam Physician*. 2008;78(11):1289-1294.

43. Jutley R, Cadle I, Cross K. Preoperative assessment of primary varicose veins: a duplex study of venous incompetence. *Eur J Vasc Endovasc Surg*. 2001;21:370-373.
44. Kabnick LS. Varicose veins: endovenous treatment. In: Cronenwett JL and KW Johnston. eds. *Rutherford 's Vascular Surgery.* 7th ed. Philadelphia, PA:Saunders & Co;2010:Chap 56.
45. Kakkos SK, Bountouroglou D, Assam M, et al. Effectiveness and safety of ultrasound-guided foam sclerotherapy for recurrent varicose veins: immediate results. *J Endovasc Ther.* 2006;13:357-364.
46. Kalodiki E, Lattimer CR, Azzam M, et al. Long-term results of a randomized controlled trial on ultrasound-guided foam sclerotherapy combined with saphenofemoral ligation vs standard surgery for varicose veins. J Vasc Surg. 2012;55:451-457.
47. Khilnani NM, Grassi CJ, Kundu S, et al. Cardiovascular Interventional Radiological Society of Europe, American College of Phlebology, and Society of Interventional Radiology Standards of Practice Committees. Multi-society consensus quality improvement guidelines for the treatment of lower-extremity superficial venous insufficiency with endovenous thermal ablation from the Society of Interventional Radiology, Cardiovascular Interventional Radiological Society of Europe, American College of Phlebology and Canadian Interventional Radiology Association. *J Vasc Interv Radiol*. 2010;21(1):14-31.
48. Kundu S, Lurie F, Millward SF, Padberg F, Vedantham S. Recommended reporting standards for endovenous ablation for the treatment of venous insufficiency: Joint statement of the American Venous Forum and The Society of Interventional Radiology. *J Vasc Interv Radiol.* 2007;18:1073-1080.
49. Kundu S, Grassi CJ, Khilnani NM, et al. Multi-disciplinary quality improvement guidelines for the treatment of lower extremity superficial venous insufficiency with ambulatory phlebectomy from the Society of Interventional Radiology, Cardiovascular Interventional Radiology Society of Europe, American College of Phlebology and the Canadian Interventional Radiology Association, Standards of Practice Committee. *J Vasc Interv Radiol.* 2010;21(1):1-13.
50. Leopardi D, Hoggan BL, Fitridge RA, Woodruff PWH, Maddern GJ. Systematic review of treatments for varicose veins. *Ann Vasc Surg.* 2009;23(2):263-276.
51. Lew WK, Feied CF. Varicose vein surgery. *eMedicine Specialties, Vascular Surgery*. http://www.emedicine.com/med/topic2788.htm. Updated November 11, 2013. Accessed September 17, 2014.
52. Lurie F, Creton D, Eklof B, et al. Prospective randomized study of endovenous radiofrequency obliteration (Closure procedure) versus ligation and stripping in a selected population (EVOLVeS Study). *Journal of Vascular Surgery*. August 2003;38:207-214.
53. Merchant RF, DePalma RG, Kabnick LS. Endovascular obliteration of saphenous reflux: a multicenter study. *J Vasc Surg*. June 2002;35:1190-1196.
54. Michaels JA, Campbell WB, Brazier JE, et al. Randomised clinical trial, observational study and assessment of cost-effectiveness of the treatment of varicose veins (REACTIV trial). *Health Technol Assess*. 2006;10(13):1-196.
55. Min RJ, Khilnani N, Zimmet SE. Endovenous laser treatment of saphenous vein reflux: long-term results. *J Vasc Interv Radiol.* August 2003;14:991-996.
56. Monohan DL. Can phlebectomy be deferred in the treatment of varicose veins? *J Vasc Surg.* 2005;42:1145- 1149.
57. Myers KA, Jolley D, Clough A, Kirwan J. Outcome of ultrasound-guided sclerotherapy for varicose veins: medium- term results assessed by ultrasound surveillance. *Eur J Vasc Endovasc Surg.* 2007;33:116-121.
58. Myers KA, Roberts S. Evaluation of published reports of foam sclerotherapy: what do we know conclusively? *Phlebology*. 2009;24:275-280.
59. Nael R, Rathbun S. Treatment of varicose veins. *Curr Treat Options Cardiovasc Med*. 2009;11(2):91-103.
60. Nesbitt C, Eifell RKG, Coyne P, Badri H, Bhattacharya V, Stansby G. Endovenous ablation (radiofrequency and laser) and foam sclerotherapy versus conventional surgery for great

saphenous vein varices. *Cochrane Database of Systematic Reviews*. 2011, Issue 10. Art. No,:CD005624. DOI: 10.1002/14651858.CD005624.pub2.
61. Nijsten T, Vanden Bos RR, Goldman MP, et al. Minimally invasive techniques in the treatment of saphenous varicose veins. *J Am Acad Dermatol*. 2009;60:110-119.
62. Ombrellino M, Kabnick LS. Varicose vein surgery. *Semin Intervent Radiol*. 2005;22(3):185-194.
63. Passman MA, Dattilo JB, Guzman RJ, et al. Combined endovenous ablation and transilluminated powered phlebectomy: is less invasive better? *Vasc Endovascular Surg*. 2007;41(1):41-47.
64. Peden E, Lumsden A. Radiofrequency ablation of incompetent perforator veins. *Perspect Vasc Surg Endovasc Ther.* 2007;19(1):73-75.
65. Proebstle TM, Gul D, Hehr HA, et al. Infrequent early recanalization of greater saphenous vein after endovenous laser treatment. *J Vasc Surg*. September 2003;38:511-516.
66. Raju S, Neglen P. Chronic venous insufficiency and varicose veins. *N Engl J Med*. 2009;360(22):2319-2327.
67. Rasmussen LH, Lawaetz M, Bjoern L, Vennits B, Blemings A, Eklof B. Randomized clinical trial comparing endovenous laser ablation, radiofrequency ablation, foam sclerotherapy and surgical stripping for great saphenous varicose veins. *Br J Surg*. 2011;98:1079-1087.
68. Rautio T, Ohinmaa A, Perala J, et al. Endovenous obliteration versus conventional stripping operation in the treatment of primary varicose veins: a randomized controlled trial with comparison of the costs. *J Vasc Surg.* May 2002;35(5):958-965.
69. Rautio TT, Perala JM, Wiik HT, et al. Endovenous obliteration with radiofrequency-resistive heating for greater saphenous vein insufficiency: a feasibility study. *J Vasc Interv Radiol*. June 2002;13(6):569-575.
70. Rigby KA, Palfreyman SJ, Beverley C, Michaels JA. Surgery versus sclerotherapy for the treatment of varicose veins. *The Cochrane Database of Systematic Reviews*. 2006, Volume 4.
71. Scavee V. Transilluminated powered phlebectomy: not enough advantages? Review of the literature. *European Journ Vascular & Endovascular Surg*. 2006;31(3):316-319.
72. Schanzer, H. Endovenous ablation plus microphlebectomy/sclerotherapy for the treatment of varicose veins: single or two-stage procedure? *Vasc Endovascular Surg.* 2010;44(7):545-549.
73. Shadid N, Ceulen R, Nelemans P, et al. Randomized clinical trial of ultrasound-guided foam sclerotherapy versus surgery for the incompetent great saphenous vein. *Br J Surg*. 2012;99:1062-1070.
74. Smith PC. Sclerotherapy and foam sclerotherapy for varicose veins. *Phlebology*. 2009;24:260-269.
75. Smith PC, Browne A. Prospective five-year study of ultrasound-guided foam sclerotherapy in the treatment of great saphenous vein reflux. *Phlebology*. 2009;24:183-188.
76. Society of Interventional Radiologists. *Endovenous Ablation Position Statement*. http://www.sirweb.org/clinical/cpg/SIR_venous_ablation_statement_final_Dec03.pdf. December 2003. Accessed September 17, 2014.
77. Society of Interventional Radiologists. *Interventional Radiology Nonsurgical Outpatient Procedure Treats Varicose Veins.* http://www.sirweb.org/patients/varicose-veins/. 2003. Accessed September 17, 2014.
78. Tisi PV. Varicose veins. *Clin Evid*. 2011;01:212. http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3217733/. Accessed December 9, 2014.
79. Vardanian AJ, Cao HL, Lawrence PF. Light-assisted stab phlebectomy: early postoperative experience. *Am Surg*. 2007;73(10):1067-1070.
80. Weiss RA, Weiss MA. Controlled radiofrequency endovenous occlusion using a unique radiofrequency catheter under duplex guidance to eliminate saphenous varicose vein reflux: 2-year follow-up. *Dermat Surg*. 2002;28:38-42.
81. Welch HJ. Yamaki T, Konoeda H, Fujisawa D, et al. Changes in calf muscle deoxygenation after foam sclerotherapy in patients with superficial venous insufficiency. *J Vasc Surg.* 2006;44:601-605.

82. Yamaki T, Konoeda H, Fujisawa D, et al. Changes in calf muscle deoxygenation after foam sclerotherapy in patients with superficial venous insufficiency. *J Vasc Surg*. 2012;56(6):1649-1655.

11/2015 MPC:

83. Alguire PC, Scovell S. Overview and management of lower extremity chronic venous disease. Last updated March 19, 2015. In: *UpToDate*, Basow, DS (Ed), UpToDate, Waltham, MA, 2015.
84. Ihnat DM. Endovenous laser ablation for the treatment of lower extremity chronic venous disease. Last updated March 20, 2015. In: *UpToDate*, Basow, DS (Ed), UpToDate, Waltham, MA, 2015.
85. Joh JH, Kim WS, Jung IM, et al. Consensus for the treatment of varicose vein with radiofrequency ablation. *Vasc Spec Int.* 2014;30(4):105-112. doi:10.5758/vsi.2014.30.4.105.
86. Scovell S. Radiofrequency ablation for the treatment of lower extremity chronic venous disease. Last updated August 2, 2013. In: *UpToDate*, Basow, DS (Ed), UpToDate, Waltham, MA, 2015.

Pre-06/2016 Medical Technology Assessment Committee (MTAC) (Sclerotherapy for Saphenous Veins):

87. Bhayani R, Lippitz J. Varicose Veins. *Dis Mon*. 2009;55:212-222.
88. Blaise S, Bosson JL, Diamand JM. Ultrasound-guided sclerotherapy of the great saphenous vein with 1% vs. 3% polidocanol foam: a multicenter double-blinded randomized trial with 3-year follow-up. *Eur J Vasc Endovasc Surg*. 2010;39:779-786.
89. Chen CH, Chiu CS, Yang CH. Ultrasound-guided foam sclerotherapy for treating incompentent great saphenous veins – results of 5 years of analysis and morphologic evolvement study. *Dermatol Surg*. 2012:38(6):851-857.
90. ECRI Institute. *ECRI Custom Hotline: Echosclerotherapy (Ultrasound-guided) for Treatment of Varicose Veins*. April 2009. Plymouth Meeting, PA.
91. ECRI Institute. *ECRI Hotline: Sclerotherapy for the Treatment of Varicose Veins*. April 2008. Plymouth Meeting, PA.
92. ECRI Institute. *ECRI Hotline: Visual Sclerotherapy for the Treatment of Varicose Veins*. March 2010. Plymouth Meeting, PA.
93. FDA/CDRH resources page. *Sotradecol.* Food and Drug Administration Web site. Available at: http://www.fda.gov/cdrh/index.htm. Accessed March 2, 2010.
94. Gloviczki P, Gomerota AJ, Dalsing MC, et al. 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;53(16s):2s-48s.
95. Greenberg DL, Scovell S. Liquid and foam sclerotherapy techniques for the treatment of lower extremity veins. In: Basow, DS (Ed). *UpToDate*. Waltham, MA: Up to Date; 2013.
96. Hayes, Inc. *Hayes Brief: Ultrasound-Guided Foam Sclerotherapy (UGFS) for Varicose Veins*. November 2011. Search last updated November 2012. Lansdale, PA.
97. Hayes, Inc. *Hayes Directory Report: Sclerotherapy for Symptomatic Varicose Veins*. December 2004. Search last updated January 2009. [Archived January 2010]. Lansdale, PA.
98. Jones RD, Carek PJ. Management of Varicose Veins. *Am Fam Physician*. 2008;78(11):1289-1294.
99. Kakkos SK, Bountouroglou D, Assam M, et al. Effectiveness and safety of ultrasound-guided foam sclerotherapy for recurrent varicose veins: immediate results. *J Endovasc Ther*. 2006;13:357-364.
100. Kalodiki E, Lattimer CR, Azzam M, et al. Long-term results of a randomized controlled trial on ultrasound-guided foam sclerotherapy combined with saphenofemoral ligation vs standard surgery for varicose veins. *J Vasc Surg*. 2012;55:451-457.
101. Kundu, S, Grassi CJ, Khilnani NM, et al. Multi-disciplinary quality improvement guidelines for

the treatment of lower extremity superficial venous insufficiency with ambulatory phlebectomy from the Society of Interventional Radiology, Cardiovascular Interventional Radiology Society of Europe, American College of Phlebology and the Canadian Interventional Radiology Association, Standards of Practice Committee. *J Vasc Interv Radiol.* 2010 Jan;21(1):1-13.

102. Myers KA, Roberts S. Evaluation of published reports of foam sclerotherapy: what do we know conclusively? *Phlebology*. 2009;24:275-280.
103. Nesbitt C, Eifell RKG, Coyne P, Badri H, Bhattacharya V, Stansby G. Endovenous ablation (radiofrequency and laser) and foam sclerotherapy versus conventional surgery for great saphenous vein varices. *Cochrane Database of Systematic Reviews*. 2011, Issue 10. Art. No,:CD005624. DOI: 10.1002/14651858.CD005624.pub2.
104. Nijsten T, Renate R, Goldman MP. Minimally invasive techniques in the treatment of saphenous varicose veins. *J Am Acad Dermatol.* 2009;60:110-119.
105. Rasmussen LH, Lawaetz M, Bjoern L, Vennits B, Blemings A, Eklof B. Randomized clinical trial comparing endovenous laser ablation, radiofrequency ablation, foam sclerotherapy and surgical stripping for great saphenous varicose veins. *Br J Surg*. 2011;98:1079-1087.
106. Rigby KA, Palfreyman SSJ, Beverley C, Michaels JA. Surgery versus sclerotherapy for the treatment of varicose veins. *Cochrane Database of Systematic Reviews* 2004, Issue 4. Art. No.: CD004980.
107. Shadid N, Ceulen R, Nelemans P, et al. Randomized clinical trial of ultrasound-guided foam sclerotherapy versus surgery for the incompetent great saphenous vein. *Br J Surg*. 2012;99:1062-1070.
108. Smith PC, Browne A. Prospective five-year study of ultrasound-guided foam sclerotherapy in the treatment of great saphenous vein reflux. *Phlebology.* 2009;24:183-188.
109. Smith PC. Sclerotherapy and foam sclerotherapy for varicose veins. *Phlebology*. 2009;24:260-269.
110. Tisi PV, Beverley C, Rees A. Injection sclerotherapy for varicose veins. *Cochrane Database of Systematic Reviews* 2006, Issue 4. Art. No.: CD001732.
111. Yamaki T, Konoeda H, Fujisawa D, et al. Changes in calf muscle deoxygenation after foam sclerotherapy in patients with superficial venous insufficiency. *J Vasc Surg*. 2012;56(6):1649-1655.

06/07/2016 MTAC (Sclerotherapy for Saphenous Veins):

112. American College of Phlebology. *Practice Guideline: Treatment of Superficial Venous Disease of the Lower Leg*. Revised February 3, 2016. Accessed June 15, 2016.
113. American College of Radiology. A*CR Appropriateness Criteria®: Radiologic Management of Lower-Extremity Venous Insufficiency*. Last review date 2012. Accessed June 27, 2016.
114. Alguire PC, Scovell S. Overview and management of lower extremity chronic venous disease. Last updated March 15, 2015. In: *UpToDate*, Basow, DS (Ed), UpToDate, Waltham, MA, 2016.
115. Boersma D, Kornmann VNN, van Eekeren RRJP, et al. Treatment modalities for small saphenous vein insufficiency: systematic review and meta-analysis. *J Endovasc Ther*. 2016;23(1):199-211. doi: 10.1177/1526602815616375.
116. 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).
117. 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.
118. Canadian Agency for Drugs and Technologies in Health (CADTH). *Foam Sclerotherapy for Treatment of Varicose Veins: A Review of the Clinical Effectiveness, Safety, Cost-Effectiveness, and Guidelines*. February 12, 2015. Accessed July 11, 2016.

119. Davies HO, Popplewell M, Darvall K, Bate G, Bradbury AW. A review of randomised controlled trials comparing ultrasound-guided foam sclerotherapy with endothermal ablation for the treatment of great saphenous varicose veins. *Phlebology*. 2016;31(4):234-240. doi: 10.1177/0268355515595194.
120. Hayes, Inc. *Hayes Search & Summary: Varithena (Polidocanol Injectable Foam 1%) (Provensis Ltd.)For The Treatment of Great Saphenous Vein (GSV) Reflux*. December 4, 2014. Lansdale, PA.
121. King JT, O'Byrne M, Vasquez M, Wright D; 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. doi: 10.1016/j.ejvs.2015.06.111.
122. Nesbitt C, Bedenis R, Bhattacharya V, Stansby G. Endovenous ablation (radiofrequency and laser) and foam sclerotherapy versus open surgery for great saphenous vein varices. *Cochrane Database Syst*. Revised July 30, 2014;(7):CD005624. doi: 10.1002/14651858.CD005624.pub3.
123. National Institute for Health and Care Excellence (NICE*). Ultrasound-Guided Foam Sclerotherapy for Varicose Veins*. Issued February 2013. NICE Interventional procedure guidance 440. London: National Clinical Guideline Centre (UK).
124. National Institute for Health and Care Excellence (NICE). *Varicose Veins in the Legs*. Issued August 2014. NICE quality standard 67. London: National Clinical Guideline Centre (UK).
125. O'Donnell TF Jr, Passman MA, Marston WA, et al. Management of venous leg ulcers: clinical practice guidelines of the Society for Vascular Surgery and the American Venous Forum. *J Vasc Surg*. 2014;60:3S-59S.
126. Scovell S. Liquid, foam, and glue sclerotherapy techniques for the treatment of lower extremity veins. Last updated June 1, 2016. In: *UpToDate*, Basow, DS (Ed), UpToDate, Waltham, MA, 2016.
127. Todd KL, III, Wright DI, VANISH-2 Investigator Group. Durability of treatment effect with polidocanol endovenous microfoam on varicose vein symptoms and appearance (VANISH-2). *J Vasc Surg:Venous and Lym Dis*. 2015;3:258-264.
128. Todd KL III, Wright DI, VANISH-2 Investigator Group. The VANISH-2 study: a randomized, blinded, multicenter study to evaluate the efficacy and safety of polidocanol endovenous microfoam 0.5% and 1.0% compared with placebo for the treatment of saphenofemoral junction incompetence. *Phlebology*. 2014;29(9):608-618. doi: 10.1177/0268355513497709.
129. 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. doi:10.1002/bjs.9867.

11/2016 MPC:
No new references added.

12/2016 MTAC (Review: Endovenous Mechanochemical Ablation (MOCA) for the Treatment of Varicose Veins):

130. Bishawi M, Bernstein R, Boter M, et al. Mechanochemical ablation in patients with chronic venous disease: a prospective multicenter report. *Phlebology.* July 2014;29(6):397-400. doi: 10.1177/0268355513495830.
131. Boersma D, van Eekeren RR, Werson DA, van der Waal RI, Reijnen MM, de Vries JP. Mechanochemical endovenous ablation of small saphenous vein insufficiency using the ClariVein(®) device: one-year results of a prospective series. *Eur J Vasc Endovasc Surg*. March 2013;45(3):299-303. doi: 10.1016/j.ejvs.2012.12.004.
132. Hayes, Inc. *Hayes Brief: Endovenous Mechnochemical Ablation (MOCA) (ClariVein Occlusion Catheter, Nonthermal Vein Ablation System [Vascular Insights LLC]) for Treatment of Varicose Veins*. March, 2015. Annual Review update March, 2016. Lansdale,

PA.
133. Lane T, Bootun R, Dharmarajah B, et al. A multi-centre randomised controlled trial comparing radiofrequency and mechanical occlusion chemically assisted ablation of varicose veins - Final results of the Venefit versus Clarivein for varicose veins trial. *Phlebology*. May 24, 2016. pii: 0268355516651026.
134. Tang TY, Kam JW, Gaunt ME. ClariVein® - Early results from a large single-centre series of mechanochemical endovenous ablation for varicose veins. *Phlebology.* February 2016; DOI: 10.1177/0268355516630154.
135. van Eekeren RR, Boersma D, Konijn V, de Vries JP, Reijnen MM. Postoperative pain and early quality of life after radiofrequency ablation and mechanochemical endovenous ablation of incompetent great saphenous veins. *J Vasc Surg*. February 2013;57(2):445-450. doi: 10.1016/j.jvs.2012.07.049.
136. Witte ME, Holewijn S, van Eekeren RR, de Vries JP, Zeebregts CJ, Reijnen MM. Midterm Outcome of Mechanochemical Endovenous Ablation for the Treatment of Great Saphenous Vein Insufficiency. *J Endovasc Ther*. October 2016. pii: 1526602816674455. [Epub ahead of print]

11/2017 MPC:
No new references

08/2018 MTAC (Review: Medical Adhesive for the Treatment of Varicose Veins):

137. ECRI Institute. *Product Brief: VenaSeal Closure System (Medtronic plc.) for Embolizing Varicose Veins.* August 2018. Plymouth Meeting, PA.
138. ECRI Institute. *Product Brief: VenaSeal Closure System (Medtronic) for Embolizing Varicose Veins.* March 2017. Plymouth Meeting, PA.
139. Evidence Compendium U.S. Edition. *VenaSeal™ Closure System.* Plymouth, MN; Medtronic. August 2017.
140. Gibson K, Ferris B. Cyanoacrylate closure of incompetent great, small and accessory saphenous veins without the use of post-procedure compression: Initial outcomes of a post-market evaluation of the VenaSeal System (the WAVES Study). *Vascular.* April 2017; 25(2):149-156.
141. Gibson K, Morrison N, Kolluri R, et al. Twenty-four month results from a randomized trial of cyanoacrylate closure versus radiofrequency ablation for the treatment of incompetent great saphenous veins. [published online ahead of print June 15, 2018]. *J Vasc Surg Venous Lymphat Disord.* doi: 10.1016/j.jvsv.2018.04.009.
142. National Institute for Health and Care Excellence. *Interventional procedures guidance: Cyanoacrylate glue occlusion for varicose veins*. London (UK): National Institute for Health and Care Excellence; June 26, 2015.
143. Scovell S. Liquid, foam, and glue sclerotherapy techniques for the treatment of lower extremity veins. Last updated July 28, 2017. In: *UpToDate*, Collins, K (Ed), UpToDate, Waltham, MA, 2018.

08/2018 MTAC (Review: Sclerotherapy for Saphenous Veins):

144. Carugo D, Ankrett DN, Zhao X, et al. Benefits of polidocanol endovenous microfoam (Varithena®) compared with physician-compounded foams. *Phlebology*. May 2016;31(4):283-295. doi: 10.1177/0268355515589063.
145. ECRI Institute. *Product Brief: Varithena Injectable Foam (BTG International, Inc.) for Treating Varicose Veins*. January 2015. Plymouth Meeting, PA.
146. Gibson K, Kabnick L; Varithena® 013 Investigator Group. 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*. April 2017;32(3):185-193. doi: 10.1177/0268355516635386.

147. Hayes, Inc. *Hayes Brief: Polidocanol Endovenous Microfoam (Varithena) 1% for Treatment of Varicose Veins*. May 2016. Lansdale, PA.
148. Hayes, Inc. *Hayes Brief Annual Review: Polidocanol Endovenous Microfoam (Varithena) 1% for Treatment of Varicose Veins*. January 2018. Lansdale, PA.
149. National Institute for Health and Care Excellence (NICE). *Ultrasound-guided foam sclerotherapy for varicose veins*. *NICE Interventional Procedures Guidance No. 440 [IPG440].* London, UK: National Institute for Health and Care Excellence; February 23, 2013.
150. National Institute for Health and Care Excellence (NICE). *Varicose veins: diagnosis and management. NICE Clinical Guideline No. 168 [CG168].* London, UK: National Institute for Health and Care Excellence; July 24, 2013.
151. Scovell S. Liquid, foam, and glue sclerotherapy techniques for the treatment of lower extremity veins. Last updated July 28, 2017. In: *UpToDate*, Collins, K (Ed), UpToDate, Waltham, MA, 2018.
152. Star P, Connor DE, Parsi K. Novel developments in foam sclerotherapy: Focus on Varithena® (polidocanol endovenous microfoam) in the management of varicose veins. *Phlebology.* April 2018;33(3):150-162. doi: 10.1177/0268355516687864.
153. Todd KL 3rd, Wright DI; VANISH-2 Investigator Group. The VANISH-2 study: a randomized, blinded, multicenter study to evaluate the efficacy and safety of polidocanol endovenous microfoam 0.5% and 1.0% compared with placebo for the treatment of saphenofemoral junction incompetence. *Phlebology*. October 2014;29(9):608-618. doi: 10.1177/0268355513497709.

11/2018 MPC:
No new references

06/2019 MTAC Review: Slcerotherapy for Saphenous Veins:

154. Dillavou, ED, Kiguchi, M. Comparison of methods for endovenous ablation for chronic venous disease. Last updated May 29, 2019. In: *UpToDate*, Collins, KA (Ed), UpToDate, Waltham, MA, 2019.
155. Hamann SAS, Giang J, De Maeseneer MGR, Nijsten TEC, van den Bos RR. Editor's Choice - Five Year Results of Great Saphenous Vein Treatment: A Meta-analysis. *Eur J Vasc Endovasc Surg.* December 2017;54(6):760-770. doi: 10.1016/j.ejvs.2017.08.034.
156. Lam YL, Lawson JA, Toonder IM, et al. Eight-year follow-up of a randomized clinical trial comparing ultrasound-guided foam sclerotherapy with surgical stripping of the great saphenous vein. *Br J Surg.* May 2018;105(6):692-698. doi: 10.1002/bjs.10762.
157. Paravastu SCV, Horne M, Dodd PDF. Endovenous ablation therapy (laser or radiofrequency) or foam sclerotherapy versus conventional surgical repair for short saphenous varicose veins (Review). Cochrane Database Syst Rev. 2016;(11): CD010878.pub2. DOI: 10.1002/14651858.CD010878.pub2.
158. Scovell, S. Liquid, foam, and glue sclerotherapy techniques for the treatment of lower extremity veins. Last updated January 21, 2019. In: *UpToDate*, Collins, KA (Ed), UpToDate, Waltham, MA, 2019.
159. Vähäaho S, Halmesmäki K, Albäck A, Saarinen E, Venermo M. Five-year follow-up of a randomized clinical trial comparing open surgery, foam sclerotherapy and endovenous laser ablation for great saphenous varicose veins. *Br J Surg.* May 2018;105(6):686-691. doi: 10.1002/bjs.10757.

09/2019 MTAC Review: Endovenous Mechanochemical Ablation (MOCA) for the Treatment of Varicose Veins:

160. Dillavou ED, Kiguchi M. Comparison of methods for endovenous ablation for chronic venous disease. Last updated July 17, 2019. In: *UpToDate*, Collins KA (Ed), UpToDate, Waltham, MA, 2019.
161. ECRI Institute. *Product Brief: ClariVein Infusion Catheter (Vascular Insights, LLC) for Peripheral Vascular Interventions.* June 2017. Plymouth Meeting, PA.

162. Hayes, Inc. *Hayes Health Technology Assessment: Endovenous Mechnochemical Ablation (MOCA) (ClariVein Infiusion Catheter, Nonthermal Vein Ablation System; Vascular Insights LLC) for Treatment of Varicose Veins*. June 2017. Lansdale, PA.
163. Hayes, Inc. *Hayes HTA Annual Review: Endovenous Mechnochemical Ablation (MOCA) (ClariVein Infiusion Catheter, Nonthermal Vein Ablation System; Vascular Insights LLC) for Treatment of Varicose Veins*. June 2018. Lansdale, PA.
164. Hayes, Inc. *Hayes HTA Annual Review: Endovenous Mechnochemical Ablation (MOCA) (ClariVein Infiusion Catheter, Nonthermal Vein Ablation System; Vascular Insights LLC) for Treatment of Varicose Veins*. August 2019. Lansdale, PA.
165. Holewijn S, van Eekeren RRJP, Vahl A, de Vries JPPM, Reijnen MMPJ, and MARADONA study group. Two-year results of a multicenter randomized controlled trial comparing Mechanochemical endovenous Ablation to RADiOfrequeNcy Ablation in the treatment of primary great saphenous vein incompetence (MARADONA trial). *J Vasc Surg Venous Lymphat Disord*. May 2019;7(3):364-374. doi: 10.1016/j.jvsv.2018.12.014.
166. Vähäaho S, Mahmoud O, Halmesmäki K, et al. Randomized clinical trial of mechanochemical and endovenous thermal ablation of great saphenous varicose veins. *Br J Surg.* April 2019;106(5):548-554. doi: 10.1002/bjs.11158.
167. Witte ME, Zeebregts CJ, de Borst GJ, Reijnen MMPJ, Boersma D. Mechanochemical endovenous ablation of saphenous veins using the ClariVein: A systematic review. *Phlebology*. December 2017;32(10):649-657. doi: 10.1177/0268355517702068.

11/2019 MPC:
No new references

02/2020 MPC:
No new references

04/2020 MTAC Review (Medical Adhesive for the Treatment of Varicose Veins):

168. BlueCross BlueShield Association Evidence Street. *Treatment of Varicose Veins/Venous Insufficiency*. June 2019.
169. ECRI Institute. *Product Brief: VenaSeal Closure System (Medtronic plc.) for Embolizing Varicose Veins.* November 2019. Plymouth Meeting, PA.
170. Hayes, Inc. *Health Technology Assessment: Cyanoacrylate Embolization (VenaSeal Closure System) for the Treatment of Varicose Veins.* October 2019. Lansdale, PA.
171. Kolluri R, Chung J, Kim S, et al. Network meta-analysis to compare VenaSeal with other superficial venous therapies for chronic venous insufficiency. *J Vasc Surg Venous Lymphat Disord.* [published online ahead of print February 13, 2020]. doi: 10.1016/j.jvsv.2019.12.061.
172. Morrison N, Gibson K, Vasquez M, Weiss R, Jones A. Five-year extension study of patients from a randomized clinical trial (VeClose) comparing cyanoacrylate closure versus radiofrequency ablation for the treatment of incompetent great saphenous veins. [published online ahead of print March 20, 2020]. *J Vasc Surg Venous Lymphat Disord.* doi: 10.1016/j.jvsv.2019.12.080.
173. Morrison N, Kolluri R, Vasquez M3 Madsen M, Jones A, Gibson K. Comparison of cyanoacrylate closure and radiofrequency ablation for the treatment of incompetent great saphenous veins: 36-Month outcomes of the VeClose randomized controlled trial. *Phlebology.* July 2019;34(6):380-390. doi: 10.1177/0268355518810259.
174. National Institute for Health and Care Excellence. *Interventional Procedures Guidance #670. Cyanoacrylate glue occlusion for varicose veins.* London (UK): National Institute for Health and Care Excellence. March 04, 2020.
175. Scovell, S. Liquid, foam, and glue sclerotherapy techniques for the treatment of lower extremity veins. Last updated December 02, 2019. In: *UpToDate*, Collins, KA (Ed), UpToDate, Waltham, MA, 2020.

176. Zierau UT. VenaSeal®-Closure: Results Over 6 Years Treatment. A follow - Up Study Conducted on 1950 Truncal Saphenous Veins in 1061 Cases. *J Vasc Endovasc Therapy*. September 2018;3(3:17).

06/2020 MPC:
No new references

11/2020 MPC:
No new references

11/2021 MPC:
No new references

06/2022 MPC:

177. Choi JY, Lee JH, Kwon OJ. Association between the saphenous vein diameter and venous reflux on computed tomography venography in patients with varicose veins. *PLoS One*. 2022 Feb;17(2):e0263513. doi: 10.1371/journal.pone.0263513.
178. Swoboda SJ, Schumann H, Kiritsi D. A leg ulcer with pulsating varicose veins - from the legs to the heart. *Int Wound J*. 2018;15(1):62-64. doi: 10.1111/iwj.12834.

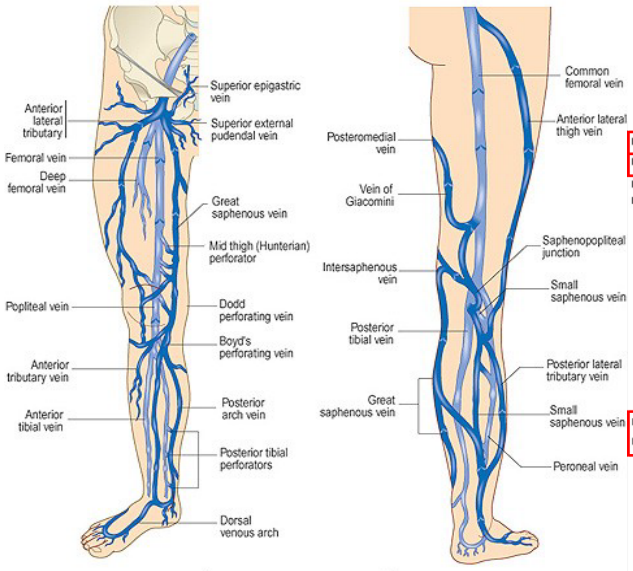
11/2022 MPC:

179. Gibson K, Khilnani N, Schul M, Meissner M; American College of Phlebology Guidelines Committee. American College of Phlebology Guidelines - Treatment of refluxing accessory saphenous veins. Phlebology. 2017 Aug;32(7):448-452. doi: 10.1177/0268355516671624. Epub 2016 Oct 13. PMID: 27738242.
180. Masuda E, Ozsvath K, Vossler J, Woo K, Kistner R, Lurie F, Monahan D, Brown W, Labropoulos N, Dalsing M, Khilnani N, Wakefield T, Gloviczki P. The 2020 appropriate use criteria for chronic lower extremity venous disease of the American Venous Forum, the Society for Vascular Surgery, the American Vein and Lymphatic Society, and the Society of Interventional Radiology. J Vasc Surg Venous Lymphat Disord. 2020 Jul;8(4):505-525.e4. doi: 10.1016/j.jvsv.2020.02.001. Epub 2020 Mar 3. PMID: 32139328.

11/2023 MPC:
No new references

09/2024 MPC:
No new references

Appendix 1



The Venous Anatomy of the Legs
Deep System - light blue Superficial System - dark blue

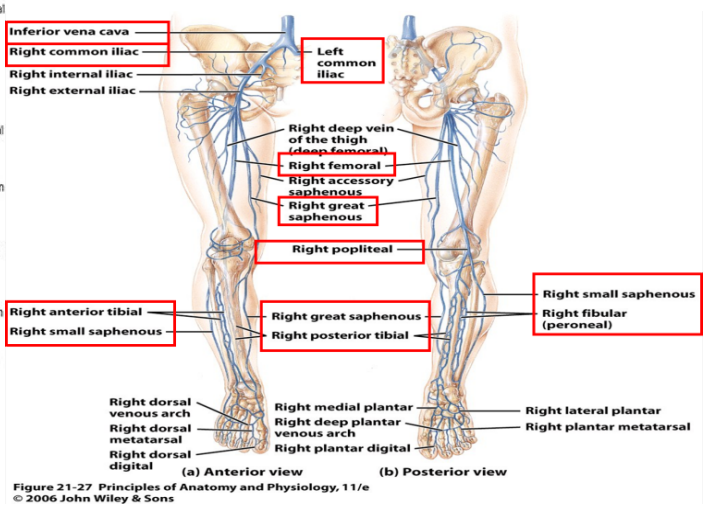
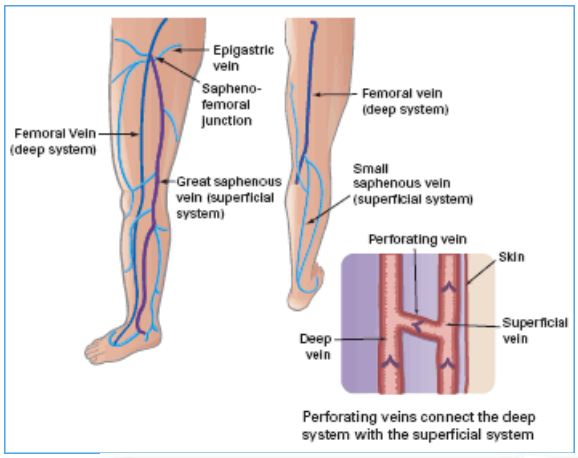


Figure 21-27 Principles of Anatomy and Physiology, 11/e
© 2006 John Wiley & Sons



Perforating veins connect the deep system with the superficial system