Surgical and Ablative Procedures for Venous Insufficiency and Varicose Veins (for Kentucky Only)

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Ü Instructions for Use

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Related Policies

- Cosmetic and Reconstructive Procedures (for Kentucky Only)
- Embolization of the Ovarian and Iliac Veins for Pelvic Congestion Syndrome (for Kentucky Only)
- Outpatient Surgical Procedures – Site of Service

Application

This Medical Policy only applies to the state of Kentucky.

Coverage Rationale

Ü See Benefit Considerations

Varicose Vein Ablative and Stripping Procedures

Varicose Vein ablative and Stripping procedures are considered reconstructive, proven, and medically necessary in certain circumstances. For medical necessity clinical coverage criteria, refer to the InterQual® CP: Procedures:

- Ablation, Endovenous, Varicose Vein
- Ligation/Excision, Varicose Vein, +/- Stripping

Click here to view the InterQual® criteria.

Ligation Procedures

The following procedure is proven and medically necessary:

- Ligation at the saphenofemoral junction, as a stand-alone procedure, when used to prevent the propagation of an active clot to the deep venous system in individuals with ascending Superficial Thrombophlebitis who fail or are intolerant of anticoagulation therapy

The following procedure is proven and medically necessary in certain circumstances:

- Ligation, subfascial, endoscopic surgery for treatment of perforating veins associated with chronic Venous Insufficiency. For medical necessity clinical coverage criteria, refer to the InterQual® CP: Procedures, Ligation, Subfascial, Endoscopic, Perforating Vein.

  Click here to view the InterQual® criteria.

The following procedures are unproven and not medically necessary for treating Venous Reflux due to insufficient evidence of efficacy:

- Ligation of the Great Saphenous Vein (GSV) at the saphenofemoral junction, as a stand-alone procedure
- Ligation of the Small Saphenous Vein (SSV) at the saphenopopliteal junction, as a stand-alone procedure
- Ligation of the accessory veins, as a stand-alone procedure
- Ligation at the saphenofemoral junction, as an adjunct to radiofrequency ablation or endovenous laser ablation of the main saphenous veins

Ambulatory Phlebectomy

Ambulatory phlebectomy for treating Varicose Veins is proven and medically necessary in certain circumstances. For medical necessity clinical coverage criteria, refer to the InterQual® CP: Procedures, Ambulatory Phlebectomy, Varicose Vein for:

- Hook Phlebectomy
- Microphlebectomy
- Mini Phlebectomy
- Stab Avulsion
- Stab Phlebectomy

Click here to view the InterQual® criteria.

Other Procedures

Sclerotherapy is proven and medically necessary in certain circumstances. For medical necessity clinical coverage criteria, refer to the InterQual® CP: Procedures, Sclerotherapy, Varicose Vein.

Click here to view the InterQual® criteria.

The following procedures are unproven and not medically necessary for treating Venous Reflux due to insufficient evidence of efficacy:

- Endovascular embolization of Varicose Veins using cyanoacrylate-based adhesive
- Endovenous mechanochemical ablation (MOCA) of Varicose Veins
- Porcine bioprosthetic valve (e.g., VenoValve) implantation into the femoral vein for treatment of deep vein reflux associated with chronic Venous Insufficiency

Definitions

Refer to the federal, state, or contractual definitions that supersede the definitions below.

Endovenous Ablation: A minimally invasive procedure that uses heat generated by radiofrequency (RF) or laser energy to seal off damaged veins (NIH, 2023).

Great Saphenous Vein (GSV): A long vein that can be seen just in front of the anklebone. This vein travels along the inside of the leg and thigh (about one-half inch beneath the skin in the thigh) until it empties into the deep vein called the common femoral vein in the groin [American Vein & Lymphatic Society (AVLS), 2023].

Ligation: Tying off a vein (AVLS, 2023).

Reticular Vein: A network of veins parallel to the skin surface and lying between the saphenous fascia and dermis. These veins communicate with either saphenous tributaries or the deep veins through perforators (Meissner, 2005).

Small Saphenous Vein (SSV): A superficial vein that starts at the outside of the foot and travels up the back of the calf where it empties into the deep vein (popliteal vein) in the crease of the knee (AVLS, 2023).

Spider Vein: Spider Veins/Telangiectasias are dilated small superficial veins measuring less than 1.0 mm in diameter and occurring predominantly in the lower extremities (Nukano, 2021).

Superficial Thrombophlebitis: Inflammation of a vein due to a blood clot in a vein just below the skin's surface (AVLS, 2023).

Varicose Veins: Varicose Veins are dilated subcutaneous tributaries ≥ 3 mm in diameter and patients with Varicose Veins belong to clinical stage, etiology, anatomy, pathology (CEAP) Class C2 (Gloviczki, 2023).

Venous Reflux/Insufficiency: Gloviczki et al. (2023) defines Venous Reflux as reversed blood flow in the veins. Abnormal (pathological reflux) times exceed different thresholds depending on the system of veins:

- Deep veins: 1 sec
- Superficial veins: 0.5 sec
- Perforator veins: 0.5 sec

Applicable Codes

The following list(s) of procedure and/or diagnosis codes is provided for reference purposes only and may not be all inclusive. Listing of a code in this policy does not imply that the service described by the code is a covered or non-covered health service. Benefit coverage for health services is determined by federal, state, or contractual requirements and applicable laws that may require coverage for a specific service. The inclusion of a code does not imply any right to reimbursement or guarantee claim payment. Other Policies and Guidelines may apply.

Coding Clarification:

- According to the American Medical Association (AMA), CPT code 37241 is specific to venous embolization/occlusion and excludes lower extremity venous incompetency. Coding instructions state that 37241 should not be used to request treatment of incompetent extremity veins. For sclerosis of veins or endovenous ablation of incompetent extremity veins, refer to CPT codes 36468-36479 (CPT Assistant, 2014).
- Adherence to AMA coding guidance is required when requesting endovenous ablation procedures.

Per AMA coding guidance, the initial incompetent vein treated (e.g., CPT code 36475) may only be requested once per extremity. For endovenous ablation, treatment of subsequent incompetent veins in the same extremity as the initial vein treated (e.g., CPT code 36476), only one add-on code per extremity may be requested, regardless of the number of additional vein(s) treated (CPT Assistant, November 2016).

Therefore, only one primary code may be requested for the initial vein treated, and only one add-on code per extremity may be requested for any subsequent vein(s) treated.

CPT Code	Description
0744T	Insertion of bioprosthetic valve, open, femoral vein, including duplex ultrasound imaging guidance, when performed, including autogenous or nonautogenous patch graft (e.g., polyester, ePTFE, bovine pericardium), when performed
36465	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)
36466	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
36468	Injection(s) of sclerosant for spider veins (telangiectasia), limb or trunk
36470	Injection of sclerosant; single incompetent vein (other than telangiectasia)
36471	Injection of sclerosant; multiple incompetent veins (other than telangiectasia), same leg
36473	Endovenous ablation therapy of incompetent vein, extremity, inclusive of all imaging guidance and monitoring, percutaneous, mechanochemical; first vein treated
36474	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)
36475	Endovenous ablation therapy of incompetent vein, extremity, inclusive of all imaging guidance and monitoring, percutaneous, radiofrequency; first vein treated
36476	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)
36478	Endovenous ablation therapy of incompetent vein, extremity, inclusive of all imaging guidance and monitoring, percutaneous, laser; first vein treated

CPT Code	Description
36479	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)
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; first vein treated
36483	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)
37500	Vascular endoscopy, surgical, with ligation of perforator veins, subfascial (SEPS)
37700	Ligation and division of long saphenous vein at saphenofemoral junction, or distal interruptions
37718	Ligation, division, and stripping, short saphenous vein
37722	Ligation, division, and stripping, long (greater) saphenous veins from saphenofemoral junction to knee or below
37735	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
37765	Stab phlebectomy of varicose veins, 1 extremity; 10-20 stab incisions
37766	Stab phlebectomy of varicose veins, 1 extremity; more than 20 incisions
37780	Ligation and division of short saphenous vein at saphenopopliteal junction (separate procedure)
37785	Ligation, division, and/or excision of varicose vein cluster(s), 1 leg
37799	Unlisted procedure, vascular surgery

Description of Services

Varicose Veins are enlarged veins that are swollen and raised above the surface of the skin. They can be dark purple or blue and look twisted and bulging. Varicose Veins are commonly found on the backs of the calves or on the inside of the leg. Veins have one-way valves that help keep blood flowing towards the heart. When the valves become weak or damaged and do not close properly, blood can back up and pool in the veins causing them to get larger. The resulting condition is known as Venous Insufficiency or Venous Reflux. Varicose Veins may lead to complications such as pain, blood clots or skin ulcers.

Duplex ultrasound is considered the gold standard for diagnosis of superficial venous incompetence. The CEAP (clinical, etiology, anatomy, pathophysiology) classification system is used to describe the degree of varicosity. The “C” part of CEAP classification is more useful and practical in rating the severity of Varicose Veins:

- C0: No visible or palpable signs of venous disease
- C1: Telangiectasias (Spider Veins) or Reticular Veins
- C2: Varicose Veins (diameter of vein is > 3mm)
- C3: Edema
- C4a: Pigmentation and eczema
- C4b: Lipodermatosclerosis and atrophie blanche
- C5: Healed venous ulcer
- C6: Active venous ulcer

[Lurie et al. American Venous Forum (AVF), 2020]

Venous clinical severity scoring has been used to measure clinical improvement after treatment of Varicose Veins. Other venous severity scoring methods include Venous Severity Score, Venous Clinical Severity Score, Venous Segmental Disease Score [Lurie et al. (AVF), (2020)].

Preoperative venous duplex ultrasound is used to evaluate patients for Venous Insufficiency symptoms or suspected DVT; it can provide a road map of vein anatomy similar to contrast venography, as well as essential hemodynamic information about the presence of proximal obstruction, vein valve function, and Venous Reflux (Lin et al., 2015).

Varicose Veins are treated with lifestyle changes and medical procedures done either to remove the veins or to close them. Endovenous Ablation therapy uses lasers or radiofrequency energy to create heat to close off a Varicose Vein. Vein Stripping and Ligation involves tying shut and removing the veins through small cuts in the skin [National Heart, Lung, and Blood Institute (NHLBI), 2014].

Endomechanical ablation uses a specialized, rotating catheter (e.g., ClariVein) to close off a Varicose Vein by damaging the vessel lining prior to injecting a sclerosing agent. This technique is also referred to as mechanochemical ablation (MOCA), mechanicochemical Endovenous Ablation (MCEA) and mechanically enhanced endovenous chemical ablation (MEECA).

Endovascular embolization using cyanoacrylate-based adhesive (e.g., VenaSeal™ Closure System) is a minimally invasive, non-thermal and non-sclerosant procedure that does not require tumescent anesthesia. The medical adhesive is used to close the lower extremity superficial truncal veins, such as the Great Saphenous Vein, in individuals with symptomatic Venous Reflux disease.

Endovascular embolization using endovenous foam sclerotherapy with polidocanol endovenous microfoam (PEM) [e.g., Varithena™ (Provensis Ltd.)], is a prescribed proprietary canister that generates a sterile, uniform, stable, low-nitrogen polidocanol 1% microfoam sclerosant intended for ultrasound-guided intravenous (IV) injection for treating venous incompetence and varicosities (Hayes, 2022). The aim of ultrasound-guided foam sclerotherapy for Varicose Veins is to damage the endothelial surface of the vein causing scarring and leading to blockage of the treated Varicose Veins. Sclerosant, in the form of a foam, is intended to have good surface area contact with the vein walls [National Institute of Health and Care Excellence (NICE), 2013].

Benefit Considerations

Coverage Limitations and Exclusions

The following procedures are excluded from coverage:

- Treatments for Spider Veins and/or Telangiectasias are considered to be cosmetic and therefore excluded from coverage.
- Endovenous Ablation (radiofrequency and/or laser) of either reticular or telangiectatic veins is not reconstructive and not medically necessary and therefore excluded from coverage.

Clinical Evidence

Endovenous Mechanochemical Ablation

Evidence in peer review literature evaluating endovenous mechanochemical ablation (MOCA) for the treatment of venous insufficiency and varicose veins is limited. Future robust RCTs are warranted along with long-term outcomes to establish the safety and efficacy of this procedure.

Lim et al. (2023) conducted a meta-analysis to compare outcomes from RCTs regarding MOCA versus endovenous thermal ablation (EVTA) in the treatment of adult patients with symptomatic or complicated superficial venous incompetence of CEAP classes 2-6. Occlusion rate, QoL, procedural and postprocedural pain, and rates of venous thromboembolism were the outcomes assessed. Four RCTs were included in the meta-analysis comprised of 654 patients. The anatomical occlusion rate at one year was lower after MOCA than EVTA (risk ratio 0.85, 95 per cent c.i. 0.78 to 0.91; $p < 0.001$). No significant differences were detected in procedural pain (mean difference -3.25, -14.25 to 7.74; $p = 0.560$) or postprocedural pain (mean difference -0.63, -2.15 to 0.89; $p = 0.420$). There were no significant differences in Aberdeen Varicose Vein Questionnaire score at one year (mean difference 0.06, -0.50 to 0.62; $p = 0.830$) or in incidence of venous thromboembolism (risk ratio 0.72, 95 per cent c.i. 0.14 to 3.61; $p = 0.690$). The authors concluded there was no difference in procedural and postprocedural pain between the interventions but the success rate of occlusion after MOCA was significantly lower than after EVTA. Additionally, the authors note this study supports existing international guidelines which advocate EVTA as the preferred first-line treatment for superficial venous incompetence in the majority of patients. The authors state additional long-term studies are needed to evaluate the impact of reduced vein occlusion rate on quality of life and reinterventions. Mohamed et al. (2021) which was previously cited in this policy, is included in this review.

A systematic review and meta-analysis consisting of eight RCTs was conducted by Shahzad et al. (2023) who compared the technical success, complications, and QoL after thermal versus non-thermal EVLA for the treatment of superficial venous incompetence. Vein occlusion rate up to four weeks and one to two years from procedure was the primary outcome. Peri-procedural pain, nerve injury, endothermal heat induced thrombosis, and QoL were the secondary

outcomes measured. The study comprised a total of 1956 patients, endovenous thermal ablation was received by 1042 individuals and 915 underwent endovenous non-thermal ablation. There was no statistically significant difference in occlusion rate at all time points. Relative risk at four weeks and one to two years was 0.99 and 0.95 respectively. Non-thermal ablation was tolerated better and had less risk of nerve injury. There was no statistically significant difference in risk of endothermal heat induced thrombosis (EHIT). There was improvement in QoL scores post-procedure but there was no statistically significant difference in thermal vs. non-thermal ablation. The quality of evidence assessed using GRADE methodology showed high quality for occlusion rate at four weeks and one to two years, moderate quality for nerve injury and peri-procedural pain, and low quality for EHIT. The authors concluded there is no statistically significant difference in vein occlusion rates between thermal and glue ablation of truncal varicose veins, QoL after both thermal and non-thermal endovenous ablation are similar and non-thermal endovenous ablation resulted in less pain and less risk of nerve injury. However, the occlusion rate using MOCA, considered in isolation, is statistically significantly worse than for thermal ablation. Limitations include the impact of stab phlebectomies and compression therapy to endovenous ablation was not explored, the lack of information on differences in heat energy and laser wavelengths used in trials, and individual modalities within each group were not separately evaluated. Bootun et al. (2016), Holewijn et al. (2019), Mohamed et al. (2021), and Vähäaho et al. (2019), which were previously cited in this policy, are included in this review.

A Hayes Health Technology Assessment states MOCA with the ClariVein infusion catheter appears safe and effective over the short-term but the low-quality body of evidence does not allow conclusions to be drawn regarding the long-term durability of the procedure. The report states that MOCA resulted in slightly poorer technical outcomes and higher rates of recanalization than thermal ablation and surgical procedures. The report recommends future well-designed trials with larger sample sizes that compare MOCA using the ClariVein infusion catheter with clinical alternatives with a long-term follow-up. The updated annual review recommends no change in the current rating (Hayes, 2022; updated 2023).

In an updated Cochrane review, Whing et al. (2021) compared interventions for treating varicosities of the GSV. The review included 24 RCTs with 5,135 participants who underwent EVLA, RFA, EVSA, UGFS, cyanoacrylate glue, MOCA, or high ligation and stripping. The authors found there was no clear difference in technical success or recurrence between RFA compared to MOCA, however, long-term data were not available, and the confidence intervals of the combined data were broad, making these findings largely inconclusive. Additionally, the authors noted all the trials had some risk of bias concerns. The authors determined there were a relatively small number of studies for comparison and differences in outcome definitions and time points reported limited their conclusions. Future studies which provide more evidence on the breadth of treatments are recommended by the authors. Bootun et al. (2016), Lane et al. (2017), Holewijn et al. (2019), Vähäaho et al. (2019), which were previously cited in this policy, are included in this review.

Kim et al. (2017) evaluated in a case series whether early efficacy in endovenous MOCA is maintained at 24 months. Patients with reflux in the GSV involving the SFJ and no previous venous interventions were included. The occlusion rate of treated veins was assessed with duplex ultrasound. Patient clinical improvement was assessed by CEAP class and VCSS. Of the initial 126 patients, there were 65 patients with 24-month follow-up. Of these 65 patients, 70% were female, with a mean age of 70 ±14 years and an average BMI of 30.5 ±6. The mean GSV diameter in the upper thigh was 7.6 mm and the mean treatment length was 39 cm. Adjunctive treatment of the varicosities was performed in 14% of patients during the procedure. Closure rates were 100% at one week, 98% at three months, 95% at 12 months, and 92% at 24 months. There was one patient with complete and four with partial recanalization ranging from seven to 12 cm (mean length 9 cm). There was significant improvement in CEAP and VCSS ($p < .001$) for all time intervals. Early high occlusion rate with MOCA is associated with significant clinical improvement, which was maintained at 24 months. According to the authors, this finding is suggestive of a good option for the treatment of GSV incompetence. Longer-term outcomes are needed to evaluate MOCA's efficacy. The study is limited by lack of comparison group and large loss to follow-up.

Vos et al. (2017) conducted a systematic review and meta-analysis to evaluate the efficacy of MOCA and cyanoacrylate vein ablation (CAVA) for GSV incompetence. Eligible articles were prospective studies that included patients treated for GSV incompetence and described the primary outcome. Exclusion criteria were full text not available, case reports, retrospective studies, small series ($n < 10$), reviews, abstracts, animal studies, studies of SSV incompetence, and recurrent GSV incompetence. Primary outcome was anatomic success. Secondary outcomes were initial technical success, VCSS, AVVQ score, and complications. Fifteen articles met the inclusion criteria. Pooled anatomic success for MOCA and CAVA was 94.7% and 94.8% at six months and 94.1% and 89.0% at one year, respectively. VCSS and AVVQ score significantly improved after treatment with MOCA and CAVA. The authors conclude that both of these non-thermal techniques are promising and could serve as alternatives for thermal ablation techniques. However, to determine their exact role in clinical practice, high-quality RCTs comparing these novel modalities with well-established techniques are required. This study is limited by inclusion or mostly uncontrolled studies to assess the efficacy and safety of MOCA. Elias and Raines (2012) and Bishawi et al. (2014), which were previously cited in this policy, are included in this meta-analysis.

Witte et al. (2017a) conducted a systematic review and meta-analysis of MOCA of saphenous veins using the ClariVein to report on the anatomical, technical, and clinical success. The literature search identified 759 records, of which 13 were included, describing 10 unique cohorts. A total of 1,521 veins (1,267 GSV and 254 SSV) were included, with cohort sizes ranging from 30 to 570 veins. The pooled anatomical success rate after short-term follow up was 92% (95% CI 90-94%) (n = 1,314 veins). After six and 12 months these numbers were 92% (95% CI 88-95%) (n = 284) and 91% (95% CI 86-94%) (n = 228), respectively. The long-term anatomical success rates at two and three years were 91% (95% CI 85-95%) (n = 136) and 87% (95% CI 75-94%) (n = 48), respectively. Major complications and especially nerve injury were very rare (≤ 0.2%). All studies were of moderate or good quality using the methodological index for non-randomized studies (MINORS) scoring scale. The authors concluded that MOCA using the ClariVein in combination with liquid sclerosant is associated with an anatomical success rate ranging from 87% to 92% and good clinical success. However, they reported that no RCTs are available studying the anatomical success after MOCA compared to the endothermal ablation.

Witte et al. (2017b) reported midterm results of MOCA for treating GSV insufficiency. In a 1-year period, 85 consecutive patients undergoing MOCA with polidocanol in 104 limbs were enrolled in a prospective registry. The patients were evaluated at baseline and during follow-up (four weeks and one, two, and three years) using duplex ultrasound, the CEAP classification, the VCSS, the RAND Short Form 36-Item Health Survey (RAND-SF36), and the AVVQ. Primary outcome measures were clinical and anatomic success. Secondary outcome measures included general and disease specific QoL and re-interventions. After a median follow-up of 36 months (interquartile range 12.5, 46.3), recanalization occurred in 15 (15%) of 102 successfully treated vein segments. Anatomic success was 92%, 90%, and 87% after one, two, and three years, respectively. The VCSS improved at all time intervals compared to the preprocedural median. The clinical success at three years was 83%. The AVVQ and RAND-SF36 scores showed an improvement at all time intervals compared to baseline values. Between 12 and 36 months, however, a significant deterioration was observed in VCSS, which was accompanied by worsening of disease specific and general QoL. Although the authors concluded that MOCA demonstrated to be an effective treatment modality for GSV insufficiency at midterm follow-up, clinical results seemed to drop over time. Additionally, these findings are limited by lack of comparison group undergoing a different treatment.

Vun et al. (2015) assessed the efficacy of the ClariVein system for the treatment of superficial vein incompetence. Fifty-one GSVs and six SSVs were treated. Duplex showed a technical success rate of 91%. Comparison with 50 RFA and 40 EVLA procedures showed procedure times were significantly less for ClariVein than for either RFA or EVLA. Median pain scores were significantly lower for ClariVein than for RFA and EVLA. No major complications or deep vein thromboses were reported. Study limitations included small sample size, lack of randomization, and short-term follow-up. Further data on long-term clinical outcomes is needed.

In a pilot study, van Eekeren et al. (2011) evaluated the feasibility and safety of endovenous MOCA for the treatment of GSV incompetence. Thirty limbs in 25 patients (18 women; mean age 52 years) with GSV incompetence were treated with the ClariVein® device. Initial technical success, complications, patient satisfaction, and classification by VCSS were assessed 6 weeks after the treatment. Initial technical success of MOCA was 100%. There were no major adverse events. Duplex ultrasonography at six weeks showed 26 (87%) of 30 veins were completely occluded. Three veins showed partial recanalization in the proximal and distal GSV. One patient had full segment recanalization and was successfully retreated. The VCSS significantly improved at six weeks. Patient satisfaction was high, with a median satisfaction of 8.8 on a 0-10 scale. The authors concluded that endovenous MOCA is feasible and safe in the treatment of GSV incompetence. Larger studies with a prolonged follow-up are indicated to prove the efficacy of this technique. This study is limited by lack of comparison group undergoing a different treatment approach.

Endovascular Embolization With Cyanoacrylate-Based Adhesive

Quality evidence in peer review literature evaluating endovascular embolization with cyanoacrylate-based adhesive for the treatment of venous insufficiency and varicose veins is limited. Future robust RCTs are warranted along with long-term outcomes to establish the safety and efficacy of this procedure. An ongoing RCT may provide more definitive findings about this technology (NCT03820947).

Amshar et al. (2022) conducted a systematic review and meta-analysis to evaluate the efficacy, intervention time, and safety of cyanoacrylate embolization (CAE) in comparison to EVLA in treatment of saphenous vein insufficiency. Efficacy was determined by venous closure rate one-year post-intervention and VCSS one-year post-intervention. Safety was determined by rates of periprocedural pain, skin pigmentation, nerve damage, phlebitis, DVT and ecchymosis. Two randomized-controlled trials and three cohort studies were included in this review. The total number of individuals was 1,432 (710 CAE and 722 EVLA). Venous closure rates and VCSS did not differ significantly between CAE group and EVLA group. Pooled data showed that CAE group was associated with less periprocedural pain score ($p < 0.001$), lower skin pigmentation rates (0.60% vs. 4.46%; $p = 0.008$), and lower nerve damage rates (0% vs. 3.94%; $p = 0.007$). Rates of phlebitis, DVT, and ecchymosis did not differ significantly between the two groups. In addition, intervention time was significantly faster in CAE group compared to EVLA group ($p < 0.001$). The authors concluded CAE was not inferior to

EVLA in terms of efficacy and CAE showed less adverse effects occurrence rates of periprocedural pain, skin pigmentation, and nerve damage complications. Additionally, intervention time is stated to be faster with CAE compared to EVLA. The authors note that future RCTs with larger sample sizes and longer post-procedural follow-up time are needed. Additionally, efficacy outcomes were limited to one year and longer-term outcome data may provide additional evidence of efficacy. Bozkurt and Yilmaz (2016), and Eroglu and Yasim (2018) which were previously cited in this policy, are included in this review. Currently, the VariClose Vein Sealing System (Biolas, FG Grup, Turkey) is under research in countries other than the United States and has neither been approved nor cleared for marketing by the FDA.

A 2022 Hayes Health Technology Assessment evaluated nine clinical studies on the efficacy and safety of cyanoacrylate embolization with the VenaSeal Closure System. The evidence included three RCTs and six retrospective comparative studies. The conclusion states that a low-quality body of evidence suggests VenaSeal has a high level of successful venous closure for at least one year that may result in reduced symptom severity and improved QoL. Efficacy and safety may be comparable to RFA, EVLA, and MOCA; however, substantial uncertainly remains regarding its effectiveness due to the lack of well-designed comparative studies and limited follow-up beyond one year. The authors overall conclusion is that cyanoacrylate embolization with the VenaSeal Closure System has potential but unproven benefits. The updated Hayes, 2023 summary makes no change to the current rating.

Joh et al. (2021) conducted an open-label multicenter, prospective, RCT that compare the clinical outcomes of cyanoacrylate closure (CAC) and surgical stripping (SS) for the treatment of incompetent great saphenous veins. One hundred and twenty-six patients were randomized into two groups (63 with CAC and 63 with SS). Target vein occlusion was assessed on the third day and one, three, six, and 12 months postoperatively using duplex ultrasound. The primary endpoint of the study was to evaluate complete closure of the target vein at three months. Ecchymosis grades, VCSS, AVVQ scores, and pain were also assessed as secondary outcomes. Postoperative pain scores were significantly better in the CAC group than in the SS group. In addition, the mean ecchymosis grade was 0.3 ±0.5 in the CAC group and 1.1 ±1.1 in the SS group ($p < .001$). The VCSS and QoL had improved equally in both groups. Most complications were minor (nine events in CAC group and 20 events in SS group) with one major complication occurring in a patient who had undergone the SS procedure. Complete occlusion of the target vein at three months was achieved by both procedures. Postoperative pain and ecchymosis grades were significantly lower in the CAC group. The authors concluded that CAC has a high success rate with few complications. Limitations noted by the authors include lack of information on patient return to work and daily activities, pain scores during the procedure and immediately after the procedure were not obtained, the 2X2 factorial design with 1:1 randomization, could contribute to differences in gender distribution and VCSSs in the two groups and concomitant phlebectomy could have also influenced the occurrence of complications. Additionally, lack of masking could have introduced a bias in the findings.

A systematic review by Dimech and Cassar (2020) was performed to assess the efficacy of *n*-butyl-2-cyanoacrylate (NBCA) glue in ablating primary truncal varicose veins and eliminating reflux compared with existing endovascular techniques. Secondary outcomes include complications and quality of life. PRISMA was used as a guide, and studies were screened for risk of bias and methodological quality. Subjects had to be ≥ 18 years of age and followed-up post-treatment with color Duplex ultrasound (DUS). Eligibility criteria included SFJ or SPJ incompetence with reflux down truncal veins lasting > 0.5 seconds on DUS interrogation and a Clinical, Etiological, Anatomical, and Pathophysiological classification of venous disorders ranging between C1 and C6. Out of 2,910 patients (3,220 veins) in 17 studies, 1,981 were administered NBCA, 445 radiofrequency ablation (RFA), and 484 EVLA with mean procedure times of 25.7, 23.2, and 28.7 minutes, respectively. Mean recruitment period was nine months (1-36 months) and followed-up for an average of 12.3 months (1-36 months). The majority were C2 to C3. Two-year occlusion rates were 93.7, 90.9, and 91.5% for NBCA, RFA, and EVLA, respectively. NBCA-treated patients experienced the least complications, with bruising, phlebitis, and pain being the most prevalent. Quality of life improved equally in all three modalities. The authors concluded that NBCA is simple to administer, safe, and effective even without compression stockings. The review was limited by lack of randomization for most included studies, and inclusion of products not currently FDA-approved. Further studies are required to assess longer-term benefit and the effect of anticoagulation on vein obliteration.

The VenaSeal Sapheon Closure System Pivotal Study (VeClose) is a multi-center RCT that compared cyanoacrylate closure (CAC) to RFA for the treatment of incompetent great saphenous veins. In this trial, 222 subjects with symptomatic GSV incompetence were randomly assigned to receive either CAC (n = 108) with the VenaSeal Sapheon Closure System or RFA (n = 114). The primary endpoint was closure of the target vein at month three, as assessed by duplex ultrasound. To determine non-inferiority of CAE to RFA, the investigators used a predetermined margin of 10%. Secondary endpoints included subject-rated pain experienced during the procedure (i.e., pain experienced after vein access but before all treatment/access catheters were removed), investigator-rated ecchymosis at day three, adverse events, and details of adjunctive procedures. Patient follow-up visits were on day three and at months one, three, six, 12, 24, and 36. For the extension study, patients who were successfully contacted and were interested in participation provided written informed consent for the 60-month follow-up visit. Assessment tools included the VCSS, AVVQ and EuroQol-Five Dimension (EQ-

5D) quality of life survey. This trial has generated multiple publications that reported outcomes with various follow-up periods e.g., three months (Morrison, 2015), 12 months (Morrison, 2017), 24 months (Gibson, 2018a), 36 months (Morrison, 2019), and 60 months (Morrison, 2020), as well as a publication with results of a roll-in phase analysis, which included 20 additional patients treated with CAC (Kolluri, 2016). Design limitations of this study and the resulting publications included lack of blinding of the subjects or assessors to the intervention. Furthermore, the primary endpoint of the study was complete closure of the target vein at 3 months after index treatment, thus the study may not have been powered to detect clinically significant differences between treatments groups for important outcomes and at different times of follow-up. These studies were also included in the Hayes report (2022). The individual studies are listed below:

- Morrison et al. (2015) reported 3-month outcomes from the VeClose trial. No adjunctive procedures such as phlebectomy and UGFS were allowed until after the month three visit. The closure rates were 99% for VenaSeal and 96% for RFA. Pain experienced during the procedure was reported as mild and was similar between treatment groups. Good safety profiles were reported with both treatments. The authors concluded that cyanoacrylate ablation did not require tumescent anesthesia, was associated with less post procedure ecchymosis, and was noninferior to RFA for the treatment of incompetent GSVs at month three after the procedure.
- Morrison et al. (2017) reported 12-month outcomes from the VeClose trial. Of 222 randomized patients, a 12-month follow-up was obtained for 192 (95 CAC and 97 RFA; total follow-up rate, 86.5%). The complete occlusion rate was nearly identical in both groups (97.2% in the CAC group and 97.0% in the RFA group). Twelve-month freedom from recanalization was similar in the CAC and RFA groups, although there was a trend toward greater freedom from recanalization in the CAC group ($p = .08$). The authors reported that patient symptoms and QoL improved equally in both groups.
- Twenty-four-month outcomes from the VeClose trial were reported by Gibson et al (2018a). One hundred and seventy-one patients completed the 24-month follow-up, which included 87 from the CAC group and 84 from the RFA group. The 24-month GSV closure rate was 95.3% in the CAC group and 94.0% in the RFA group. Symptoms and QoL improved similarly in both groups. No clinically significant device- or procedure-related late adverse events were reported. The authors concluded that both CAC and RFA were effective in closure of the target GSV, resulting in similar and significant improvements in the patient's QoL through 24 months.
- One hundred and forty-six patients completed the 36-month follow-up to the VeClose trial, which included 72 patients from the CAC group and 74 patients from the RFA group, with outcomes reported by Morrison et al. (2019). The 36-month GSV closure rate was 94.4% for the CAC group and 91.9% for the RFA group. Stable improvement in symptoms and QoL was observed in both groups. Adverse event rates between the 24- and 36-month visits were similar between the groups as were serious adverse events which were infrequent and judged unrelated to either the device or the procedure in both groups. The authors surmised the results of this trial continue to demonstrate the safety and efficacy of CAC for the treatment of GSV incompetence with vein closure rate at 36 months similar to that of RFA. The findings are limited by the loss to follow up (34%), which could have introduced biases in the findings.
- Morrison et. al. (2020) reported 60-month outcomes from the VeClose trial with a total of 89 patients in the original study completing the 60-month visit. Of those, 47 patients were from the CAC group, 33 patients were from the RFA group, and nine patients were from the roll-in CAC group. No new recanalization events were observed between 36 and 60 months of follow-up. Kaplan-Meier estimates for freedom from recanalization in the randomized CAC and RFA groups were 91.4% and 85.2%, respectively. Both groups demonstrated sustained improvements in EuroQol-5 Dimension (EQ-5D) and QoL. Whereas patients assigned to C0 or C1 clinical class were excluded from the original study, more than half of all returning patients [64% (57/89)] were now assigned to C0 or C1, suggesting an improved clinical class from baseline. Furthermore, 41.1% of returning CAC patients and 39.4% of returning RFA patients at least two CEAP clinical classes lower than at baseline. The authors concluded that CAC and RFA were effective in achieving complete target vein closure of the GSV at long-term follow-up. CAC was also associated with sustained improvements in symptoms and QoL, lower CEAP class, and high level of patient satisfaction without serious adverse effects between 36 and 60 months. The limitations of this publication included the small rate of successful follow-up i.e., 36% of the original study randomized population, which could have introduced biases in the findings.

Kolluri et al. (2020) conducted a meta-analysis designed to compare VenaSeal closure system with EVLA, RFA, MOCA, sclerotherapy, and surgical management of chronic venous insufficiency achieve complete closure of the treated vein within six months after intervention. Secondary outcomes were QoL, VCSS, pain scores, and adverse effects. Twenty RCTs comprising 4570 patients were analyzed. For the primary outcome measure of anatomic success, VenaSeal system had the highest probability of being ranked first ($p = .980$); RFA was ranked second ($p = .365$), EVLA third ($p = .397$), surgery fourth ($p = .290$), MOCA fifth ($p = .695$), and sclerotherapy sixth ($p = .982$). For secondary outcome measures, VenaSeal system ranked third for VCSS ($p = .332$), fifth for EuroQol-5 Dimension ($p = .420$), and third for Aberdeen Varicose Vein Questionnaire ($p = .300$). Although, VenaSeal system was slightly inferior to some of the other interventions for health-related QoL, the 95% credible interval of log odds ratio indicated insufficient evidence for any concrete conclusion to be drawn. VenaSeal system ranked first in reduction of postoperative pain score from baseline ($p = .690$) and was lowest in occurrence of adverse events ($p = .650$). Odds of occurrence of adverse events was 3.3 times in the sclerotherapy arm, 2.7 times in the EVLA arm, 1.6 times with surgery, and 1.1 times with RFA vs VenaSeal system arm.

The authors concluded VenaSeal was a promising option for treatment for patients with CVI due to superior outcomes as assessed by anatomic success, reduction of pain score, and smaller chance of occurrence of adverse events when compared with other interventions. Limitations include short-term follow-up and restricted data availability in terms of time points and pooling of data.

Gibson et al. (2018b) reported three-month outcomes from a post-market case series study of endovenous cyanoacrylate closure by the VenaSeal system (the WAVES study). Fifty subjects with symptomatic GSV, SSV, and/or accessory saphenous vein incompetence were treated with the VenaSeal system with no post procedure compression stockings. Concomitant procedures were not allowed as part of the original study protocol. Treating physicians predicted the type and nature of any concomitant procedures that they would usually perform at the time of ablation, if not limited by the constraints of the study. Evaluations were performed at one week, one and three months and included duplex ultrasound, numeric pain rating scale, revised VCSS, the AVVQ, and time to return to work and normal activities. At the three-month visit, the need for and type of adjunctive procedures were recorded. Complete closure at three months was achieved in 70 (99%) of the treated veins (48 GSVs, 14 accessory saphenous veins, eight SSVs). Revised VCSS improved from 6.4 ±2.2 to 1.8 ±1.5 ($p < .001$) and AVVQ from 17.3 ±7.9 to 6.5 ±7.2 ($p < .0001$). Sixty-six percent of patients underwent tributary treatment at three months. The percentage of patients who required adjunctive treatments at three months was lower than had been predicted by the treating physicians (65% versus 96%, $p = .0002$). The authors reported that closure rates were high in the absence of the use of compression stockings or side branch treatment. Improvement in QoL was significant, and the need for and extent of concomitant procedures was significantly less than had been predicted by the treating physicians. Additional studies with larger patient populations are needed to further evaluate the need for concomitant procedures with the VenaSeal system. These findings are limited by lack of comparison group undergoing a different treatment. This study was also included in the Hayes report (2022).

Gibson and Ferris (2017b) reported results of a prospective case series study (the WAVES study) of cyanoacrylate closure for the treatment of GSVs, SSVs, and/or accessory saphenous veins up to 20 mm in diameter ($n = 50$). Compression stockings post-procedure were not utilized. Patients returned at one week and one month for follow-up. All treated veins (48 GSVs, 14 accessory saphenous veins, and eight SSVs) had complete closure by duplex ultrasound at seven days and one month. Mean time to return to work and normal activities was 0.2 ±1.1 and 2.4 ±4.1 days, respectively. The revised VCSS was improved to 1.8 ±1.4 ($p < .001$) and AVVQ score to 8.9 ±6.6 ($p < .001$) at one month. Phlebitis in the treatment area or side branches occurred in 10 subjects (20%) and completely resolved in all but one subject (2%) by one month. The authors concluded that cyanoacrylate closure is safe and effective for the treatment of one or more incompetent saphenous or accessory saphenous veins, closure rates were high even in the absence of the use of compression stockings or side branch treatment. Time back to work or normal activities was short and improvements in venous severity scores and QoL were in the authors' opinion significant, comparing favorably with alternative treatment methods. RCTs with a larger patient population and longer follow-up periods are needed to validate findings. The findings of this study are limited by lack of comparison group undergoing a different treatment approach. This study was also included in the Hayes report (2022).

Almeida et al. (2015) evaluated the safety and effectiveness of endovenous cyanoacrylate-based embolization of incompetent GSVs in a case series study of 38 patients. At 12 months, 36 patients were available for follow-up and 24 patients at 24 months. Complete occlusion of the treated GSV was confirmed by duplex ultrasound in all patients except for one complete and two partial recanalizations observed at, one, three and six months of follow-up, respectively. Kaplan-Meier analysis yielded an occlusion rate of 92.0% (95% CI 0.836-1.0) at 24 months follow-up. VCSS improved in all patients from a mean of 6.1 ±2.7 at baseline to 1.3 ±1.1, 1.5 ±1.4 and 2.7 ±2.5 at six, 12 and 24 months, respectively ($p < .0001$). Edema improved in 89% of legs ($n = 34$) at 48 hours follow-up. At baseline, only 13% were free from pain. At six, 12 and 24 months, 84%, 78% and 64% were free from leg pain, respectively. In a follow-up study, Almeida et al. (2017) evaluated the long-term safety and effectiveness of endovenous cyanoacrylate (CA)-based closure of incompetent GSV on the twenty-nine individuals that were available for the 36-month follow-up. Complete occlusion of the treated veins was confirmed by ultrasound in all subjects with the exception of two subjects showing recanalization at month one and month three. Kaplan-Meier analysis revealed an occlusion rate at month 36 of 94.7%. The mean VCSS) improved from 6.1 ±2.7 at baseline to 2.2 ±0.4 at month 36 ($p < .0001$). Pain, edema, and varicosities (VCSS subdomains) improved in 75.9%, 62.1%, and 41.4% of subjects, respectively, at month 36. Overall adverse events were self- limited and mild or moderate. The authors concluded cyanoacrylate adhesive had no reported serious adverse events, had long-term occlusion rates comparable to other thermal and nonthermal methods, and appears to be safe and effective for saphenous vein closure. Small sample size and lack of comparison groups are limitations to this study.

An ECRI clinical evidence assessment (2015) suggests that VenaSeal is safe and as effective as RFA for treating varicose veins in patients with venous reflux disease. However, how well VenaSeal works compared with other treatment modalities cannot be determined because the systematic review assessed too few patients for each comparison and no studies in the systematic review performed head-to-head comparisons. The report determined the evidence was

somewhat favorable but RCTs are needed to compare VenaSeal with other treatment modalities. Limitations of the reviewed studies include risk for lack of blinding, single-center focus, and lack of randomization (ECRI, updated 2021).

A prospective multicenter case series study was conducted on 78 patients with GSV reflux using cyanoacrylate embolization (Proebstle et al., 2015). Clinical examination, QoL assessment and duplex ultrasound were performed at two days, one, three, six, and 12 months. 68 (97.1%) were available for 12-month follow-up. Two-day follow-up showed one proximal and one distal partial recanalization. Three additional proximal recanalizations were observed at 3-month (n = 2) and 6-month (n = 1) follow-up. Cumulative 12-month survival free from recanalization was 92.9% (95% confidence interval, 87.0%-99.1%). Mean (standard deviation) VCSS improved from 4.3 ±2.3 at baseline to 1.1 ±1.3 at 12 months. AVVQ score showed an improvement from 16.3 at baseline to 6.7 at 12 months ($p < .0001$). Side effects were generally mild; a phlebitic reaction occurred in eight cases (11.4%) with a median duration of 6.5 days (range, 2-12 days). Pain without a phlebitic reaction was observed in five patients (8.6%) for a median duration of 1 day (range, 0-12 days). No serious adverse event occurred. Paresthesia was not observed. The authors concluded that endovenous CA embolization of refluxing GSVs is safe and effective without the use of tumescent anesthesia or compression stockings. Additional studies are needed to validate the effectiveness of cyanoacrylate embolization.

VenoValve

Evidence in peer review literature evaluating VenoValve porcine bioprosthetic valve for the treatment of chronic venous insufficiency is limited. Future robust RCTs are warranted along with long-term outcomes to establish the safety and efficacy of this procedure.

A 2022 Hayes Emerging Technology Report states published evidence is limited to publications reporting 6-month and 1-year outcomes for 11 patients. The VenoValve will be the first porcine bioprosthetic valve to reach the market in the U.S., and the first device approved to treat CVI, if eventually FDA-approved. VenoValve is currently under investigation in the Surgical Anti-Reflux Venous Valve Endoprosthesis (SAVVE) trial (NCT04943172).

Ulloa and Glickman (2021) conducted a single-center, prospective, non-randomized, first-in-human trial using a prosthetic venous valve, VenoValve, for patients with severe chronic venous insufficiency (C4b-C6 disease). Ten patients had the prosthetic valve surgically implanted into the femoral vein. Follow-up examinations were conducted postoperatively at two and 14 days and then every 30 days for six months to evaluate feasibility, initial safety, and performance outcomes of the VenoValve. Six patients had required bovine patch angioplasty of the vein. Four adverse events occurred, including one case of hematoma at the incision site that was aspirated, two cases of superficial wound infection in C6 patients treated with antibiotics, and one case of a bleeding complication due to warfarin anticoagulation. One patient's VenoValve had thrombosed at five months due to nontherapeutic anticoagulation. Improvements in all five patients who had reached the 6-month follow-up mark with the VenoValve were demonstrated during the study period by decreases in the VCSS (61% decrease from baseline), visual analog scale for pain scores (57% decrease), and reflux time (40% decrease) and a statistically significant improvement in the VEINES-QOL/Sym questionnaire. The patient with the occluded VenoValve had experienced improvements in all areas except for the reflux time. The authors concluded that VenoValve showed promising results with improvements noted in QOL and clinical outcomes. The authors recommended further follow-up and larger studies in the future. Ulloa et al. (2023) reported on two-year follow-up results aimed to evaluate the long-term clinical safety and performance of the eleven patients who were implanted with the VenoValve into the midthigh femoral vein. All eleven implant procedures were successful. Two-year follow-up data was obtained for eight subjects: one patient died of non-device related causes, one was lost to follow-up, and one refused to follow-up due to the COVID-19 pandemic. No device-related adverse events occurred between the first and second years of follow-up. Reported two-year clinical performance outcomes included significant decreases in mean reflux times of the mid-popliteal vein (61%), and significant improvements in mean scores for disease severity rVCSS (56%) and VAS pain (87%). The authors surmised the long-term safety and performance of the VenoValve was sustained as the patients obtained wound healing without ulcer recurrence. Additionally, there were significant improvements in reflux time, disease severity, pain scores and patients diagnosis were reclassified from severe to mild disease. The authors endorse continued long-term follow-up, future larger, multi-center studies, and note the clinical trial NCT04943172 currently underway.

Clinical Practice Guidelines

American College of Phlebology

The American College of Phlebology Guidelines Committee (Gibson et al., 2017c) performed a systematic review of the literature regarding the clinical impact and treatment of incompetent accessory saphenous veins. They developed a consensus opinion that patients with symptomatic incompetence of the accessory great saphenous veins (anterior and posterior accessory saphenous veins) be treated with EVTA (laser or radiofrequency) or UGFS to eliminate symptomatology (Recommendation Grade 1C).

The American College of Phlebology Guidelines Committee (2016) updated their evidence-based recommendations for treatment of superficial venous disease of the lower leg. They recommend that named veins [GSV, SSV, AAGSV, posterior accessory of the great saphenous vein (PAGSV), intersaphenous vein (Vein of Giacomini)] must have a reflux time > 500 msec regardless of the reported vein diameter (Grade 1A).

EVTA (laser and radiofrequency) is the Committee's preferred treatment for saphenous and accessory saphenous (GSV, SSV, AAGSV, PAGSV) vein incompetence (Grade 1B). They suggest mechanical/chemical ablation may also be used to treat truncal venous reflux (Grade 2B). They further comment that open surgery is appropriate in veins not amenable to endovenous procedures but otherwise is not recommended because of increased pain, convalescent time, and morbidity (Grade 1B).

European Society for Vascular Surgery (ESVS)

The ESVS released a clinical practice guideline for management of chronic venous disease (De Maeseneer et al., 2022). The guidelines state that for patients with GSV and SSV incompetence requiring treatment endovenous thermal ablation is recommended as the first-choice treatment, in preference to high ligation/stripping and UGFS. However, UGFS may be considered for treating saphenous trunks with a diameter less than 6mm. The guidelines note that in long term follow up of comparative studies, treatment with UGFS has been substantially less effective than EVLA, RFA, and surgery in terms of occlusion or absence rates. Additionally, foam sclerotherapy is the technique of choice for anatomical configurations that make endovenous cannulation or advancing the ablation device challenging, and is suitable for treating tortuous, recurrent varicose veins. Mechanochemical ablation and cyanoacrylate adhesive closure may be considered when a non-thermal technique is preferred for patients with GSV incompetence. For patients with GSV incompetence, high ligation/stripping should be considered, if endovenous thermal ablation options are not available. Endovenous non-thermal non tumescent ablation methods may be considered for treatment of SSV incompetence. Additionally, endovenous thermal ablation and UGFS may be considered for anterior accessory saphenous vein requiring treatment.

National Institute for Health and Care Excellence (NICE)

In 2020, the National Institute for Health and Care Excellence (NICE) released an update to their guidance on Cyanoacrylate Glue Occlusion for Varicose Veins. The updated guidance states that current evidence on the safety and efficacy of cyanoacrylate glue occlusion for varicose veins is adequate to support the use of this procedure provided that standard arrangements are in place for clinical governance, consent and audit. In addition, the guideline states physicians should: 1) only perform the procedure after appropriate training and experience in the use of venous ultrasound; 2) discuss the available options with the patient before making a decision; and 3) follow their hospital's policies regarding performing procedures and monitoring results.

In an updated guideline on endovenous MOCA for varicose veins, NICE (2016) states that current evidence on the safety and efficacy of endovenous MOCA for varicose veins appears adequate to support the use of this procedure provided that standard arrangements are in place for consent, audit and clinical governance. Clinicians are encouraged to collect longer-term follow-up data.

The NICE 2013 interventional procedure guidance on UGFS specifies that if symptoms related to varicose veins are severe, the main treatment options include endovenous laser treatment and radiofrequency ablation, and surgery (ligation and stripping of the GSVs or ligation with or without stripping of the SSVs, and phlebectomy). The NICE 2013 clinical guideline on the diagnosis and treatment of varicose veins adds that if endovenous ablation is unsuitable, offer UGFS.

Society for Vascular Surgery (SVS)/American Venous Forum (AVF)/American Vein and Lymphatic Society (AVLS)/Society of Interventional Radiology (SIR)

Gloviczki et al. 2023 published Part II of the guidelines for the management of varicose veins of the lower extremities which focuses on patients with compression, treatment with drugs and nutritional supplements, evaluation and treatment of varicose tributaries, superficial venous aneurysms, and on the management of complicated varicose veins. Recommendations of the guideline are summarized as follows (not all-inclusive):

- In symptomatic patients with C2 disease suggestion is made against using truncal vein diameter to determine which patients need venous ablation. Grade of recommendation, 2 (weak), quality of evidence, B (moderate).
- For patients with symptomatic telangiectasias and reticular veins, sclerotherapy with liquid or foam is recommended. Grade of recommendation, 1 (strong), quality of evidence, B (moderate).
- For treatment of symptomatic varicose tributaries, miniphlebectomy or ultrasound-guided sclerotherapy using physician-compounded foam (PCF), or PEM is recommended. Grade of recommendation, 1 (strong), quality of evidence, B (moderate).

- For patients with symptomatic reflux in the GSV or SSV and associated varicosities, ablation of the refluxing venous trunk and concomitant phlebectomy or UGFS of the varicosities with PCF or PEM is recommended. Grade of recommendation, 1 (strong), quality of evidence, C (low to very low).
- For patients with symptomatic reflux in the AAGSV or PAGSV, suggestion is made for simultaneous ablation of the refluxing venous trunk and phlebectomy or UGFS of the varicosities with PCF or PEM. Grade of recommendation, 2 (strong), quality of evidence, C (low to very low).
- For patients with varicose veins (CEAP class C2) who have significant, symptomatic axial reflux of the GSV or SSV, recommendation is made against treatment of incompetent perforating veins concomitant with initial ablation of the saphenous veins. Grade of recommendation, 1 (strong), quality of evidence, C (low to very low).
- For patients with varicose veins (CEAP class C2) who have significant, symptomatic axial reflux of the AAGSV or PAGSV, suggestion is made against treatment of incompetent perforating veins concomitant with initial ablation of the superficial truncal veins. Grade of recommendation, 2 (weak), quality of evidence, C (low to very low).

The SVS, AVF, and AVLS collaborated to update the 2011 SFS/AVF clinical practice guideline to provide evidence-based recommendations for treating patients with varicose veins of the lower limbs (Gloviczki. et al., 2022). Recommendations of the guideline are summarized as follows (not all-inclusive):

- For patients with CVD of the lower extremities, duplex ultrasound scanning is the diagnostic test of choice for evaluation of venous reflux.
- Reflux is defined as a minimum value > 500 ms of reversed flow in the superficial truncal veins and the tibial, deep femoral, and perforating veins.
- Axial reflux is defined as uninterrupted retrograde venous flow from the groin to the calf, and junctional reflux is limited to the SFJ or SPJ.
- Use of the 2020 upgraded CEAP classification of chronic venous disorders is recommended.
- “Pathologic” perforating veins in patients with varicose veins (CEAP clinical class C2) includes those with an outward flow duration of ≥ 500 ms and a diameter of ≥ 3.5 mm on duplex ultrasound.
- For patients with symptomatic varicose veins and axial reflux in the GSV and SSV, treatment with endovenous ablation over high ligation and stripping is recommended due to less post procedure pain and morbidity, and an earlier return to regular activity; if the technology or expertise in endovenous ablation is not available or the venous anatomy precludes endovenous treatment, ligation and stripping is recommended.
- For patients with symptomatic varicose veins and axial reflux in the AAGSV or PAGSV, treatment with ligation and stripping of the accessory saphenous vein, with additional phlebectomy, if needed, if technology or expertise in endovenous ablations is not available or if the venous anatomy precludes endovenous treatment is suggested.
- For patients with symptomatic varicose veins and axial reflux in the GSV, SSV, who place a high priority on the long-term outcomes of treatment (QoL and recurrence), treatment with EVLA, RFA, or high ligation and stripping over physician compounded UGFS is suggested.
- For patients with symptomatic axial reflux, both thermal and nonthermal ablation of the GSV and SSV are recommended depending on the available expertise of the treating physician and the preference of the patient.
- In patients with symptomatic reflux in the GSV or SSV and associated varicosities, ablation of the refluxing venous trunk, and concomitant phlebectomy, or UGFS of the varicosities with physician-compounded foam or commercial PEM is recommended.
- In patients with symptomatic reflux in the GSV or SSV, ablation of the refluxing venous trunk, and staged or UGFS of the varicosities is recommended only if anatomic or medical reasons are present.

The SVS, AVF, AVLS, and SIR developed the appropriate use criteria (AUC) for chronic lower extremity venous disease using the RAND/UCLA Appropriateness Method incorporating best available evidence with expert opinion and engaging a panel of experts in the field through a modified Delphi exercise (Masuda et al. 2020). The consensus does not appear to be based on a systematic review of the literature. One hundred and nineteen scenarios were rated on a scale of one to nine by an expert panel, with one being never appropriate and nine being appropriate. The panelists rated ablation for axial reflux of the GSV, with or without SFJ reflux, in symptomatic patients, CEAP classes 2-6 as appropriate. Per the AUC, when accompanied by no SFJ reflux (the junction is either assumed or proven to be competent or previously interrupted and communicates with the GSV through incompetent thigh perforators or other sources of collateral flow) the remaining refluxing GSV may be the source of recurrent symptoms. Therefore, for axial GSV reflux, ablating the GSV will likely lead to decreased recurrence even if the SFJ shows no reflux. The mean number of saphenous vein ablations per person ranges from 1.3 to 1.9. However, occasionally, treatment requiring three or more ablations in a limb is needed. The authors note that the AUC statements were intended to serve as a guide to patient care, particularly in areas where high quality evidence is lacking and was not meant to be a guide that addresses all clinical situations.

The SVS and AVF released joint clinical practice guidelines regarding the care of patients with venous leg ulcers (O’Donnell et al., 2014). For patients with a venous leg ulcer (C6), and incompetent superficial veins that have reflux to

the ulcer bed in addition to pathological perforating veins (> 500 ms reflux duration and diameter of > 3.5 mm), that are located beneath or associated with the ulcer bed, the guideline recommends ablation of both the incompetent superficial veins and perforator veins in addition to standard compressive therapy to aid in ulcer healing and prevent recurrence. For patients who are at risk for a venous leg ulcer (C4b), or have a healed venous ulcer (C5), and have axial reflux directed to the bed of the affected skin/ulcer, the guidelines recommend ablation of the incompetent superficial veins in addition to standard compressive therapy.

U.S. Food and Drug Administration (FDA)

This section is to be used for informational purposes only. FDA approval alone is not a basis for coverage.

Vein ligation surgery is a procedure and therefore not subject to FDA regulation.

The ClariVein® infusion catheter (Vascular Insights) received FDA approval (K071468) on March 20, 2008. The device is designed to introduce physician-specified medicaments into the peripheral vasculature. Refer to the following website for more information: http://www.accessdata.fda.gov/cdrh_docs/pdf7/K071468.pdf. (Accessed December 15, 2023)

The VenaSeal™ Closure System received the FDA's pre-market approval (PMA) on February 20, 2015 (P140018). The device is indicated for the permanent closure of lower extremity superficial truncal veins, such as the GSV, through endovascular embolization with coaptation. VenaSeal is intended for use in adults with clinically symptomatic venous reflux as diagnosed by duplex ultrasound (DUS). Refer to the following website for more information: https://www.accessdata.fda.gov/scripts/cdrh/cfdocs/cfpma/pma.cfm?id=P140018. (Accessed December 15, 2023)

Varithena (polidocanol injectable foam) (Provensis Ltd.) received FDA approval on November 25, 2013, as a sclerosing agent indicated for the treatment of incompetent great saphenous veins, accessory saphenous veins and visible varicosities of the GSV system above and below the knee. Refer to the following websites for more information:

- https://www.accessdata.fda.gov/drugsatfda_docs/appletter/2013/205098Orig1s000ltr.pdf
- https://www.accessdata.fda.gov/drugsatfda_docs/label/2013/205098s000lbl.pdf

(Accessed December 15, 2023)

Sclerotherapy

The U.S. Food and Drug Administration (FDA) has approved various sclerosing agents to treat varicose veins of the lower extremities. Two most commonly used include sodium tetradecyl sulfate and polidocanol. Asclera® (polidocanol) is a sclerosing agent approved by the FDA in March 2010 and is indicated to treat small spider veins and uncomplicated reticular veins (varicose veins 1 to 3 mm in diameter) in the lower extremity. It has not been studied in larger varicose veins > 3 mm in diameter. https://www.accessdata.fda.gov/drugsatfda_docs/nda/2010/021201s000_Medr.pdf (Accessed December 15, 2023)

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Policy History/Revision Information

Date	Summary of Changes
08/01/2024	**Related Policies** • Added reference link to the Medical Policy titled *Outpatient Surgical Procedures -Site of Service* **Coverage Rationale** ***Varicose Vein Ablative and Stripping Procedures*** • Removed language indicating Adherence to American Medical Association (AMA) coding guidance is required when requesting coverage of Endovenous Ablation procedures; only one primary code may be requested for the initial vein treated and only one add-on code per extremity may be requested for any subsequent vein(s) treated ***Ligation Procedures*** • Added language to indicate Ligation of the accessory veins, as a stand-alone procedure, is unproven and not medically necessary for treating Venous Reflux due to insufficient evidence of efficacy **Definitions** • Added definition of "Small Saphenous Vein (SSV)" • Removed definition of: o Stripping o Telangiectasia • Updated definition of: o Great Saphenous Vein (GSV) o Reticular Vein o Spider Vein o Varicose Veins o Venous Reflux/Insufficiency **Benefit Considerations** ***Coverage Limitations and Exclusions*** • Removed language indicating: o Procedures that correct an anatomical congenital anomaly without improving or restoring physiologic function are considered cosmetic procedures and therefore excluded from coverage; the fact that a covered person may suffer psychological consequences or socially avoidant behavior as a result of an injury, sickness, or congenital anomaly does not classify surgery (or other procedures done to relieve such consequences or behavior) as a reconstructive procedure o Any procedure that does not meet the criteria in the *Coverage Rationale* section [of the policy] is excluded from coverage **Supporting Information** • Updated *Clinical Evidence*, *FDA*, and *References* sections to reflect the most current information • Archived previous policy version CS117KY.08

Instructions for Use

This Medical Policy provides assistance in interpreting UnitedHealthcare standard benefit plans. When deciding coverage, the federal, state, or contractual requirements for benefit plan coverage must be referenced as the terms of the federal, state, or contractual requirements for benefit plan coverage may differ from the standard benefit plan. In the event of a conflict, the federal, state, or contractual requirements for benefit plan coverage govern. Before using this policy, please check the federal, state, or contractual requirements for benefit plan coverage. UnitedHealthcare reserves the right to modify its Policies and Guidelines as necessary. This Medical Policy is provided for informational purposes. It does not constitute medical advice.

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