

**Radiologic Management of Lower-Extremity Venous Insufficiency
EVIDENCE TABLE**

Reference	Study Type	Patients/ Events	Study Objective (Purpose of Study)	Study Results	Strength of Evidence
1. Callam MJ. Epidemiology of varicose veins. <i>Br J Surg</i> 1994; 81(2):167-173.	15	N/A	Analysis of all published data on epidemiology of VV, with emphasis on differing epidemiological terminology, populations sampled, assessment methods and VV definitions.	Half of the adult population has minor stigmata of venous disease (women 50%-55%; men 40%-50%) but fewer than half of these will have visible VV (women 20%-25%; men 10%-15%). Data suggest female sex, increased age, pregnancy, geographical site and race are risk factors for VV.	3
2. Evans CJ, Fowkes FG, Ruckley CV, Lee AJ. Prevalence of varicose veins and chronic venous insufficiency in men and women in the general population: Edinburgh Vein Study. <i>J Epidemiol Community Health</i> 1999; 53(3):149-153.	3b	1,566	Cross sectional survey to determine the prevalence of VV and CVI in the general population.	Prevalence of venous reflux in the general population was related to the presence of “venous disease”, although it was also present in those without clinically apparent disease. There was a higher prevalence of reflux in the deep veins in men than the deep veins in women.	2
3. Raffetto JD, Khalil RA. Mechanisms of varicose vein formation: valve dysfunction and wall dilation. <i>Phlebology</i> 2008; 23(2):85-98.	7	N/A	Review mechanisms and determinants in the development of varicosities.	There are reflux and incompetent valves as well as vein wall dilation in VV. Increase in vein wall tension enlarges the expression/activity of matrix metalloproteinases, which induces degradation of the extracellular matrix proteins and affect the structural integrity of the vein wall. Recent evidence also suggests an effect of matrix metalloproteinases on the endothelium and smooth muscle components of the vein wall and thereby causing changes in the venous constriction/relaxation properties.	4
4. Davies AH, Steffen C, Cosgrove C, Wilkins DC. Varicose vein surgery: patient satisfaction. <i>J R Coll Surg Edinb</i> 1995; 40(5):298-299.	3b	311	To determine patient satisfaction of VV surgery. Responses from a postal survey of 456 patients [National Health Service (NHS) 327; private patients 129] who had VV surgery during a 10-year period was used in study.	Of 311 patients, 19% of the NHS patients compared with 34% of the private patients were completely satisfied with the surgery, the communication and had no post-operative complications (P<0.01). 26% of the NHS patients were very dissatisfied with their treatment compared with 13% of the private patients (P<0.025). Most dissatisfied patients were female (P<0.005). Results suggest that while VV surgery is regarded as a safe and often minor procedure, it is associated with a significant surgical morbidity and patient dissatisfaction.	2

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5. Labropoulos N, Delis K, Nicolaides AN, Leon M, Ramaswami G. The role of the distribution and anatomic extent of reflux in the development of signs and symptoms in chronic venous insufficiency. <i>J Vasc Surg</i> 1996; 23(3):504-510.	15	465 patients (594 limbs)	To identify the distribution of venous reflux in patients with different patterns of reflux with each class. Color-flow duplex imaging was used to evaluate the whole venous system (groin to ankle).	Distribution and extent of reflux is linked with clinical severity of CVI through class 2. Distal venous reflux is present in at least 80% of the symptomatic limbs. DVT may not be a prerequisite for the development of skin changes or ulceration in about 75% of the limbs. SVS could be beneficial to at least one third of patients with skin changes or ulceration.	2
6. Dwerryhouse S, Davies B, Harradine K, Earnshaw JJ. Stripping the long saphenous vein reduces the rate of reoperation for recurrent varicose veins: five-year results of a randomized trial. <i>J Vasc Surg</i> 1999; 29(4):589-592.	1	100 patients (133 legs)	5-year randomized trial to examine the possible long-term clinical advantages of stripping the long saphenous vein during routine primary VV surgery.	Stripping reduced the risk of reoperation by two-thirds after 5 years and should be routine for primary long saphenous VV.	1
7. Perkins JM. Standard varicose vein surgery. <i>Phlebology</i> 2009; 24 Suppl 1:34-41.	7	N/A	Review the practice of standard VV surgery including sapheno-femoral and sapheno-popliteal ligation, perforator surgery and surgery for recurrent VV. Evidence regarding methods of closure over the ligated sapheno-femoral junction is examined as well as the requirement for stripping and the use of different types of stripper.	Standard VV surgery remains the gold standard against which other techniques should be measured. Adequate training is important to prevent unnecessary recurrence and avoidable complications.	4
8. Eklof B. CEAP classification and implications for investigations. <i>Acta Chir Belg</i> 2006; 106(6):654-658.	15	N/A	Review classification of diseases to improve understanding of chronic venous disorders.	Classification of diseases is basic instrument for uniform diagnosis and meaningful communication of chronic venous disorders.	4
9. Eklof B, Rutherford RB, Bergan JJ, et al. Revision of the CEAP classification for chronic venous disorders: consensus statement. <i>J Vasc Surg</i> 2004; 40(6):1248-1252.	15	N/A	Consensus statement on changes to clinical, etiologic, anatomic, and pathophysiologic (CEAP system) classification for chronic venous disorders.	Changes include refinement of several definitions used in describing chronic venous disorders; refinement of the C classes of CEAP; addition of the descriptor n (no venous abnormality identified); elaboration of the date of classification and level of investigation; and as a simpler alternative to the full (advanced) CEAP classification, introduction of a basic CEAP version.	4
10. Kistner RL, Eklof B, Masuda EM. Diagnosis of chronic venous disease of the lower extremities: the "CEAP" classification. <i>Mayo Clin Proc</i> 1996; 71(4):338-345.	15	70 consecutive patients (102 extremities)	To test a new classification of chronic venous disease based on the CEAP system in a series of patients using objective tests to establish all diagnoses.	CEAP classification with diagnoses determined by objective testing accurately identifies categories of chronic venous disease.	2
11. Khilnani NM, Min RJ. Duplex ultrasound for superficial venous insufficiency. <i>Tech Vasc Interv Radiol</i> 2003; 6(3):111-115.	12	N/A	Review role of duplex US in superficial venous insufficiency.	Duplex US ensures that the appropriate treatment is selected and complete treatment of all of the abnormal venous segments occur.	4

* See Last Page for Key

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12. Geier B, Mumme A, Hummel T, Marpe B, Stucker M, Ascitutto G. Validity of duplex-ultrasound in identifying the cause of groin recurrence after varicose vein surgery. <i>J Vasc Surg</i> 2009; 49(4):968-972.	10	125 groin recurrences in 95 consecutive patients	Prospective study to determine validity of duplex US in identifying the cause of groin recurrence after VV surgery. US was compared to histological classification (gold standard) of the recurrent groin.	Duplex US had sensitivity of 77.1% and PPV of 91.4% in correctly identifying a residual stump as the cause of recurrence. For the correct classification of neovascularization, sensitivity was 61.5% and PPV 25.8%, while a combination of both was sensitivity of 10% and PPV of 14.3%. Validity of duplex US in classifying the different types of recurrent groin vessels is limited. Histological examination should still be regarded as the gold-standard when trying to differentiate between different types of groin recurrences.	2
13. Hartmann K, Klode J, Pfister R, et al. Recurrent varicose veins: sonography-based re-examination of 210 patients 14 years after ligation and saphenous vein stripping. <i>Vasa</i> 2006; 35(1):21-26.	3c	245 extremities of 210 patients	To assess the frequency of varicose recurrence using duplex US after flush ligation of the SFJ or SPJ junction with additional stripping of the incompetent saphenous vein.	Duplex US provided no evidence for recurrent VV at the former SFJ or SPJ in 68.5% of re-examined limbs. 14 years after flush ligation of the SFJ or SPJ with stripping of the incompetent saphenous vein, junctional recurrences were found in less than one-third of re-examined extremities. Duplex US determined a clinically relevant recurrence (>3 mm in diameter) in only 7% of limbs. Postoperative varices seem to develop less often after SPJ surgery than after SFJ surgery and according to the data; obesity (body mass index ≥ 30) constitutes a significant risk factor.	2
14. Myers K, Fris R, Jolley D. Treatment of varicose veins by endovenous laser therapy: assessment of results by ultrasound surveillance. <i>Med J Aust</i> 2006; 185(4):199-202.	4	404 veins in 308 patients	To assess the efficacy of EVLT for treating VV with saphenous reflux. A trial of treatment, with results assessed by US surveillance.	Univariate life table analysis showed primary success in 80% (95% CI: 69%-87%) and secondary success after further treatment of recurrent saphenous vein reflux by US-guided sclerotherapy in 88% (95% CI: 78%-95%) at 3 years. Results indicate EVLT effectively controlled saphenous reflux.	2
15. Jung SC, Lee W, Chung JW, et al. Unusual causes of varicose veins in the lower extremities: CT venographic and Doppler US findings. <i>Radiographics</i> 2009; 29(2):525-536.	13	1,350 cases	Review cases of VV in the lower extremities with both CT venography and Doppler US.	Doppler US with complementary CT venography is useful for determining the precise cause of VV.	2

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16. Min SK, Kim SY, Park YJ, et al. Role of three-dimensional computed tomography venography as a powerful navigator for varicose vein surgery. <i>J Vasc Surg</i> 2010; 51(4):893-899.	10	94 consecutive patients	To verify the role of CT venography in the treatment of VV in terms of advantages and complications.	The average numbers of perforators marked by CT venography were 12.07 +/- 4.27 in each limb. The perforators were evaluated by duplex for the presence of reflux ≥ 0.5 sec. Mean number of perforators with reflux in each limb was 1.41 +/- 1.67, which were ligated during the surgery. CT venography can provide excellent road map for VV surgery without significant complications. It cannot replace duplex US, but can provide powerful 3D images for designing operation as well as education and research.	2
17. Park UJ, Yun WS, Lee KB, et al. Analysis of the postoperative hemodynamic changes in varicose vein surgery using air plethysmography. <i>J Vasc Surg</i> 2010; 51(3):634-638.	4	1,620 patients	Retrospective analysis to use air plethysmographic parameters to evaluate the changes in venous hemodynamics after the surgical treatment of primary VV.	Preoperatively, median (interquartile range) values were venous volume, 121.6 (94.7-160.6) mL; VFI, 4.8 (2.9-7.6) mL/s; RVF, 40.6% (29.7%-50.0%); and ejection fraction, 53.5% (44.3%-64.1%). Postoperatively, the median (interquartile range) values were venous volume, 90.6 (69.1-116.8) mL; VFI, 1.4 (0.9-1.9) mL/s; RVF, 28.4% (17.5%-38.7%); and ejection fraction, 65.2% (54.5%-77.2%). Venous volume, VFI, and RVF were reduced 25.2%, 71.5%, and 29.9%, respectively; ejection fraction was increased 20.3%. The results were significant for all four variables ($P < .001$). We compared the degree of hemodynamic changes according to the treatment modalities: the high ligation and stripping group, 1,578 cases; the GSV valvuloplasty group, 124 cases; and the VNUS group (VNUS Medical Technologies Inc, San Jose, CA), 54 cases. The reduction of the venous volume, VFI, and RVF was greater in the GSV stripping group and in the VNUS group than in the valvuloplasty group ($P < .001$), yet no difference was noted in the ejection fraction increase among the surgical modalities ($P = .157$). The results show that the venous hemodynamic parameters of primary venous volume were improved after surgical treatment.	2

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18. Motykie GD, Caprini JA, Arcelus JI, Reyna JJ, Overom E, Mokhtee D. Evaluation of therapeutic compression stockings in the treatment of chronic venous insufficiency. <i>Dermatol Surg</i> 1999; 25(2):116-120.	3a	112	To evaluate the effectiveness of therapeutic compression stockings in the treatment of lower extremity CVI. Patients with CVI received graduated-compression stockings and rated the severity of their symptoms on a five-point scale before wearing the stockings, and then again after 1 and 16 months of treatment.	Statistically significant improvement (P<0.001) in severity scores for lower extremity swelling, pain, skin discoloration, activity tolerance, depression and sleeping problems after 1 and 16 months of treatment with compression stockings. Therapeutic graduated-compression stockings are effective.	2
19. van Geest AJ, Franken CP, Neumann HA. Medical elastic compression stockings in the treatment of venous insufficiency. <i>Curr Probl Dermatol</i> 2003; 31:98-107.	7	N/A	Review medical elastic compression stockings in the treatment of venous insufficiency.	Compression therapy is important in patients with phlebological diseases or tendency to form non-venous oedema. Clinical knowledge is necessary for everyone involved in compression therapy.	4
20. Norgren L, Austrell C, Nilsson L. The effect of graduated elastic compression stockings on femoral blood flow velocity during late pregnancy. <i>Vasa</i> 1995; 24(3):282-285.	4	10	To examine the effect on femoral vein flow velocity of graduated compression in women during late pregnancy.	Maternal heart rate increased significantly when the position was changed from supine to vertical. This orthostatic increase was significantly reduced when graduated compression exerting 25 mmHg at the ankle level was applied. Findings support the use of graduated compression during late pregnancy.	4
21. Biswas S, Clark A, Shields DA. Randomised clinical trial of the duration of compression therapy after varicose vein surgery. <i>Eur J Vasc Endovasc Surg</i> 2007; 33(5):631-637.	8	300	Randomized controlled trial to determine whether a period of one or three weeks of compression following VV surgery influenced the outcome.	There was no benefit in wearing compression stockings for more than one week following uncomplicated high saphenous ligation with stripping of the GSV with respect to postoperative pain, number of complications, time to return to work, or patient satisfaction for up to 12 weeks following surgery.	1
22. Hammarsten J, Pedersen P, Cederlund CG, Campanello M. Long saphenous vein saving surgery for varicose veins. A long-term follow-up. <i>Eur J Vasc Surg</i> 1990; 4(4):361-364.	8	42	Randomized study to evaluate the long-term results of long saphenous vein saving surgery compared with standard stripping. Patients with VV were randomly allocated to treatment, either with standard stripping of the long saphenous vein or high ligation.	Recurrence rate was 12 and 11% in the stripping and the high ligation group respectively. At follow-up, the venous return time was increased significantly in both groups (P>0.001). Vein mapping by means of US at follow-up showed that 78% of the preserved saphenous veins were suitable for use as arterial conduits.	2
23. Murli NL, Navin ID. Classical varicose vein surgery in a diverse ethnic community. <i>Med J Malaysia</i> 2008; 63(3):193-198.	3a	200	Retrospective analysis (1999-2004) to assess outcome of VV surgery in a diverse ethnic community.	96.2% of patients treated expressed satisfaction with VV surgery. Classical VV surgery is widely applicable across diverse ethnicities with a high rate of success.	2

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24. Walsh JC, Bergan JJ, Beeman S, Comer TP. Femoral venous reflux abolished by greater saphenous vein stripping. <i>Ann Vasc Surg</i> 1994; 8(6):566-570.	4	29 limbs in 21 patients	To determine valve closure using the method of van Bemmelen in patients who were examined by color-flow duplex imaging.	Improvement of deep venous hemodynamics by ablation of superficial reflux supports the reflux circuit theory of venous overload. Preoperative evaluation of venous hemodynamics by duplex scanning appears to provide useful preoperative and postoperative information regarding venous insufficiency in individual patients.	3
25. McMullin GM, Coleridge Smith PD, Scurr JH. Objective assessment of high ligation without stripping the long saphenous vein. <i>Br J Surg</i> 1991; 78(9):1139-1142.	4	54 limbs	To assess the procedure of high ligation plus multiple avulsion of varicosities for the treatment of VV in limbs using noninvasive methods.	Statistically significant correlation between observed improvement and predicted improvement in refilling times in the limbs with no reflux in the long saphenous vein after operation. No correlation between predicted and observed refilling times in the limbs with persisting reflux in the long saphenous vein after operation.	3
26. Rutgers PH, Kitslaar PJ. Randomized trial of stripping versus high ligation combined with sclerotherapy in the treatment of the incompetent greater saphenous vein. <i>Am J Surg</i> 1994; 168(4):311-315.	8	156 consecutive patients	Prospective randomized study to compare the treatment of GSV insufficiency by stripping and local avulsions of VV with high ligation of the SFJ combined with sclerocompression therapy.	Cosmetic results were significantly better (P<0.05) in the stripped limbs than in the limbs with high ligation and sclerotherapy. Clinical and Doppler US evidence of reverse flow in the saphenous vein was significantly less (P<0.001) after the stripping operation. Results of treatment of isolated saphenous vein insufficiency by stripping operation were superior to those obtained by high ligation combined with sclerotherapy.	1

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27. Suzuki M, Unno N, Yamamoto N, et al. Impaired lymphatic function recovered after great saphenous vein stripping in patients with varicose vein: venodynamic and lymphodynamic results. <i>J Vasc Surg</i> 2009; 50(5):1085-1091.	4	39 total patients; 15 controls	To investigate the effect of surgical treatment on lower limb lymph flow in patients with VV.	CEAP clinical stage venous disease, transit time in patients with C4 approximately 6 and C2 approximately 3 was significantly longer than that in the control group (587 +/- 97 seconds, 484 +/- 82 seconds, 252 +/- 29 seconds, respectively, mean +/- SD, P<.01). Among all limbs with VV, there were correlations between transit time and venous volume (Pearson r = 0.31, P<.01), between transit time and VFI (Pearson r = 0.48, P<.01). All patients underwent GSV stripping. 6-months later, the venous clinical severity score (VCSS) significantly improved with significant reductions in both venous volume and VFI values. Transit time 6 months postoperatively was also significantly shorter than that before surgical treatment (501 +/- 67 seconds, 340 +/- 38 seconds, respectively, mean +/- SD, P<.01). Venous volume could affect lymphatic function and delay lymphatic flow in the lower limbs. Derangement of lymph flow may correlate with the severity of clinical venous disease and/or the magnitude of venous reflux, which could be reversible with surgical treatment of venous incompetence.	2
28. Eskelinen E, Rasanen P, Alback A, et al. Effectiveness of superficial venous surgery in terms of quality-adjusted life years and costs. <i>Scand J Surg</i> 2009; 98(4):229-233.	4	143 patients	To assess the impact of SVS on HRQoL and to explore the cost-utility of venous surgery.	After SVS, the HRQoL score improved in 71% of the patients, and the mean score increased from 0.919 (on a 0-1 scale) preoperatively to 0.933 postoperatively at 6 months (P<0.001). Patients with a clinically important result from SVS (≥ 0.03 increase in the HRQoL score) had significantly worse HRQoL at baseline. At 6 months postoperatively, the mean (SD) hospital costs were 1637 euros (693) and the mean quality-adjusted life year gain 0.504 (1.674), respectively. Thus, the mean cost per quality-adjusted life year gained during a 6-month period was 3248 euros for SVS. SVS improves HRQoL, and is a cost-effective treatment of symptomatic superficial venous insufficiency.	2

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29. Herman J, Sekanina Z, Utikal P, Bachleda P, Duda M. Peroneal nerve injury during varicose veins surgery. <i>Int Angiol</i> 2009; 28(6):458-460.	4	2,344 patients	Retrospective study to assess the causes of injury to great nerves during VV surgery and comment on the consequences.	In 3 patients out of 2,344 the peroneal nerve was injured. The 3 patients underwent neurosurgery. In the first patient transplantation of the sacral nerve was performed. In the second patient the nerve was released from ligatures, and in the third patient the nerve was first released from the cicatrice and the transposition of the tendon of the posterior tibial muscle followed. All three patients went through intensive rehabilitation. The first patient still wears peroneal splint, the limb is atrophic. In the second patient the function has been well restored and he is not disabled anymore. However, the restitution of the lower limb function is not sufficient for him to work as a teacher of physical education. The third patient still suffers from serious paresis of the peroneal nerve. Even a frequent and relatively simple intervention such as VV surgery may be accompanied by serious complications affecting patients for the rest of their lives. Serious motor nerve injuries are encountered only in operations in the popliteal fossa and the fibula head. Complications are more frequent when operations are performed by young general surgeons than when they are performed by an experienced surgeon or an expert in vascular surgery. The affected patients should be referred for neurosurgery; however, results are unpredictable. In spite of an intensive rehabilitation and possible plastic surgery the patients are permanently affected.	4

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30. Pittaluga P, Chastanet S, Locret T, Barbe R. The effect of isolated phlebectomy on reflux and diameter of the great saphenous vein: a prospective study. <i>Eur J Vasc Endovasc Surg</i> 2010; 40(1):122-128.	4	54 patients; (55 limbs)	To evaluate the effect of phlebectomy on venous reflux and diameter of the GSV.	Following treatment a significant reduction of the mean reflux duration was observed (0.81 sec vs 1.5 sec, P<0.01, t-test), mean peak reflux velocity (120 mm s(-1) vs 249 mm s(-1) P<0.01, t-test) and mean diameter of the GSV (SFJ = 5.6 mm vs 6.7 mm, P<0.01, sub-terminal valve 4.8 mm vs 4.4 mm P<0.05, mid-thigh 5.0 mm vs 4.2 mm, P<0.01, knee 4.0 mm vs 5.3 mm P<0.01, mid-calf 2.7 mm vs 4.0 mm, P<0.01, t-test). A reduced reflux in the GSV after phlebectomy was noted with a significant reduction in reflux duration and peak reflux velocity. Phlebectomy also led to a significant reduction in GSV diameter. These data suggest that the haemodynamics and the diameter of the saphenous vein can be improved by using a treatment focusing on the saphenous tributaries.	2
31. Carradice D, Mekako AI, Hatfield J, Chetter IC. Randomized clinical trial of concomitant or sequential phlebectomy after endovenous laser therapy for varicose veins. <i>Br J Surg</i> 2009; 96(4):369-375.	8	50	Randomized clinical trial of concomitant or sequential phlebectomy after EVLT for VV. Patients were randomized to EVLT alone or EVLTAP.	Although concomitant phlebectomy with EVLT prolonged the procedure, it reduced the need for secondary procedures and improved quality of life and the severity of venous disease.	2
32. Ho P, Poon JT, Cho SY, et al. Day surgery varicose vein treatment using endovenous laser. <i>Hong Kong Med J</i> 2009; 15(1):39-43.	4	24	Prospective study to examine the safety and efficacy of endovenous laser obliteration to treat VV in a day surgery setting, using sedation and local anaesthesia.	100% procedural success rate. Endovenous laser VV treatment performed under local anaesthesia and sedation in a day surgery setting is safe, and yields satisfactory clinical and duplex outcomes.	2
33. Jung IM, Min SI, Heo SC, Ahn YJ, Hwang KT, Chung JK. Combined endovenous laser treatment and ambulatory phlebectomy for the treatment of saphenous vein incompetence. <i>Phlebology</i> 2008; 23(4):172-177.	3a	148	Retrospective study is to assess the safety and effectiveness of EVLTAP as a single procedure for the treatment of saphenous vein incompetence.	No postprocedural DVT and pulmonary embolism occurred. At 3 months saphenous vein recanalization rate was 5.7%. Residual varicosities were found in 11.4% of the patients at 3-months after procedure, but only 2.3% of those required subsequent interventions. Combined EVLT and AP could be a safe and effective treatment modality for the saphenous vein incompetence.	2

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34. Kim HK, Kim HJ, Shim JH, Baek MJ, Sohn YS, Choi YH. Endovenous lasering versus ambulatory phlebectomy of varicose tributaries in conjunction with endovenous laser treatment of the great or small saphenous vein. <i>Ann Vasc Surg</i> 2009; 23(2):207-211.	3c	132 patients treated with EVLTAP 133 patients treated only with EVLT	Retrospective study to compare EVLT alone with combined EVLTAP in the treatment of VV.	Residual tributary varicosities were noted in 12 patients (9.1%) in the combination group and in 11 (8.3%) in the EVLT only group (P=0.813) during follow-up period. For patients who had reflux in the perforating veins, the reoperation rate was significantly higher compared to the patients without reflux in the perforating veins in each group (P=0.015 in combination group, P=0.006 in EVLT only group). EVLT as sole therapy is safe and effective. However, longer follow-up is needed to confirm findings.	2
35. Mekako A, Hatfield J, Bryce J, et al. Combined endovenous laser therapy and ambulatory phlebectomy: refinement of a new technique. <i>Eur J Vasc Endovasc Surg</i> 2006; 32(6):725-729.	3a	67 patients (70 limbs)	To assess whether ambulatory phlebectomy performed alongside EVLTAP, is effective, acceptable, and reduces subsequent requirement for interventions.	49 patients (70%) completed follow-up. US showed 69 (99%) and 47 (96%) occluded long saphenous veins at 1 and 12 weeks respectively. EVLTAP produces excellent results, is feasible and acceptable, and prevents need for subsequent procedures in the short-term.	2
36. Jeanneret C, Fischer R, Chandler JG, Galeazzi RL, Jager KA. Great saphenous vein stripping with liberal use of subfascial endoscopic perforator vein surgery (SEPS). <i>Ann Vasc Surg</i> 2003; 17(5):539-549.	3a	632	Study based on registry of patients who had GSV stripping and liberal use of SEPS for minimal to severe lower limb venous insufficiency. Clinical examinations and color-coded duplex scanning were performed on randomly selected, sample of 170 limbs to assess the affect of early SEPS on junctional SFJ and/or SPJ) and IPV and superficial varicosities at a median of 6.5 years.	IPV was present in 68 legs (40%). IPV alone or combined with junctional insufficiency is associated with increased symptoms and disease progression. Prevalence of SFJ, SPJ, and IPV (62%) and recurrent varicosities (46%) suggests that early use of SEPS does not prevent disease progression and offers no benefit over GSV stripping in the absence of deep vein insufficiency or threatened ulceration.	2
37. Kianifard B, Holdstock J, Allen C, Smith C, Price B, Whiteley MS. Randomized clinical trial of the effect of adding subfascial endoscopic perforator surgery to standard great saphenous vein stripping. <i>Br J Surg</i> 2007; 94(9):1075-1080.	1	38 patients SEPS group 32 patients no SEPS group	Randomized trial to examine the outcome of IPV's following saphenofemoral ligation and stripping of the GSV, with or without SEPS.	No differences between the two groups with respect to pain, mobility or quality of life scores during follow-up. A significantly higher proportion of patients in the no SEPS group had IPV's on duplex imaging at 1 year (25/32 vs 12/38; P<0.001). IPV's do not remain closed following standard VV surgery. The addition of SEPS was not associated with significant morbidity but did reduce the number of IPV's.	2

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38. Kumar A, Agarwal PN, Kumar Garg P. Evaluation of subfascial endoscopic perforator vein surgery (SEPS) using harmonic scalpel in varicose veins: An observational study. <i>Int J Surg</i> 2009.	3a	21	Prospective study to evaluate SEPS using harmonic scalpel in VV.	In 8 weeks, all ulcers were healed with no recurrence in 11.9 months follow-up period. Use of ultrasonic scalpel in SEPS is technically feasible, causes less tissue damage as it generates a low thermal effect, and is associated with minimal morbidity.	3
39. Pares JO, Juan J, Tellez R, et al. Varicose vein surgery: stripping versus the CHIVA method: a randomized controlled trial. <i>Ann Surg</i> 2010; 251(4):624-631.	1	501 total patients	Randomized control trial to compare the efficacy of the CHIVA method for the treatment of VV with respect to the standard treatment of stripping.	In an intention-to-treat analysis, clinical outcomes in the CHIVA group were better (44.3% cure, 24.6% improvement, 31.1% failure) than in both the stripping with clinic marking (21.0% cure, 26.3% improvement, 52.7% failure) and stripping with duplex marking (29.3% cure, 22.8% improvement, 47.9% failure) groups. The ordinal odds ratio between the stripping with clinic marking and CHIVA groups, of recurrence at 5 years of follow-up, was 2.64, (95% CI: 1.76-3.97, P<0.001). The ordinal odds ratio of recurrence at 5-years of follow-up, between the stripping with duplex marking and CHIVA group, was 2.01 (95% CI: 1.34-3.00, P<0.001). The present results indicate that, thanks to specific venous hemodynamic evaluation, the CHIVA method is more effective than stripping with clinical marking or stripping with duplex marking to treat VV. When carrying out a stripping intervention, Duplex marking does not improve the clinical results of this ablative technique.	1
40. Gonzalez-Zeh R, Armisen R, Barahona S. Endovenous laser and echo-guided foam ablation in great saphenous vein reflux: one-year follow-up results. <i>J Vasc Surg</i> 2008; 48(4):940-946.	2	FS-53 patients; EVL-45 patients	Prospective controlled study to test the hypothesis that: Endovenous laser treatment is more effective than FS in the closure of the refluxing GSV, and to record the associated complications of echo-guided endovenous chemical ablation with foam and EVLA for the treatment of GSV reflux and to further identify risk factors associated with treatment failure.	EVLA had higher occlusion rates than echo-guided chemical ablation with foam after one year follow-up. Matching the patient to the technique based on GSV diameter measured before treatment may assist in boosting the treatment success rate to >90%. Findings need to be confirmed by a larger patient cohort followed and compared over a longer period of time.	2

Radiologic Management of Lower-Extremity Venous Insufficiency
EVIDENCE TABLE

Reference	Study Type	Patients/ Events	Study Objective (Purpose of Study)	Study Results	Strength of Evidence
41. Luebke T, Brunkwall J. Systematic review and meta-analysis of endovenous radiofrequency obliteration, endovenous laser therapy, and foam sclerotherapy for primary varicosis. <i>J Cardiovasc Surg (Torino)</i> 2008; 49(2):213-233.	7 (systematic review)	29 EVLT studies, 32 RFO studies and 22 FS trials were included	Systematic review to assess safety and effectiveness of endovenous RFO, EVLT, and FS and compare with conventional ligation and vein stripping.	EVLT, RFO, and FS seem to be safe and effective modalities with good short and mid-term. Acquisition of comparative long-term and very long-term data on clinical efficacy, safety, quality of life outcomes and costs is needed by large high-quality prospective randomized trials of endovenous techniques vs each other and vs surgery before considering endovenous techniques as the standard treatment.	3
42. Figueiredo M, Araujo S, Barros N, Jr., Miranda F, Jr. Results of surgical treatment compared with ultrasound-guided foam sclerotherapy in patients with varicose veins: a prospective randomised study. <i>Eur J Vasc Endovasc Surg</i> 2009; 38(6):758-763.	3a	60 patients	To compare VCSSs in patients with healed venous ulcers due to VV of the lower limbs (the CEAP classification) treated by saphenous stripping and phlebectomy or by US-guided FS.	The mean VCSSs measured before and after 180 days were as follows: Surgery group - pain: before 1.97 SD 0.19, 180 days 0.72 SD 0.53; oedema: before 1.66 SD 0.48, 180 days 0.55 SD 0.63; inflammation: before 1.55 SD 0.63, 180 days 0.72 SD 0.45. FS group - pain: before 1.81 SD 0.40, 180 days 0.56 SD 0.51; oedema: before 1.70 SD 0.47, 180 days 0.48 SD 0.64; inflammation: before 1.67 SD 0.68, after 0.89 SD 0.32. All scores showed statistically significant reductions in both patient groups. The saphenous vein had been obliterated, 180 days after treatment, in 78% of the surgery group, compared with 90% in the FS group. US-guided FS is a safe and effective option for patients with chronic venous disorders.	3
43. Belcaro G, Nicolaides AN, Ricci A, et al. Endovascular sclerotherapy, surgery, and surgery plus sclerotherapy in superficial venous incompetence: a randomized, 10-year follow-up trial--final results. <i>Angiology</i> 2000; 51(7):529-534.	1	121	Randomized, prospective, 10-year follow-up study to evaluate the efficacy and costs of endovascular sclerotherapy in comparison with surgery and surgery associated with sclerotherapy.	96 patients completed the 10-year follow-up. Cost of endovascular sclerotherapy was 68% of surgery while cost of surgery and sclerotherapy was 122% of surgery only. Endovascular sclerotherapy is an effective, cheaper treatment option, but surgery after 10 years is superior.	1
44. Disselhoff BC, Buskens E, Kelder JC, der Kinderen DJ, Moll FL. Randomised comparison of costs and cost-effectiveness of cryostripping and endovenous laser ablation for varicose veins: 2-year results. <i>Eur J Vasc Endovasc Surg</i> 2009; 37(3):357-363.	1	120	Randomized comparison of costs and cost-effectiveness of cryostripping and EVLA for VV.	Outcome of cryostripping and endovenous laser is similar. In terms of costs per quality-adjusted life year gained, outpatient cryostripping appeared to be the dominant strategy, but endovenous laser yielded comparable outcomes for a relatively little additional cost.	1

**Radiologic Management of Lower-Extremity Venous Insufficiency
EVIDENCE TABLE**

Reference	Study Type	Patients/ Events	Study Objective (Purpose of Study)	Study Results	Strength of Evidence
45. Nwaejike N, Srodon PD, Kyriakides C. Endovenous laser ablation for short saphenous vein incompetence. <i>Ann Vasc Surg</i> 2009; 23(1):39-42.	3a	368 EVLA procedures	To evaluate the safety and efficacy of EVLA as an alternative to open surgery for short saphenous vein incompetence. Data were prospectively collected for all patients undergoing EVLA for short saphenous vein disease.	66 (18%) of 368 procedures were for short saphenous vein incompetence. Six (9%) short saphenous vein procedures were for recurrent disease after conventional surgery. 40 (61%) procedures were performed under local anesthesia. During a median follow-up of 14 months (interquartile range 6-24) there was no clinical or duplex evidence of recurrence and no recanalization of the short saphenous vein. Results suggest EVLA is a safe alternative to conventional surgery.	2
46. Theivacumar NS, Darwood RJ, Dellegrammaticas D, Mavor AI, Gough MJ. The clinical significance of below-knee great saphenous vein reflux following endovenous laser ablation of above-knee great saphenous vein. <i>Phlebology</i> 2009; 24(1):17-20.	3c	69 limbs (64 patients)	To assess the significance of persistent below-knee GSV reflux following EVLA of above-knee GSV.	The untreated below-knee GSV remained patent in all limbs. US showed normal antegrade flow in 34/69 (49%, Group A), flash reflux <1 s in 7/69 (10%, Group B) and >1 s reflux in 28/69 (41%, Group C). Although Aberdeen VV severity scores (AVVSS) improved in all groups (P<0.001): Group A: 14.6 (8.4-19.3) vs 2.8 (0.5-4.4), Group B: 13.9 (7.5-20.1) vs 3.7 (2.1-6.8), Group C: 15.1 (8.9-22.5) vs 8.1 (5.3-12.6) the improvement was less in Group C (P<0.001 vs Group A and Group B) and was associated with a greater requirement (Group A: 4/34 [12%]; Group B: 1/7 [14%]; Group C: 25/28 [89%]) for sclerotherapy (persisting varicosities) (P<0.001).	2
47. van den Bremer J, Joosten PP, Hamming JF, Moll FL. Implementation of endovenous laser ablation for varicose veins in a large community hospital: the first 400 procedures. <i>Eur J Vasc Endovasc Surg</i> 2009; 37(4):486-491.	3a	323 patients (403 limbs)	Prospective audit that examines the implementation of EVLA for VV in a large community hospital with emphasis on obstacles, technical results, pain scores, failures and learning curve.	EVLA of the incompetent GSV is effective and safe. EVLA is simple to perform, accepted by patients and relatively atraumatic.	2
48. Zafarghandi MR, Akhlaghpour S, Mohammadi H, Abbasi A. Endovenous laser ablation (EVLA) in patients with varicose great saphenous vein (GSV) and incompetent saphenofemoral junction (SFJ): an ambulatory single center experience. <i>Vasc Endovascular Surg</i> 2009; 43(2):178-184.	3a	77 limbs in 74 patients	Prospective study to evaluate treatment results for varicose GSV using EVLA in an ambulatory single center.	Continued closure of treated GSV was present in 98.3% of the legs evaluated at 3-week follow-up (n=60). At 3- and 6-month intervals, 94.1% and 97% successful occlusion was achieved, respectively. EVLA treatment of the GSV is safe and highly effective method accompanied with few complications in midterm follow-up.	2

**Radiologic Management of Lower-Extremity Venous Insufficiency
EVIDENCE TABLE**

Reference	Study Type	Patients/ Events	Study Objective (Purpose of Study)	Study Results	Strength of Evidence
49. Ravi R, Trayler EA, Barrett DA, Diethrich EB. Endovenous thermal ablation of superficial venous insufficiency of the lower extremity: single-center experience with 3000 limbs treated in a 7-year period. <i>J Endovasc Ther</i> 2009; 16(4):500-505.	4	2,354 patients	To demonstrate that endovenous thermal ablation is not only effective and safe but also a durable treatment in patients with symptomatic VV.	Treatment of 3,000 limbs involved the use of EVLA in 2,841 (2,460 GSVs, 269 SSVs, and 112 accessory saphenous veins) and RFA in 159 GSVs. Post-procedure duplex US found 57 (2.0%) veins recanalized or incompletely occluded [51 (2%) treated with EVLA and 6 (3.7%) with RFA] in patients treated for GSV or accessory saphenous veins incompetence. In the 269 SSVs treated (all with EVLA), 18 (6.7%) limbs demonstrated incomplete occlusion. Overall, both EVLA and RFA procedures were well tolerated, with minimal complications. In the longitudinal assessment of the 105 patients (126 limbs) participating in annual follow-up for a mean 6.7 years, the overall rate of satisfaction, symptom relief, and absence of varicosities was 86%. Endovenous ablation of saphenous vein has proven to be an effective, safe, and very durable procedure.	2
50. Almeida JI, Kaufman J, Gockeritz O, et al. Radiofrequency endovenous ClosureFAST versus laser ablation for the treatment of great saphenous reflux: a multicenter, single-blinded, randomized study (RECOVERY study). <i>J Vasc Interv Radiol</i> 2009; 20(6):752-759.	1	87 veins in 69 patients	Multicenter, prospective, randomized trial to compare recovery and quality-of-life factors between radiofrequency and 980-nm EVLA. ClosureFAST device was compared with a 980-nm EVLA at comparable energy delivery to close incompetent GSV.	All scores referable to pain, ecchymosis, and tenderness were statistically lower in the ClosureFAST group at 48 hours, 1 week, and 2 weeks. Minor complications were more prevalent in the endovenous laser group (P=.0210); there were no major complications. VCSSs and quality of life measures were statistically lower in the ClosureFAST group at 48 hours, 1 week, and 2 weeks.	1
51. Golan JF, Glenn DM. Laser and radiofrequency endovenous ablation of venous reflux. <i>Perspect Vasc Surg Endovasc Ther</i> 2008; 20(1):75-79.	7	N/A	Review laser and radiofrequency endovenous ablation of venous reflux. Discuss the technique, treatment results, and potential complications associated with each procedure.	Both techniques have unique advantages and minor drawbacks, but each offer the convenience of in-office treatment, faster recovery, and improved safety over traditional surgical procedures.	4
52. Luebke T, Gawenda M, Heckenkamp J, Brunkwall J. Meta-analysis of endovenous radiofrequency obliteration of the great saphenous vein in primary varicosis. <i>J Endovasc Ther</i> 2008; 15(2):213-223.	7 (meta-analysis)	8 studies with 428 patients: [224 (52%) endovenous RFO and 204 (48%) stripping]	Meta-analysis to compare RFO and conventional surgery with respect to postoperative complications, effectiveness of treatment, and quality of life.	Significant reductions in tenderness and ecchymosis at 1 week and significantly fewer hematomas at 72 hours, 1 week, and 3 weeks associated with RFO. RFO benefits most patients in the short term. Further randomized clinical trials of RFO vs conventional surgery necessary.	3

**Radiologic Management of Lower-Extremity Venous Insufficiency
EVIDENCE TABLE**

Reference	Study Type	Patients/ Events	Study Objective (Purpose of Study)	Study Results	Strength of Evidence
53. Pannier F, Rabe E. Endovenous laser therapy and radiofrequency ablation of saphenous varicose veins. <i>J Cardiovasc Surg (Torino)</i> 2006; 47(1):3-8.	7	N/A	Review EVLT and RFA of saphenous VV.	Short- and mid-term results are excellent with an occlusion rate for RFA of almost 90% after 5 years and about 95% for endovenous laser treatment after 2 years. Severe side effects are rare in both cases. More prospective randomized comparative studies comparing endovenous treatment and surgery or FS are necessary to decide which method is the best for which patient.	3
54. Roth SM. Endovenous radiofrequency ablation of superficial and perforator veins. <i>Surg Clin North Am</i> 2007; 87(5):1267-1284, xii.	7	N/A	Review RFA of superficial and perforator veins for venous insufficiency.	RFA reduces the incidence of neovascularization and has been shown to have fewer postprocedural complications than laser treatment. ClosureFAST catheter, an important advancement, combines the speed of EVLA with the expected fewer side effects of RFA.	3
55. Desmyttere J, Grard C, Stalnikiewicz G, Wassmer B, Mordon S. Endovenous laser ablation (980 nm) of the small saphenous vein in a series of 147 limbs with a 3-year follow-up. <i>Eur J Vasc Endovasc Surg</i> 2010; 39(1):99-103.	4	128 patients	To demonstrate the treatment outcomes of EVLA of incompetent SSVs with a 980-nm diode laser.	The initial technical success rate was 100% in 147 patients. The SSV remained closed in 114 of 117 limbs (97%) after 1 year, all of 61 limbs after 2 years and all of 30 limbs after 3 years. For the three SSVs where re-canalization was observed, the diameter was >9 mm. Major complications have not been detected and, in particular, there was no DVT. Ecchymoses were seen in 60% with a median duration of 2 weeks. Temporary paraesthesia (mostly hypoaesthesia) was observed in 40% of treated legs with a median duration of 2 weeks. The maximum duration did not exceed 4 weeks. No skin discoloration, superficial burn, thrombophlebitis or palpable induration was observed. EVLA of the incompetent SSV with a 980-nm diode laser appears to be an extremely safe technique. After successful treatment, there is a very low rate of re-canalization of the SSV. Obliteration of the SSV was confirmed at 1-, 2- and 3-year follow-up; this study suggests that this procedure will provide a lasting result.	2

**Radiologic Management of Lower-Extremity Venous Insufficiency
EVIDENCE TABLE**

Reference	Study Type	Patients/ Events	Study Objective (Purpose of Study)	Study Results	Strength of Evidence
56. Hingorani AP, Ascher E, Marks N, et al. Predictive factors of success following radio-frequency styler (RFS) ablation of incompetent perforating veins (IPV). <i>J Vasc Surg</i> 2009; 50(4):844-848.	3a	38 consecutive patients	To evaluate potential predictive factors associated with success or failure of IPVs treated with radio-frequency styler.	The mean number of ablated IPVs was 1.94 +/- 0.38 ranging from 1-3. Immediate success rate was 88% (82 cases, 32 patients). IPVs had a duplex measured mean diameter of 3.8 +/- 1.1 mm (2-6.6 mm). Eleven IPVs remained patent in 6 patients. There was no significant difference between the patent and the obliterated IPV groups concerning age (P=0.75), prior GSV ablation (P=.19), IPV diameter (P=.08) and CEAP classification. Conversely, 4/5 procedures (80%) performed in patients with "pulsatile" venous flow failed, while only two of the remaining 43 procedures (4.7%) in patients with "normal" venous flow failed (P<.001). These data show that a pulsatile venous flow pattern is a significant predictor of failure following radio-frequency styler for IPVs.	3
57. Hissink RJ, Bruins RM, Erkens R, Castellanos Nuijts ML, van den Berg M. Innovative treatments in chronic venous insufficiency: endovenous laser ablation of perforating veins: a prospective short-term analysis of 58 cases. <i>Eur J Vasc Endovasc Surg</i> 2010; 40(3):403-406.	4	28 patients: 58 perforating veins; 33 limbs	To evaluate the efficacy of EVLA of IPVs.	Occlusion of the perforating veins was achieved after 3 months in 78% of the cases. In the CEAP C6 group, 4/5 ulcers had healed after 6 weeks. No serious complications, including DVT, were encountered. EVLT for treating IPVs is a safe and technically feasible technique. The initial occlusion rate is acceptable.	3
58. Marsh P, Price BA, Holdstock JM, Whiteley MS. One-year outcomes of radiofrequency ablation of incompetent perforator veins using the radiofrequency styler device. <i>Phlebology</i> 2010; 25(2):79-84.	4	53 total patients	To assess one-year outcomes of a clinical series of patients undergoing treatment with this device. Truncal reflux, where present, was treated initially, and RFA of IPVs was performed as a secondary procedure.	Clinical, aetiological, anatomical and pathological clinical score was improved in 49.3% limbs. IPV closure was reduced in patients with recurrent VV compared with primary VV (72.3% vs 87%, P=0.056). These results demonstrate the radiofrequency styler device to be an effective treatment for IPVs.	3
59. Nwaejike N, Srodon PD, Kyriakides C. 5-years of endovenous laser ablation (EVLA) for the treatment of varicose veins--a prospective study. <i>Int J Surg</i> 2009; 7(4):347-349.	3a	624 EVLA procedures 527 LSV EVLA cases 94 SSV EVLA cases	Prospective study to evaluate the results of EVLA for the treatment of VV.	Median follow-up of 20 months. 5-year experience suggests that EVLA is a safe and effective alternative to conventional surgery for the treatment of VV. Bilateral procedures were well tolerated by patients even under local anesthesia.	2

**Radiologic Management of Lower-Extremity Venous Insufficiency
EVIDENCE TABLE**

Reference	Study Type	Patients/ Events	Study Objective (Purpose of Study)	Study Results	Strength of Evidence
60. Trip-Hoving M, Verheul JC, van Sterkenburg SM, de Vries WR, Reijnen MM. Endovenous laser therapy of the small saphenous vein: patient satisfaction and short-term results. <i>Photomed Laser Surg</i> 2009; 27(4):655-658.	4	49 consecutive patients	To assess patient satisfaction and short-term results of EVLT of the SSV.	After 6 weeks the occlusion rate was 100% and after 6.5 months no recurrent varicosities were reported. Complications consisted of bruising (51%), induration (39%), delayed tightness (16%), phlebitis (2%), and temporary paresthesia (6%) and were all self-limiting. One DVT occurred in a patient with a protein C deficiency. 92% (45/49) of patients were satisfied with the results and in 98% symptoms had significantly improved or completely disappeared. Working activities were resumed after a mean of 4 days. 43 patients (88%) would consider having endovenous laser treatment again if indicated. EVLA of the SSV seems to be a safe modality with excellent short-term results and high patient satisfaction. Controlled studies assessing the effectiveness of EVLA in comparison to conventional treatment of SSV reflux are crucial before considering EVLA as the standard treatment.	3
61. van den Bos RR, Wentel T, Neumann MH, Nijsten T. Treatment of incompetent perforating veins using the radiofrequency ablation stylet: a pilot study. <i>Phlebology</i> 2009; 24(5):208-212.	4	12 patients (14 IPV)	To describe the procedure of RFA of IPV and to evaluate its short-term effectiveness and safety.	Of the 14 treated IPV, 9 (64%) were obliterated on US examination and the others showed remaining reflux. Two patients reported localized paresthesia, but no DVT was recorded. RFA of IPV may be a promising procedure, but patient and incompetent perforator vein selection is important and further standardization of the procedure is required. Comparative clinical trials between RFA and other therapies are warranted.	3
62. Darwood RJ, Theivacumar N, Dellagrammaticas D, Mavor AI, Gough MJ. Randomized clinical trial comparing endovenous laser ablation with surgery for the treatment of primary great saphenous varicose veins. <i>Br J Surg</i> 2008; 95(3):294-301.	1	95 patients (114 legs)	Randomized trial to compare EVLA with conventional surgery in patients with primary saphenofemoral and GSV reflux.	GSV reflux was abolished in 41/42 legs treated with EVLA 1, 26/29 following EVLA 2 and 28/32 after surgery (P=0.227). The median (interquartile range, i.q.r.) AVVSS improvement was similar: 9.38 (4.54-14.93) with EVLA 1, 10.26 (5.03-15.03) after EVLA 2 and 8.36 (4.54-13.21) following surgery (P=0.694). Abolition of reflux and improvement in disease-specific quality of life was comparable following both EVLA and surgery.	2

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Reference	Study Type	Patients/ Events	Study Objective (Purpose of Study)	Study Results	Strength of Evidence
63. Christenson JT, Gueddi S, Gemayel G, Bounameaux H. Prospective randomized trial comparing endovenous laser ablation and surgery for treatment of primary great saphenous varicose veins with a 2-year follow-up. <i>J Vasc Surg</i> 2010; 52(5):1234-1241.	1	100 legs high ligation and stripping (104 limbs EVLT)	Prospective randomized trial comparing EVLA and surgery for treatment of primary GSV with a 2-year follow-up.	High ligation and stripping limbs had significantly more postoperative hematomas than EVLA limbs, and EVLA patients reported more bruising. Follow-up at 1 year was 100% for high ligation and stripping and 99% for EVLA. Two GSVs in the EVLA group reopened and 3 partially reopened. No open GSVs occurred in high ligation and stripping limbs. 98% of the limbs in both groups were free of symptoms. VCSS, AVVSS, and Short Form-36 scores did not reveal any group differences. At 2 years, no differences compared with 1-year results were observed, except that two more GSVs in the EVLA group were partially reopened. Abolition of GSV reflux and improvement in quality of life was similar after high ligation and stripping and EVLA. After EVLA, however, two GSVs were found completely reopened and five were partially reopened, which was significantly higher than after high ligation and stripping. A prolonged follow-up is ongoing.	2
64. Helmy ElKaffas K, ElKashef O, ElBaz W. Great saphenous vein radiofrequency ablation versus standard stripping in the management of primary varicose veins-a randomized clinical trial. <i>Angiology</i> 2011; 62(1):49-54.	1	180 patients	Randomized clinical trial to compare GSV RFA vs standard stripping in the management of primary VV.	Patients were followed up for 24 months. The primary occlusion rate in group A was 94.5% vs 100% in group B. RFA had a lower overall complication rate (P=.02) and shorter post-intervention hospital stay (P=.001). Kaplan-Meier analysis showed no significant differences in recurrence rates at 24 months follow-up (P=.45). RFA was significantly more expensive (P=.003). GSV occlusion was achieved efficiently in 94% of our group using RFA with minimal complications and obvious advantages as compared to standard surgery.	1

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Reference	Study Type	Patients/ Events	Study Objective (Purpose of Study)	Study Results	Strength of Evidence
65. Pronk P, Gauw SA, Mooij MC, et al. Randomised controlled trial comparing sapheno-femoral ligation and stripping of the great saphenous vein with endovenous laser ablation (980 nm) using local tumescent anaesthesia: one year results. <i>Eur J Vasc Endovasc Surg</i> 2010; 40(5):649-656.	1	121 patients 130 legs	Randomized controlled trial comparing sapheno-femoral ligation and stripping of the GSV with EVLA (980 nm) using local tumescent anesthesia	Significantly more post-treatment pain was noted after EVLA at days 7, 10 and 14 (P<0.01; P<0.01; P=0.01, respectively), more hindrance in mobility at days 7 (P<0.01) and 10 (P=0.01), and in self-care (P=0.03) and daily activities (P=0.01) at day 7 compared to sapheno-femoral ligation and stripping. Duplex US at 1-year follow-up showed 9% recurrences (5/56) after EVLA and 10% (5/49) after sapheno-femoral ligation and stripping. Both sapheno-femoral ligation and stripping and EVLA, using local tumescent anesthesia, were well tolerated, with no difference in short-term recurrence rate. In the second week after EVLA, patients experienced significantly more pain resulting in restricted mobility, self-care and daily activity compared to sapheno-femoral ligation and stripping.	1
66. Rasmussen LH, Bjoern L, Lawaetz M, Lawaetz B, Blemings A, Eklof B. Randomised clinical trial comparing endovenous laser ablation with stripping of the great saphenous vein: clinical outcome and recurrence after 2 years. <i>Eur J Vasc Endovasc Surg</i> 2010; 39(5):630-635.	1	121 patients 137 legs	Randomized clinical trial to compare the outcome 2 years after treatment of VV by EVLA or surgery by assessing recurrence, VCSS and quality of life.	A total of 18 (26%) and 25 patients (37%) in the EVLA and surgery group, respectively, developed recurrent VV (not significant between groups). The source of reflux was not significantly different between the groups. Technical failure occurred in three EVLA and two surgery patients, reflux in the anterior accessory GSV, the groin, thigh and calf perforators was found in six, two, four, and three EVLA patients, and in three, three, nine and six surgery patients. VCSS, AVSS and several domains of the Medical Outcomes Study Short Form 36 quality of life score improved significantly in both groups. No significant differences in clinical or US recurrences were found between EVLA and surgery groups. The study also shows that similar improvements in clinical severity scores and quality of life were gained in both treatments.	2

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Reference	Study Type	Patients/ Events	Study Objective (Purpose of Study)	Study Results	Strength of Evidence
67. Hoggan BL, Cameron AL, Maddern GJ. Systematic review of endovenous laser therapy versus surgery for the treatment of saphenous varicose veins. <i>Ann Vasc Surg</i> 2009; 23(2):277-287.	7 (systematic review)	59 studies, with 7 studies directly comparing EVLT with surgery	Systematic review to compare the safety and efficacy of EVLT and surgery involving saphenous ligation and stripping as treatments for VV.	Nonclinical effectiveness outcomes generally favored EVLT over surgery in the first 2 months after treatment. EVLT appears to be at least as safe as surgery. Clinical trials with minimum of 3 years of follow-up are needed to establish the enduring effectiveness of EVLT.	2
68. Murad MH, Coto-Yglesias F, Zumaeta-Garcia M, et al. A systematic review and meta-analysis of the treatments of varicose veins. <i>J Vasc Surg</i> 2011; 53(5 Suppl):49S-65S.	7	39 studies (30 were randomized trials); 8,285 total patients	To review and summarize the available evidence derived from comparative studies about the relative safety and efficacy of these treatments.	Surgery was associated with a nonsignificant reduction in the risk of VV recurrence compared with liquid sclerotherapy (RR, 0.56; 95% CI, 0.29-1.06) and all endoluminal interventions (RR, 0.63; 95% CI, 0.37-1.07). Studies of laser and RFA and FS demonstrated short-term effectiveness and safety. The quality of evidence presented in this review was limited by imprecision (small number of events), short-term follow-up, and indirectness (use of surrogate outcomes). Low-quality evidence supports long-term safety and efficacy of surgery for the treatment of VV. Short-term studies support the efficacy of less invasive treatments, which are associated with less perioperative disability and pain.	3
69. van den Bos R, Arends L, Kockaert M, Neumann M, Nijsten T. Endovenous therapies of lower extremity varicosities: a meta-analysis. <i>J Vasc Surg</i> 2009; 49(1):230-239.	7 (meta-analysis)	64 studies 12,320 limbs	Systematically review and summarize available studies on surgical and new therapies and compare the effectiveness of these different options.	After 3 years, the estimated pooled success rates (with 95% CI) for stripping, FS, RFA, and laser therapy were about 78% (70%-84%), 77% (69%-84%), 84% (75%-90%), and 94% (87%-98%), respectively. After adjusting for follow-up, foam therapy and RFA were as effective as surgical stripping (AOR, 0.12 [95% CI: -0.61-0.85] and 0.43 [95% CI: -0.19-1.04], respectively). EVLT was significantly more effective compared with stripping (AOR, 1.13; 95% CI: 0.40-1.87), foam therapy (AOR 1.02; 95% CI: 0.28-1.75), and RFA (AOR, 0.71; 95% CI: 0.15-1.27). In the absence of large, comparative randomized clinical trials, the minimally invasive techniques appear to be at least as effective as surgery in the treatment of lower extremity VV.	2

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EVIDENCE TABLE**

Reference	Study Type	Patients/ Events	Study Objective (Purpose of Study)	Study Results	Strength of Evidence
70. Subramonia S, Lees T. Randomized clinical trial of radiofrequency ablation or conventional high ligation and stripping for great saphenous varicose veins. <i>Br J Surg</i> 2010; 97(3):328-336.	1	47 patients	Randomized clinical trial compared early outcomes after RFA and conventional surgery for VV.	RFA took longer than conventional surgery: median interquartile range 76 (67-84) vs 48 (39-54) min; P<0.001. Patients returned to their normal activities significantly earlier after RFA (median 3 (2-5) vs 12.5 (4-21) days; P<0.001). Postoperative pain was significantly less after RFA (median score on visual analogue scale 1.70 (0.50-4.30) vs 4.0 (2.35-6.05); P=0.001). Patient satisfaction, quality of life improvement and analgesic requirements significantly favored RFA. RFA took longer to perform but resulted in a significantly better early outcome than conventional surgery in suitable patients with great saphenous VV.	1
71. Binkert CA, Schoch E, Stuckmann G, et al. Treatment of pelvic venous spur (May-Thurner syndrome) with self-expanding metallic endoprosthesis. <i>Cardiovasc Intervent Radiol</i> 1998; 21(1):22-26.	5	8	Case reports, assessing the treatment of pelvic venous spur (May-Thurner syndrome) with self-expanding metallic endoprosthesis.	Technical success with immediate reduction of left leg circumference was achieved in all 8 patients. Primary patency rate of 100% was observed during an average follow-up of 3 years (range 10-121 months). Percutaneous transfemoral placement of self-expanding metallic stents is an effective minimally invasive alternative to surgery in the treatment of symptomatic pelvic venous spur.	4
72. Heniford BT, Senler SO, Olsofka JM, Carrillo EH, Bergamini TM. May-Thurner syndrome: management by endovascular surgical techniques. <i>Ann Vasc Surg</i> 1998; 12(5):482-486.	5	1	Case report on the management of May-Thurner syndrome with endovascular surgical techniques.	Operative therapy is usually recommended. Treatment of a 15-year-old patient with syndrome utilizing endovascular surgical techniques resulted in an excellent outcome.	4
73. O'Sullivan GJ, Semba CP, Bittner CA, et al. Endovascular management of iliac vein compression (May-Thurner) syndrome. <i>J Vasc Interv Radiol</i> 2000; 11(7):823-836.	3c	39	Retrospective analysis to evaluate the feasibility of endovascular techniques in treating venous outflow obstruction resulting from compression of the iliac vein by the iliac artery of the left lower extremity (May-Thurner syndrome).	34/39 patients (87%) had initial technical success. Overall patency rate at 1 year was 79%. Symptomatically, 85% of patients were completely or partially improved compared with findings before treatment. Endovascular reconstruction of occluded iliac veins secondary to iliac vein compression syndrome (May-Thurner) appears to be safe and effective.	3
74. Patel NH, Stookey KR, Ketcham DB, Cragg AH. Endovascular management of acute extensive iliofemoral deep venous thrombosis caused by May-Thurner syndrome. <i>J Vasc Interv Radiol</i> 2000; 11(10):1297-1302.	4	10 symptomatic women	Report by authors on their experience on the treatment of acute extensive iliofemoral DVT caused by May-Thurner syndrome using endovascular techniques.	100% initial clinical success rate. Catheter-directed thrombolytic therapy is an effective method for restoring venous patency and provides relief of the acute symptoms.	4

**Radiologic Management of Lower-Extremity Venous Insufficiency
EVIDENCE TABLE**

Reference	Study Type	Patients/ Events	Study Objective (Purpose of Study)	Study Results	Strength of Evidence
75. Kim HS, Malhotra AD, Rowe PC, Lee JM, Venbrux AC. Embolotherapy for pelvic congestion syndrome: long-term results. <i>J Vasc Interv Radiol</i> 2006; 17(2 Pt 1):289-297.	3a	131	To evaluate the long-term results of transcatheter embolotherapy in women with chronic pelvic pain caused by ovarian and pelvic varices.	Percutaneous transfemoral venography confirmed the presence of ovarian varices in 127 (97.0%) of 131 patients, all of whom were treated with embolotherapy. Internal iliac embolotherapy performed in 108/127 patients (85%). 83% of patients exhibited clinical improvement at long-term follow-up. Direct venographic evaluation with embolotherapy can achieve significant improvement in pain perception levels in patients with chronic pelvic pain resulting from pelvic venous congestion.	2
76. Kwon SH, Oh JH, Ko KR, Park HC, Huh JY. Transcatheter ovarian vein embolization using coils for the treatment of pelvic congestion syndrome. <i>Cardiovasc Intervent Radiol</i> 2007; 30(4):655-661.	4	67	To evaluate the therapeutic effectiveness of ovarian vein embolization using coils for the treatment of pelvic congestion syndrome.	55/67 (82%) experienced pain reduction after coil embolization, were satisfied with the procedure, and did not pursue any further treatment. Ovarian vein embolization using coils is a safe and effective therapeutic method. Surgical treatment should be considered in cases where embolization proves ineffective.	3
77. Segal JB, Streiff MB, Hofmann LV, Thornton K, Bass EB. Management of venous thromboembolism: a systematic review for a practice guideline. <i>Ann Intern Med</i> 2007; 146(3):211-222.	7 (systematic review)	101 articles	Systematically review the evidence on the efficacy of interventions for treatment of DVT and pulmonary embolism. Studies selected include randomized, controlled trials; systematic reviews of trials; and observational studies.	Moderately strong evidence supports early use of compression stockings to reduce post-thrombotic syndrome. Limited evidence suggests vena cava filters are only modestly efficacious for prevention of pulmonary embolism. Conventional-intensity oral anticoagulation beyond 12 months may be optimal for patients with unprovoked venous thromboembolism, although patients with transient risk factors benefit little from more than 3 months of therapy. High-quality trials support use of low-molecular-weight heparin in place of oral anticoagulation, especially in cancer patients.	2

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Reference	Study Type	Patients/ Events	Study Objective (Purpose of Study)	Study Results	Strength of Evidence
78. Puggioni A, Marks N, Hingorani A, Shiferson A, Alhalbouni S, Ascher E. The safety of radiofrequency ablation of the great saphenous vein in patients with previous venous thrombosis. <i>J Vasc Surg</i> 2009; 49(5):1248-1255.	3b	274 patients 293 consecutive RFA procedures 62 GSV stripping procedures	Retrospective study to evaluate the safety of RFA of the GSV in patients with previous venous thrombotic events.	Acute thrombotic events after RFA were detected in 38 limbs (13%), including thrombus protrusion into the SFJ in 24 (8%), common femoral vein in 7 (2.5%), and calf vein DVT in 7 (2.5%). Overall incidence of acute thrombotic events in limbs with and without evidence of previous DVT was 7% (2/29) and 14% (36/264), respectively (P=.36). RFA of the GSV in patients with previous venous thromboembolic events is safe and should be offered as an alternative to surgical procedures. Data demonstrate that acute thrombotic events increase when larger-diameter GSVs are treated.	3
79. Blomgren L, Johansson G, Dahlberg-Akerman A, Thermaenius P, Bergqvist D. Changes in superficial and perforating vein reflux after varicose vein surgery. <i>J Vasc Surg</i> 2005; 42(2):315-320.	3c	293 patients (343 legs)	Prospective duplex study to examine the effect of current surgical treatment for primary VV on the development of venous insufficiency ≤2 years after VV surgery. Patients were part of a randomized controlled study.	VV surgery induces changes in the remaining venous segments of the legs that continue for several months. In most patients, perforators and the GSV below the knee can be ignored at the primary surgery. A substantial number of recurrences in the SFJ and SPJ are unavoidable with present surgical knowledge because they stem from new vessel formation and progression of disease.	2
80. Fischer R, Linde N, Duff C, Jeanneret C, Chandler JG, Seeber P. Late recurrent saphenofemoral junction reflux after ligation and stripping of the greater saphenous vein. <i>J Vasc Surg</i> 2001; 34(2):236-240.	3a	77 patients (125 limbs)	To determine the long-term incidence of refluxing epifascial-to-deep vein reconnections in the area of the former SFJ after ligation and stripping of the GSV. Patients were evaluated clinically and with duplex US at a mean follow-up of 34 years.	Clinical examination suggested saphenofemoral recurrence in 59 limbs (47%). Color-coded duplex US showed saphenofemoral reflux in 75 limbs (60%), vs 48 identified on clinical exam (P<.001). Study shows a 60% incidence of junctional and circumjunctional reconnections. Color-coded duplex US is a necessary concomitant to clinical examination.	2

Radiologic Management of Lower-Extremity Venous Insufficiency
EVIDENCE TABLE

Reference	Study Type	Patients/ Events	Study Objective (Purpose of Study)	Study Results	Strength of Evidence
81. O'Hare JL, Vandenbroeck CP, Whitman B, Campbell B, Heather BP, Earnshaw JJ. A prospective evaluation of the outcome after small saphenous varicose vein surgery with one-year follow-up. <i>J Vasc Surg</i> 2008; 48(3):669-673; discussion 674.	3a	219 consecutive patients (234 legs)	Multicenter, prospective cohort study to examine the effect of various surgical maneuvers during standard surgery for small saphenous VV.	Incidence of visible recurrent varicosities at 1-year was lower after saphenous VV stripping (12/67, 18%) than after disconnection only (28/116, 24%). There was no significant difference in the rate of numbness at 1 year between those who had SSV stripping (20/71, 28%) and those who had disconnection only (38/134, 28%). The rate of SPJ incompetence detected by duplex at 1 year was significantly lower in patients who underwent SSV stripping (9/67, 13%) than in those who did not (37/115, 32%) (P<.01). Stripping of the saphenous VV significantly reduced the rate of SPJ incompetence after one year without increasing the rate of complications.	2
82. Pittaluga P, Chastanet S, Guex JJ. Great saphenous vein stripping with preservation of sapheno-femoral confluence: hemodynamic and clinical results. <i>J Vasc Surg</i> 2008; 47(6):1300-1304; discussion 1304-1305.	3a	151 patients (195 lower limbs)	Retrospective cohort study to evaluate results after stripping procedures in which the sapheno-femoral confluence was preserved.	Preservation of the sapheno-femoral confluence during saphenous stripping gave good results with regard to hemodynamics and neovascularization on the sapheno-femoral confluence, VV recurrence, improvement of symptoms, and aesthetic appearance for legs with a median follow-up of 27.3 months.	2
83. Winterborn RJ, Foy C, Earnshaw JJ. Causes of varicose vein recurrence: late results of a randomized controlled trial of stripping the long saphenous vein. <i>J Vasc Surg</i> 2004; 40(4):634-639.	1 and 3a	Randomized trial; 100 patients (133 legs): Later study; 51 patients (74 legs)	Original study was a randomized trial of patients who underwent saphenofemoral ligation with or without long saphenous vein stripping. Later, some patients had clinical review and duplex imaging and completed an AVVSSS.	Cumulative total of 83 legs had developed clinically recurrent VV by 11 years (62%). No statistically significant difference between the ligation-only and the stripping groups. Stripping is recommended as part of routine VV surgery as it reduced the risk of reoperation by 60% after 11 years, although it did not reduce the rate of visible recurrent veins.	2
84. Rudstrom H, Bjorck M, Bergqvist D. Iatrogenic vascular injuries in varicose vein surgery: a systematic review. <i>World J Surg</i> 2007; 31(1):228-233.	7 (systematic review)	81 patients 87 vascular injuries (44 arterial and 43 deep vein injuries)	Systematic literature research to examine nature and consequences of iatrogenic vascular injuries during VV surgery.	Majority of venous injuries (28/43) were laceration or division of the femoral vein. Arterial stripping predominated in arterial injuries (17/44). 30% (13/44) of arterial injuries were detected preoperatively. Early detection by routine checking of arterial circulation is important.	2
85. Kontothanassis D, Di Mitri R, Ferrari Ruffino S, et al. Endovenous laser treatment of the small saphenous vein. <i>J Vasc Surg</i> 2009; 49(4):973-979 e971.	3a	204 patients (229 limbs)	Multicenter, prospective study to evaluate the feasibility, safety, and efficacy of EVLA to treat SSV.	EVLA of the SSV has excellent early and midterm results. The prevalence of thrombosis and paresthesia is very low. Symptom relief is very good.	2

**Radiologic Management of Lower-Extremity Venous Insufficiency
EVIDENCE TABLE**

Reference	Study Type	Patients/ Events	Study Objective (Purpose of Study)	Study Results	Strength of Evidence
86. Marsh P, Price BA, Holdstock J, Harrison C, Whiteley MS. Deep vein thrombosis (DVT) after venous thermoablation techniques: rates of endovenous heat-induced thrombosis (EHIT) and classical DVT after radiofrequency and endovenous laser ablation in a single centre. <i>Eur J Vasc Endovasc Surg</i> 2010; 40(4):521-527.	4	2,470 cases of RFA (350 cases of EVLA)	To retrospectively examine the rates of DVT after RFA and EVLA with specific attention to thrombus type.	Post-RFA, DVT was identified in 17 limbs (0.7%); 4 were endovenous heat-induced thrombosis (0.2%). Concomitant SSV ligation and stripping was a risk factor for calf-DVT (OR 3.4, 95% CI, 1.2-9.7, P=0.036), possibly due to an older patient group with more severe disease. Post-EVLA, 4 DVTs were identified (1%), of which 3 were endovenous heat-induced thrombosis (0.9%). The DVT rate including endovenous heat-induced thrombosis was similar in patients treated with RFA and EVLA and was low. Routine postoperative duplex US scanning is recommended until the significance of endovenous heat-induced thrombosis is better understood, in accordance with consensus guidelines. DVT rates for both techniques compare favorably with those published for saphenous vein stripping.	3
87. Goode SD, Chowdhury A, Crockett M, et al. Laser and radiofrequency ablation study (LARA study): a randomised study comparing radiofrequency ablation and endovenous laser ablation (810 nm). <i>Eur J Vasc Endovasc Surg</i> 2010; 40(2):246-253.	1	87 legs	Randomized study to determine whether RFA of the GSV was associated with less pain and bruising than EVLA.	In the bilateral group, RFA resulted in significantly less pain than EVLA on days 2-11 postoperatively. RFA also resulted in significantly less bruising than EVLA on days 3-9. There were no significant differences in mean post-operative pain, bruising and activity scores in the unilateral group. Both RFA and EVLA resulted in occlusion rates of 95% at 10 days postoperatively. RFA was less painful for patients than EVLA and produced less bruising in the postoperative period with comparable success rates but there was no difference in the unilateral group.	2

Radiologic Management of Lower-Extremity Venous Insufficiency
EVIDENCE TABLE

Reference	Study Type	Patients/ Events	Study Objective (Purpose of Study)	Study Results	Strength of Evidence
88. Pittaluga P, Chastanet S, Locret T, Rousset O. Retrospective evaluation of the need of a redo surgery at the groin for the surgical treatment of varicose vein. <i>J Vasc Surg</i> 2010; 51(6):1442-1450.	3a	288 patients (473 legs)	Retrospective study to compare traditional surgical treatment for varicose recurrence and a less aggressive surgical approach focusing on treatment of the varicose reservoir and avoiding redo surgery at the groin if possible.	Postoperative complications occurred in 6.7% in group 1 vs 0.5% in group 2 (P<.05), with inguinal complications predominating. After 3 years of follow-up, Kaplan-Meier life-table analysis showed group 1 and 2 patients had similar rates of freedom from inguinal reflux (90.8% vs 92.9% survival rate) and from varicose repeat-recurrence (90.8% vs 91.9% survival rate). Group 1 had better results for the Venous Disability Score (0.38 vs 0.58, P=.02) and cosmetic improvement (94.2% vs 84.2%; P=.00032). Surgical treatment for varicose recurrence focusing on the varicose reservoir and avoiding redo surgery at the groin led to a minimally invasive procedure and a reduction in postoperative complications, with good medium-term clinical and hemodynamic results, particularly for symptoms improvement and cosmetic appearance, with a lower cost vs traditional surgical treatment for varicose recurrence with redo surgery at the groin.	2
89. van Groenendaal L, Flinkenflogel L, van der Vliet JA, Roovers EA, van Sterkenburg SM, Reijnen MM. Conventional surgery and endovenous laser ablation of recurrent varicose veins of the small saphenous vein: a retrospective clinical comparison and assessment of patient satisfaction. <i>Phlebology</i> 2010; 25(3):151-157.	3b	281 patients	To retrospectively assess the feasibility of EVLA in recurrent VV of the SSV and to compare this technique with surgical reintervention.	Complications in both groups were mostly minor and self-limiting. Sural nerve neuralgia appeared to be more frequent in the surgically treated group (20% vs 9%). After correction for length of follow-up, the incidence of recurrences was not statistically significant between groups. EVLA is feasible in patients with recurrent VV of the SSV with possibly a lower incidence of sural nerve injury. Patient satisfaction is high for both treatment modalities. Studies with larger samples are indicated to confirm these observations.	3
90. Anchala PR, Wickman C, Chen R, et al. Endovenous laser ablation as a treatment for postsurgical recurrent saphenous insufficiency. <i>Cardiovasc Intervent Radiol</i> 2010; 33(5):983-988.	4	38 patients	To investigate the safety and efficacy of EVLA as a treatment for recurrent symptomatic saphenous insufficiency occurring after saphenous vein ligation and stripping.	No major complications were identified. EVLA of recurrent symptomatic saphenous venous insufficiency is a safe and effective treatment in patients who develop recurrent symptoms after saphenous vein ligation and stripping.	3

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EVIDENCE TABLE**

Reference	Study Type	Patients/ Events	Study Objective (Purpose of Study)	Study Results	Strength of Evidence
91. Nwaejike N, Srodon PD, Kyriakides C. Endovenous laser ablation for the treatment of recurrent varicose vein disease--a single centre experience. <i>Int J Surg</i> 2010; 8(4):299-301.	4	586 EVLA procedures	To evaluate EVLA for the treatment of recurrent VV disease.	Mean length of vein treated was LSV-36 cm +/- 14.5 (6-73) and SSV-14.5 cm +/- 7.35 (5-24); mean energy delivered was LSV 3102J +/- 1053 (150-4656) and SSV-693J +/- 396 (135-1216). 17 patients had bilateral EVLA for recurrent disease at the same setting with one patient having bilateral procedures under local anesthetic. There was an incidence of pulmonary embolism 10 days post EVLA and two patients required further phlebectomies post EVLA for residual varices that were present preoperatively. Median follow-up was 18 months (range 1-38), with no clinical recurrence and no recanalization of the treated LSV or SSV on duplex US. In our experience EVLA can be safely performed for recurrent VV disease. In our experience Redo EVLA is not more difficult than primary EVLA to perform.	3

Evidence Table Key

Study Type Key

Numbers 1-7 are for studies of therapies while numbers 8-15 are used to describe studies of diagnostics.

1. Randomized Controlled Trial — Treatment
2. Controlled Trial
3. Observation Study
 - a. Cohort
 - b. Cross-sectional
 - c. Case-control
4. Clinical Series
5. Case reviews
6. Anecdotes
7. Reviews

8. Randomized Controlled Trial — Diagnostic
9. Comparative Assessment
10. Clinical Assessment
11. Quantitative Review
12. Qualitative Review
13. Descriptive Study
14. Case Report
15. Other (Described in text)

Strength of Evidence Key

- Category 1 - The conclusions of the study are valid and strongly supported by study design, analysis and results.
- Category 2 - The conclusions of the study are likely valid, but study design does not permit certainty.
- Category 3 - The conclusions of the study may be valid but the evidence supporting the conclusions is inconclusive or equivocal.
- Category 4 - The conclusions of the study may not be valid because the evidence may not be reliable given the study design or analysis.

Abbreviations Key

- AOR = Adjusted odds ratio
CI = Confidence interval
CT = Computed tomography
CVI = Chronic venous insufficiency
DVT = Deep vein thrombosis
EVLA = Endovenous laser ablation
EVLTA = Endovenous laser therapy
EVLTA/TAP = EVLT with concomitant ambulatory phlebectomies
FS = Foam sclerotherapy
GSV = Great saphenous vein
HRQoL = Health-related quality of life
IPV = Incompetent perforating vein
LSV = Large saphenous vein
PPV = Positive predictive value
RFA = Radiofrequency ablation
RFO = Radiofrequency obliteration
RR = Relative risk
RVF = Residual volume fraction
SD = Standard deviation
SEPS = Subfascial endoscopic perforator vein surgery
SFJ = Saphenofemoral junction
SPJ = Saphenopopliteal junction
SSV = Small saphenous vein
SVS = Superficial venous surgery
US = Ultrasound
VFI = Venous filling index
VV = Varicose veins