

Management of Varicose Tributaries: Phlebectomy, Foam Sclerotherapy and Timing Relative to Truncal Ablation – A Narrative Review

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Abstract

Varicose tributaries often persist after endovenous ablation of an incompetent saphenous trunk, and their management is one of the most common decisions in venous practice. Ambulatory phlebectomy and ultrasound-guided foam sclerotherapy (UGFS) are both endorsed by current European, American and UK guidance, but how they compare is less clear. This narrative review summarises the evidence on efficacy, safety, timing and cost. Direct comparative evidence is limited to three small randomised trials of foam versus phlebectomy and an older trial that used liquid rather than foam sclerosant; adequately powered trials remain unpublished or under way. On that evidence, phlebectomy may be more durable, while foam causes less early pain and bruising and allows a faster return to work, at the cost of more pigmentation. Treating tributaries at the same sitting as truncal ablation reduces re-intervention in pooled data, including a meta-analysis restricted to randomised trials, although the accompanying quality-of-life gains are small and early. A tributary-first strategy that preserves the saphenous trunk (ASVAL) was non-inferior in quality of life in one large trial, but a quarter of patients needed later truncal treatment. Most practical choices between the two techniques still rest on anatomy, patient priorities and expert consensus rather than trial data.

Introduction & Background

Varicose veins are common, affecting roughly a quarter to two-fifths of adults in population studies [1, 2]. Most arise from superficial venous incompetence involving the great or small saphenous vein, an accessory saphenous vein, or the tributaries that drain into them. In the Clinical-Etiological-Anatomical-Pathophysiological (CEAP) classification, visible varicose veins of 3 mm or more are clinical class C2 [3].

Endovenous thermal ablation is now first-line treatment for an incompetent saphenous trunk [4, 5]. Closing the trunk removes the main source of reflux, but the bulging tributaries that patients see often persist. Truncal ablation alone proved sufficient in

about 64% of patients in a large meta-analysis, leaving roughly a third who need further tributary treatment [6].

Two techniques dominate that treatment: ambulatory phlebectomy and ultrasound-guided foam sclerotherapy (UGFS). Both are endorsed by current guidelines [4, 7]. Conventional practice treats the refluxing trunk together with, or before, its tributaries. An alternative tributary-first strategy, ambulatory selective varices ablation under local anaesthesia (ASVAL), removes the tributaries and preserves the trunk [8, 9].

This narrative review aims to compare phlebectomy and foam sclerotherapy for varicose tributaries in terms of efficacy, safety, timing relative to truncal ablation and cost, and to set out where the evidence is strong, weak or absent.

Review

Methods

This is a narrative review, not a systematic one. PubMed/MEDLINE was searched from inception to 6 October 2026 using the following strategy: (phlebectomy OR "stab avulsion" OR "foam sclerotherapy" OR "ultrasound-guided sclerotherapy") AND (varicose OR tributar*) AND (concomitant OR staged OR sequential OR ASVAL OR randomized OR "meta-analysis"). The search returned 346 records. The Cochrane Central Register of Controlled Trials (CENTRAL), which includes trial registry records, was searched with the same strategy on the same date and returned 274 records. Titles, and abstracts where needed, were screened for relevance to the treatment of varicose tributaries. Current European, American, UK and International Union of Phlebology guidance and its cited evidence was also reviewed, reference lists of key papers were hand-searched, and targeted searches identified recent publications not yet indexed.

Randomised controlled trials (RCTs), systematic reviews and meta-analyses, clinical practice guidelines, and large prospective registries or cohorts reporting efficacy, safety or cost outcomes were prioritised. English-language publications were included. No formal risk-of-bias assessment or quantitative pooling was performed. Statements that reflect expert consensus or the author's practice, rather than trial evidence, are labelled as such.

The two techniques

Ambulatory phlebectomy (mini- or stab phlebectomy) removes the varicose vein mechanically. Under local or tumescent anaesthesia, 1–3 mm incisions are made along the pre-marked vein and segments are extracted with a phlebectomy hook. The incisions

need no sutures. The modern technique was developed by the Swiss dermatologist Robert Muller in the 1950s and is widely regarded as the reference treatment for palpable tributaries [10].

Ultrasound-guided foam sclerotherapy injects a detergent sclerosant, mixed with air or a physiological gas into a fine foam, directly into the vein under duplex guidance. Foam displaces blood rather than mixing with it, which prolongs contact with the vein wall, and it is visible on ultrasound as it travels [11]. The Tessari two-syringe method made physician-compounded foam simple and reproducible [12]. The treated vein becomes a fibrous cord that is reabsorbed over weeks to months.

Feature	Ambulatory phlebectomy	Foam sclerotherapy (UGFS)
Mechanism	Physical removal of the vein	Chemical endothelial injury, then fibrosis
Anaesthesia	Local or tumescent	None
Commonly used for*	Palpable, superficial tributaries	Tortuous, deep, recurrent or residual veins
Time to final result	Immediate	Weeks to months (cord resorption)
Sessions	Usually one	Sometimes more than one*
Main early downside	Bruising and pain in the first week [13]	Inflammation, trapped blood, later pigmentation [11]

*Practice consensus [11] and the author's experience, not trial evidence.

Foam is more effective than liquid sclerosant for larger veins: in a randomised trial in the great saphenous vein (95 patients), foam eliminated reflux at 3 weeks in 85% versus 35% with liquid at the same concentration, and success at 2 years was 53% versus 12% [14]. Contraindications to sclerotherapy have been categorised in a 2023 International Union of Phlebology consensus [15].

Measuring success

Studies define success differently, so their figures are not interchangeable:

- **Anatomical success** — the treated vein occluded or absent on duplex at a set time point.
- **Clinical recurrence** — visible varicose veins returning in the treated area.
- **Re-intervention** — a further procedure for residual or recurrent veins; the most patient-relevant measure.

- **Patient-reported outcomes** — disease-specific quality of life (Aberdeen Varicose Vein Questionnaire, AVVQ, scored 0–100, lower is better; or VEINES-QOL/Sym), clinical severity (Venous Clinical Severity Score, VCSS), pain and return to work.

Statistically significant differences in these scores are not necessarily clinically important. Published estimates of the minimal clinically important difference for the AVVQ are limited; one validation study, of a Thai-language version, placed it at 6.2 points [16]. Each figure below is reported with the measure it refers to.

Comparative evidence: foam versus phlebectomy

Head-to-head evidence is scarce, small and short-term. It does not establish that either technique is superior; it suggests a trade-off between durability and recovery. The European Society for Vascular Surgery (ESVS, 2022) and the Society for Vascular Surgery, American Venous Forum and American Vein and Lymphatic Society (SVS/AVF/AVLS, 2023) guidelines both recommend either technique for symptomatic varicose tributaries; the American recommendation is graded strong, on moderate-quality evidence [4, 7].

Trial	Design	Outcome measured	Result	Main limitations
Zafarghandi et al., 2017 [13]	Single-centre RCT, 90 patients (45 per arm), UGFS vs phlebectomy of small leg varicosities	Anatomical success on duplex; pain; morbidity; return to work	Success 95.5% vs 100% at 6 months ($P = 0.11$). Foam: less bruising at 1 week (11.1% vs 37.8%, $P = 0.003$), less moderate–severe pain (15.6% vs 44.4%, $P = 0.003$), return to work 3.6 vs 13.7 days ($P < 0.001$)	Small; 6-month follow-up; management of any saphenous reflux not reported; internal inconsistencies (see below)
de Roos et al., 2003 [17]	RCT, liquid compression sclerotherapy vs phlebectomy	Clinical recurrence	25% vs 2.1% at 1 year, favouring phlebectomy	Liquid sclerosant, not foam; a single vein territory

Trial	Design	Outcome measured	Result	Main limitations
Vatsa and Pathak, 2022 [18]	RCT, 64 patients (32 per arm), phlebectomy vs foam sclerotherapy	Primary symptom relief; procedure time; complications	Good symptom relief in 85% vs 60%, favouring phlebectomy; procedure 40.2 vs 25.3 minutes. Pigmentation, thrombophlebitis, bleeding and small ulcers more frequent after foam ($P < 0.05$)	Small; follow-up and saphenous management not reported in the abstract; limited statistical reporting
Sellés Dechent et al., 2008 [19]	RCT, 105 patients; distal venous segment treated by phlebectomy vs foam during saphenectomy	Clinical recurrence	Overall recurrence 35.3% vs 57.4% ($P < 0.001$) and trunk recurrence 17.7% vs 38.9% ($P = 0.028$), favouring phlebectomy; tributary (collateral) recurrence similar, 9.8% vs 11.1%	Older open-surgery context; distal saphenous segment rather than tributaries alone; abstract conclusion ambiguously worded
Belramman et al., Imperial College [20]	Single-centre RCT, target 160 patients, foam vs phlebectomy alongside truncal ablation	Re-intervention	Not published; registry status last listed as unknown (NCT03416413)	—

Two cautions apply to the Zafarghandi trial. Its methods describe duplex assessment at 1 month, yet success is reported at 6 months. Its deep vein thrombosis (DVT) rate of 2.6% in the phlebectomy arm cannot arise from 45 patients (one patient is 2.2%, two are 4.4%). Neither undermines its findings on pain and recovery, but both lower confidence in its precision.

The de Roos trial used liquid sclerosant, which is less effective than foam for larger veins [14], so its recurrence gap may overstate the difference with modern UGFS.

For the saphenous trunk itself, the CLASS trial (798 patients) found disease-specific quality of life at 5 years was better after laser ablation or surgery than after foam [21, 22]. That result concerns truncal treatment and should not be extrapolated to tributaries.

Safety and complications

Serious complications are rare with both procedures, but their profiles differ. Phlebectomy's morbidity is front-loaded: bruising and pain in the first week [13]. Foam's is mostly delayed and cosmetic, or rare and systemic [11, 23].

Complication	Ambulatory phlebectomy	Foam sclerotherapy
Bruising at 1 week (RCT)	37.8% [13]	11.1% [13]
Superficial thrombophlebitis	4.4% (10 of 227) [9]	About 4.4% across series [23]
Hyperpigmentation	4.8% (11 of 227) [9]	10–30% across series; usually fades [23]
Postoperative bleeding	1.8% (4 of 227) [9]	Not a typical complication
Telangiectatic matting	Reported; not well quantified [24]	15–24% [23]
Nerve injury	Recognised, mainly sensory [24]; none in 227 patients [9]	About 0.2% [23]
Visual disturbance	Not applicable	0.09–2% in series of 500 or more patients; average about 1.4%; none permanent [25, 26]
Stroke	Not applicable	About 0.01%; linked to right-to-left shunts such as a patent foramen ovale [23, 27]
DVT	None in 227 patients [9]	1–3% across series [23]
Complications per session (registry)	—	0.58% with foam vs 0.22% with liquid [28]

The phlebectomy figures come from the isolated-phlebectomy arm of the SAPTAP trial [9]. Complications there were recorded at 3 months, and at 12 months in the 25.6% who later had truncal treatment, so a few events may relate to that second procedure. Foam figures come mainly from case series, registries and reviews that include truncal treatment, so comparisons between the two columns are approximate.

In a prospective study of 1,025 patients having foam to the saphenous trunks, 2.6% had transient side effects such as migraine, visual disturbance or chest tightness [29]. The French registry of 12,173 sessions likewise found a low overall complication rate [30]. The European guideline sets out precautions, including limits on foam volume per session and duplex guidance [11]. A previous severe neurological or cardiac event after sclerotherapy is an absolute contraindication to further sclerotherapy [15].

Timing: concomitant, staged or tributaries first

The SVS guideline favours treating tributaries at the same sitting as truncal ablation, with a strong recommendation for great and small saphenous reflux [7]. NICE likewise advises considering treatment of incompetent tributaries at the same time as truncal ablation [5].

- **Concomitant treatment versus ablation alone.** A 2026 meta-analysis of six RCTs (432 patients) compared ablation with immediate phlebectomy or foam against ablation alone. Combined treatment reduced re-intervention (relative risk [RR] 0.33, 95% confidence interval [CI] 0.18–0.62). It improved AVVQ at 6 weeks (mean difference 5.24, 95% CI 2.53–7.94) and VCSS at 12 months (mean difference 0.86, 95% CI 0.40–1.31). Thrombophlebitis, nerve injury, pain and serious adverse events did not differ [31]. The AVVQ gain is below the one published estimate of a clinically important difference [16], and the VCSS gain is under one point. In the AVULS trial (101 patients), 36% of the delayed group needed further treatment versus 2% after simultaneous phlebectomy ($P < 0.001$), with better VCSS up to 12 months [32]. In the 50-patient trial of Carradice et al., concomitant phlebectomy reduced secondary procedures and improved quality of life at 3 months [33]; at 5 years both strategies gave good results, with the greatest improvement after concomitant treatment [34]. A second 2026 meta-analysis of nine studies (1,954 patients, including observational designs) found a pooled odds ratio (OR) for re-intervention of 0.15 (95% CI 0.04–0.62), with very high heterogeneity ($I^2 = 93\%$) [35]. These meta-analyses overlap, both drawing on AVULS and the Carradice cohort [31, 35], so they are not independent confirmations.
- **Staged treatment.** The 2020 Aherne meta-analysis (15 studies, 6,915 limbs) found re-intervention in 6.3% after concomitant versus 36.1% after staged treatment (RR 0.21, 95% CI 0.07–0.62; $I^2 = 90\%$). Complications (RR 1.14, 95% CI 0.67–1.93) and DVT (RR 1.41, 95% CI 0.72–2.77) were similar. Its subgroup of randomised trials, however, showed no difference in re-intervention [6]. A 3-year RCT after mechanochemical ablation (85 patients) found re-intervention in 11.4% after staged foam versus 4.9% after concomitant phlebectomy (OR 2.5, 95% CI 0.46–13.67; $P = 0.435$); a non-inferiority analysis suggested staging may be inferior for quality of life [36]. Because the staged arm received foam and the concomitant arm phlebectomy, timing and technique are confounded in this trial. In a 2026 prospective non-randomised study (152 patients), tributaries had regressed by 3 months in 85% after concomitant foam versus 50.6%

with staging, but staging reduced sclerosant use and hyperpigmentation, with similar satisfaction [37]. The multicentre FinnTrunk RCT (powered for 66 patients) compared laser ablation alone with laser ablation plus concomitant foam to the tributaries. At 3 months, 20.7% of the ablation-alone group sought further foam treatment versus none after concomitant treatment ($P < 0.001$), and VCSS was slightly higher after ablation alone (median 2.0 vs 1.0; $P < 0.001$). Procedures were 9 minutes shorter without concomitant foam, and complications and quality of life were similar; the authors judged ablation alone an acceptable but slightly less effective alternative [38].

- **ASVAL (tributaries first, trunk preserved).** In SAPTAP (464 patients), isolated phlebectomy with optional later truncal ablation was non-inferior to thermal ablation plus phlebectomy at 12 months. The VEINES-QOL difference was -1.1 points (95% CI -2.7 to 0.1) against a pre-set margin of -2.7 ; VEINES-Sym was -0.7 (-2.5 to 0.0). Anatomical success at the trunk, however, was 57.8% versus 95.5%, VCSS was slightly worse (1.86 vs 1.22; $P = 0.001$), and 25.6% needed later truncal treatment [9]. Observational studies report loss of truncal reflux in about 50–66% of patients at 1 year, far less often when reflux extends below mid-thigh [39, 40]. The ESVS guideline gives ASVAL a weak (class IIb) recommendation [4, 9].

Taken together, concomitant treatment consistently reduces the need for further tributary treatment, in pooled observational data, in a meta-analysis restricted to RCTs and in the FinnTrunk trial, although an earlier randomised subgroup was inconclusive. The accompanying gains in quality of life and severity scores are small and early. Concomitant treatment is a reasonable default for large, clearly symptomatic tributaries. Staging suits smaller or uncertain tributaries, reassessed by duplex at follow-up, and spares a proportion of patients any tributary procedure. ASVAL is an option for selected patients with limited disease who prefer to preserve the trunk and accept about a one-in-four chance of later truncal treatment.

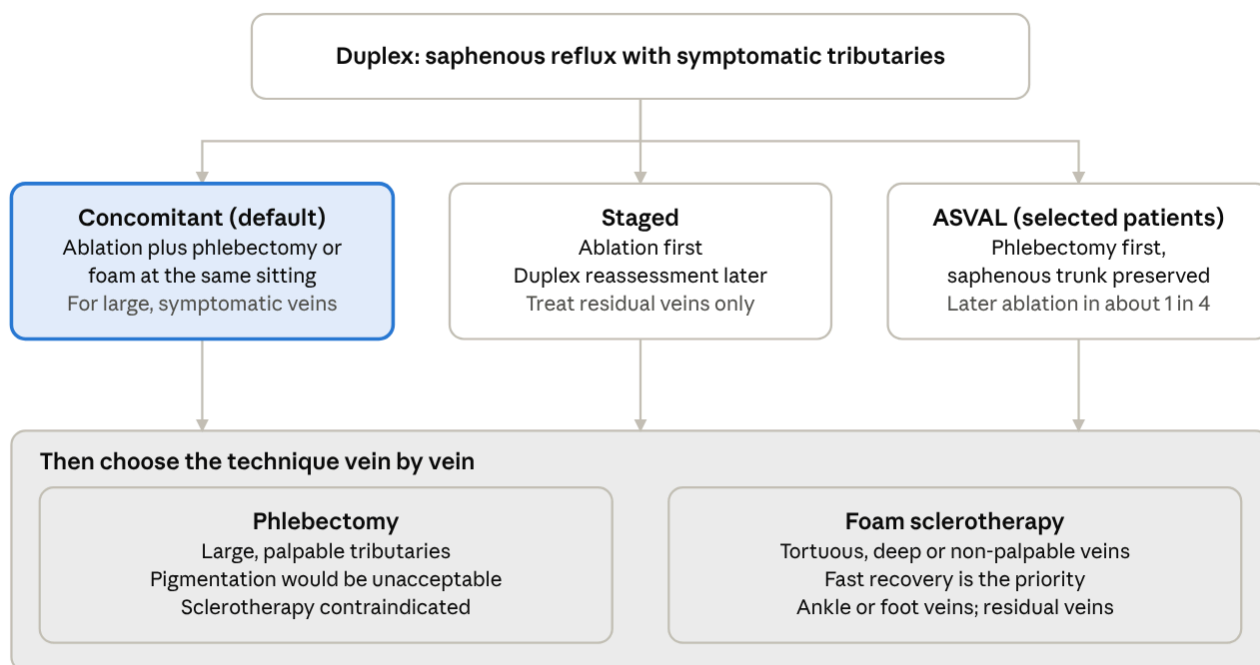
Choosing between the techniques

Matching the technique to the vein generally works better than using one method for everything, and many patients receive both. The basis column shows how much of each choice rests on evidence; most rests on consensus or experience.

Clinical situation	Usually preferred	Basis
Large, palpable tributary	Phlebectomy	Lower recurrence after phlebectomy in two RCTs, one using liquid sclerosant [17] and one in the distal saphenous segment [19]; low certainty

Clinical situation	Usually preferred	Basis
Patient prioritises fast recovery	Foam	RCT: less pain, return to work 3.6 vs 13.7 days [13]
Pigmentation would be unacceptable	Phlebectomy	Pigmentation 4.8% after phlebectomy in one trial [9] vs 10–30% across mixed foam series [23]; not directly comparable
Tortuous, deep or non-palpable vein	Foam	Expert consensus [11]
Recurrence due to neovascularisation	Either; foam often easier in scarred tissue	Guideline good-practice statement [7]; technique choice is author's practice
Ankle or foot veins, fragile skin	Foam	Author's practice
Residual veins after truncal ablation	Foam or phlebectomy	Staging evidence [6, 37]; technique choice is author's practice
Clusters of varicosities	Phlebectomy, or transilluminated powered phlebectomy where available	Guideline suggestion, weak [7]
Sclerosant hypersensitivity, or a previous severe neurological or cardiac event after sclerotherapy	Phlebectomy	Absolute contraindications to sclerotherapy [15]

Duplex findings set the order; vein anatomy sets the technique



Based on guidelines, consensus and author practice; see the decision table for the evidence behind each choice

Figure 1: Proposed decision pathway for varicose tributaries

Figure 1 brings the strategy and technique choices together. The pathway is consensus-based and has not been validated in trials.

Unless ASVAL has been deliberately chosen, tributaries should be treated together with, or after, the feeding reflux identified on duplex [4, 7].

Costs and aftercare

No published study compares the cost of foam and phlebectomy for tributaries. In SAPTAP, the phlebectomy-first strategy cost €1,030 per patient versus €1,660 for ablation plus phlebectomy, a saving of €630, in the Dutch setting [9]. For the trunk, CLASS cost-effectiveness modelling favoured laser ablation over foam [22]. Costs in other health systems, including those funded by medical schemes, may differ substantially.

Compression after either procedure is widely used, but regimens vary; NICE advises that compression after interventional treatment should not be used for more than 7 days [5]. In SAPTAP, for example, patients wore a stocking continuously for 48 hours and then by day for at least a week [9].

Other options and evidence gaps

The broader comparison of surgery with sclerotherapy has a long history. A Cochrane review found sclerotherapy better at 1 year but surgery better by 3–5 years, and concluded that there was insufficient evidence to prefer either; it also reports that recurrence after sclerotherapy in the de Roos trial rose to 37.5% at 2 years [41].

Foam may be physician-compounded or a commercially manufactured microfoam, and the SVS guideline recommends either for tributaries [7]. Transilluminated powered phlebectomy is a suggested alternative for clusters of varicosities [7]. In two RCTs it needed far fewer incisions than stab phlebectomy but did not improve cosmesis or recurrence, and one found more bruising, more pain at 6 weeks and slower early recovery [42, 43]. Endovenous laser ablation of tributaries is an emerging option, now covered by a 2025 Japanese Society of Phlebology guideline supplement, though comparative data remain limited; one comparative study has set concomitant tributary laser ablation against foam sclerotherapy during truncal laser ablation [44, 45].

Few of the studies reviewed here report a validated measure of cosmetic outcome, although appearance often drives patients' choice between the techniques. The adequately powered randomised comparison of foam and phlebectomy [20] remains unpublished and is the most important missing piece of evidence. A further randomised comparison of foam and phlebectomy [46] and a multicentre trial of simultaneous versus staged tributary treatment after radiofrequency ablation [47] are registered.

Limitations of this review

This is a narrative review by a single author, without duplicate screening, formal risk-of-bias assessment or meta-analysis, and study selection may reflect the author's judgement. Only English-language publications were included, and two databases were searched. Some recent or less accessible studies, including two of the comparative trials and the FinnTrunk trial [18, 19, 38], were assessed from their published abstracts rather than full texts. The author performs both procedures, which may influence the practice-based recommendations; these are labelled as such.

Conclusions

Ambulatory phlebectomy and ultrasound-guided foam sclerotherapy are both legitimate, guideline-endorsed treatments for varicose tributaries. The limited head-to-head evidence suggests phlebectomy may be more durable, while foam offers a quicker, less painful recovery with more cosmetic side effects. Treating tributaries at the same sitting as truncal ablation reduces the need for further treatment, but the gains in quality of life are small and early; staged treatment and the tributary-first ASVAL strategy remain reasonable in selected patients. Most day-to-day choices between the two techniques

rest on vein anatomy, patient priorities and expert consensus. The adequately powered randomised comparison now awaited should be reported before firmer recommendations are made.

Use of artificial intelligence

An AI assistant (Claude, Anthropic) was used to help retrieve and summarise literature and to draft and edit this article. The author ran the database searches, reviewed all content, and takes full responsibility for the final text.

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