Severity score improvement was better in overweight and obese patients ($P = .019$). There was no difference in satisfaction across groups. More obese patients than normal-weight patients had recanalization of treated veins at 5 years (60% vs 29%; $P < .0005$, χ^2 trend). They were also more likely to have required re-treatment by 5 years (28% vs 7%; $P = .026$).

Conclusions: Despite more severe venous disease at baseline, overweight and obese patients had greater symptomatic improvement after UGFS than normal-weight patients did. Although they were more likely to have recanalization and recurrence, their long-term satisfaction remained high.

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Three-Year Follow-Up of First Human Use of Cyanoacrylate Adhesive for Treatment of Saphenous Vein Incompetence

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Objectives: The objective of this study was to evaluate the midterm safety and efficacy of endovenous cyanoacrylate (CA) embolization of incompetent great saphenous veins (GSVs).

Methods: Incompetent GSVs in 38 patients with signs and symptoms of chronic venous disease were embolized by CA bolus injections under ultrasound guidance without perivenous tumescent anesthesia or graduated compression stockings. Treatment success was defined as occlusion of the treated vein segment as assessed with duplex ultrasound. Partial recanalization was reported if flow was observed in a vein segment 5 cm. Venous Clinical Severity Score (VCSS) assessments were performed preoperatively and at each follow-up visit (1, 3, 6, 12, 24, and 36 months).

Results: Kaplan-Meier analysis demonstrated successful venous occlusion in 94.7% [95% confidence interval, 87.9%-100%] at 36 months of follow-up; two failures and four partial recanalizations were observed (Fig 1). The mean diameter of the treated veins was 6.7 mm; the mean treatment length was 33.2 cm. The VCSS improved in all patients from a mean of 6.1 at baseline to 1.8, 1.7, 1.3, 1.5, 2.5, and 2.2 at 1, 3, 6, 12, 24, and 36 months, respectively ($P < .0001$). The sample size was too small to detect whether partial or complete recanalization affected VCSS. Threadlike thrombus or glue extensions across the saphenofemoral junction were seen at the 48-hour follow-up in 21.1% of patients but resulted in no thromboembolic sequelae. At 30 months after the procedure, one iliofemoral deep venous thrombosis in the index leg required anticoagulation and was judged unrelated to saphenous closure; this patient refused further workup for a May-Thurner lesion.

Conclusions: The first human use of endovenous CA for GSV closure proved feasible, safe, and effective. Thrombus or glue extensions seen initially were of no consequence and resolved spontaneously without anticoagulation. Clinical efficacy was maintained during a period of 36 months and is comparable to thermal technologies reported to date.

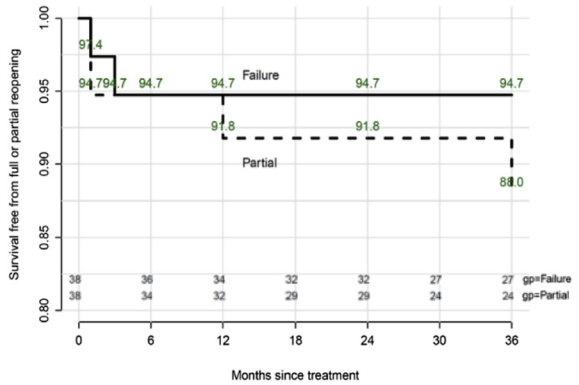

Fig. Saphenous vein occlusion with cyanoacrylate adhesive at 3-years follow-up.

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Factors That Influence Immediate Perforator Vein Closure Rates With Radiofrequency Ablation, Laser Ablation, or Foam Sclerotherapy

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Objectives: Perforator vein closure for the treatment of advanced chronic venous insufficiency has been shown to be effective with radiofrequency ablation (RFA), endovenous laser therapy (EVLT), or ultrasound-guided foam sclerotherapy (UGFS). Variables that influence the initial perforator closure rates have yet to be defined.

Methods: This retrospective analysis was performed on a prospectively managed database of perforator vein treatments performed at a single institution from February 2013 to July 2014. A duplex scan was performed at 2 weeks after the procedure. Standard statistical methods were used to compare subgroup characteristics. Univariate and multivariate analyses were performed with SAS v9.3.

Results: A total of 296 perforator ablations were performed on 112 patients. Before perforator ablation, if present, superficial venous reflux was appropriately treated. The majority of patients had advanced chronic venous insufficiency and included the following: C2, 1%; C3, 14.2%; C4, 17.6%; C5, 14.2%; and C6, 53%. Of the 296 procedures, 62 (21%) underwent EVLT, 93 (31%) RFA, and 141 (48%) UGFS (Table). The average perforator size was 4.9 ± 1.5 mm before treatment. At 2 weeks, closure rates were statistically lower for UGFS (57.1%) compared with RFA (72.2%; $P = .05$) but failed to reach significance compared with EVLT (61.3%; $P = .26$). Overall perforator vein closure rates based on CEAP classification ranged between 45.1% (C4) and 69.1% (C3), with CEAP 6 patients having a 65.6% closure rate ($P = .42$). Subgroup analysis failed to show an impact of deep vein reflux, anticoagulation, obesity, or perforator size on vein closure. Factors that negatively affected vein closure rates on univariate analysis were pulsatility in treated vein ($P = .06$), diuretic use ($P = .05$), and chronic obstructive pulmonary disease ($P = .03$). Failed UGFS perforator closure was successful with subsequent heat ablation ($P = .0008$), but repeated UGFS failed to prove successful ($P > .10$; Table). There were 13 postprocedure deep venous thromboses found (4.4%), with five of 13 in muscular calf veins and eight of 13 occurring in isolated tibial veins.

Conclusions: Thermal ablation of perforating veins appears to be more successful than UGFS by the data presented here. Factors that lower pathologic perforator closure rates include venous pulsatility, diuretic use, and chronic obstructive pulmonary disease. Recanalized vein segments after UGFS have a significantly higher chance of closure with subsequent heat ablation. CEAP 6 patients have similar closure rates compared with other CEAP categories.

Table. Closure rates of pathologic perforating veins by modality as a stand alone treatment and after failed ultrasound-guided foam sclerotherapy (*UGFS*) variable

Variable	*Total (N = 296)*	*EVLT (n = 62)*	*RFA (n = 93)*	*UGFS (n = 141)*	P *value*
Closure after single treatment	62.7%	61.3%	72.2%	57.1%	.05[a]
Closure after previous failed UGFS	75.3%	84.6%	89.1%	50%	.0008

EVLT, Endovenous laser therapy; *RFA*, radiofrequency ablation.
[a]RFA vs foam.

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Venous Drainage in Controls and Patients With Chronic Venous Insufficiency

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Objectives: The venous filling index (VFI) of air plethysmography (APG) provides a global measurement of venous filling after an elevation to dependency maneuver. It is responsive to treatments on reflux. However, the venous drainage index (VDI) after a dependency to elevation maneuver has never been investigated. The aim was to establish normal venous drainage values in healthy controls and to compare them with those of patients with superficial venous insufficiency.