

ASK THE EXPERTS

What Is Your Strategy for Determining When a Superficial Reflux Pattern Requires Treatment?

Experts discuss how they interpret reflux patterns, symptom severity, and anatomic factors to guide decisions on when superficial venous reflux warrants intervention versus observation.

With Felipe Coelho Neto, MD, MSc, PhD; Zoe Deol, MD, FACS;
and Nasim Hedayati, MD, MAS, FACS, DFSVS



Felipe Coelho Neto, MD, MSc, PhD

Division of Vascular Surgery
Hospital Vascular de Londrina
Londrina, Paraná, Brazil
contato@drfelipecoelho.com.br

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Generally, treatment decisions for varicose veins are fundamentally guided by the patient's presenting complaints that prompted the consultation, the clinical manifestation of the disease upon physical examination, and the patient's own expectations and preferences.

Patients presenting with significant varicose vein-related symptoms that impact their quality of life, as well as those with varicose veins causing aesthetic discomfort severe enough to interfere with daily routines—such as concealing legs with long clothing or avoiding environments where legs are exposed—represent classic indications for minimally invasive interventional treatment. Once interventional treatment is indicated, we proceed with a detailed ultrasound evaluation to understand the anatomic and hemodynamic characteristics underlying the varicose veins.

In 2019, we published an article evaluating reflux patterns in 1,196 lower limbs indicated for varicose vein surgical treatment. We proposed a comprehensive classification system with 10 distinct reflux patterns

for both the great saphenous vein (GSV) and the small saphenous vein (SSV).¹ Beyond understanding the distribution pattern of saphenous trunk reflux, we have also studied and published on the ultrasonographic drainage patterns of varicose veins originating from saphenous reflux. This allows us to determine the entire reflux cycle, from its origin to the return of this pathological flow to the deep venous system.²

Our studies have provided a deeper understanding of which patterns necessitate treatment and which reflux drainage patterns should be addressed. Evidently, large saphenous veins with reflux in the affected limb, when compared to the normal contralateral limb, consistently serve as a reliable parameter for treatment decisions. Similarly, short segments of proximal GSV reflux involving the proximal valve and leading to thigh varices are also indicated for treatment.

A valuable maneuver to determine the necessity of treating a refluxing saphenous vein involves digital compression of its draining tributary. If this maneuver interrupts the saphenous vein reflux measured by duplex ultrasound, the saphenous vein may be preserved, and treatment can be limited to the varicose tributaries.

The use of tourniquet photoplethysmography to assess venous refilling time upon reflux interruption can be beneficial in cases of uncertainty regarding saphenous vein treatment. If the venous refilling time improves (as measured by photoplethysmography with tourniquet application), it can be inferred that saphenous

nous vein treatment would likely also improve venous refilling time, thus supporting the treatment indication.

Regardless of the reflux pattern, certainty in treatment indication is paramount, as interventional procedures are irreversible. In cases of doubt regarding the true significance of saphenous axis reflux, we opt to preserve the saphenous vein, treat the tributaries, and maintain clinical follow-up. Should early recurrence of

varices or symptoms manifest, the necessity of treating the saphenous vein reflux becomes more evident. We consistently prioritize saphenous vein preservation unless there is absolute certainty regarding its required intervention.

1. Coelho Neto F, de Oliveira RG, Gregório EP, et al. Saphenous reflux patterns in C2 patients: a record of 1196 ultrasound reports. *Phlebology*. 2020 Jul;35:409-415. doi: 10.1177/0268355519889868
2. Coelho Neto F, Benatti MIS, Ricciardi MC, et al. Patterns of flow drainage from varicose veins originating in the incompetent great saphenous vein. *J Vasc Bras*. 2023;21:e20220019. doi: 10.1590/1677-5449.202200192



Zoe Deol, MD, FACS

Assistant Professor of Surgery
Michigan State University
Regional Medical Director
Center for Vein Restoration
Detroit, Michigan

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There are two important considerations (among other factors) to determine when a specific superficial reflux pattern requires treatment: (1) above-knee reflux patterns versus below-knee reflux patterns, and (2) how the superficial reflux relates to any deep venous and/or perforator reflux.

First, does any specific reflux pattern predict a particular severity of disease progression? Several studies have examined this question over the years. In 1994, Labropoulos et al observed in a small group of a couple hundred patients that those with below-knee reflux had more severe signs/symptoms of venous disease (CEAP [clinical, etiology, anatomy, pathophysiology] C3-C6).¹ In 2012, Engelhorn et al studied progression of C2 disease in a small group of 100 young women over a 3-year period and found very little, if any, progression of C2 disease over that period of time.² Our study published in 2025 in a large group of 21,000 patients and 31,000 limbs demonstrated a significant correlation between below-knee patterns of reflux and more severe C5 to C6 disease, in which the most severe pattern was full-length GSV and/or full-length SSV reflux.³ Conversely, we found that isolated above-knee patterns of reflux were more closely associated with C2 disease. Therefore, I always examine the specific pattern and severity of reflux when determining my recommendations for treatment versus conservative therapy. For example, for two similar patients with no swelling or skin changes but one has a large refluxing SSV from junction to distal calf and the other has a refluxing GSV isolated to the upper thigh, I am likely to offer treatment for the patient with the refluxing SSV and conservative therapy and follow-up for the patients with the refluxing GSV.

Next, I consider the pattern of deep venous and/or perforator reflux and how that affects the superficial system. Reflux in the deep and/or perforator system is either antegrade (overload incompetence) or retrograde (“blow-out” incompetence). In the former, the perforator or deep system reflux stems from the severity of superficial system reflux causing pressure on and eventual incompetence of perforator or deep venous valves. In this case, treatment of the superficial venous insufficiency usually corrects the reflux in the perforator and deep system. On the other hand, retrograde or blowout incompetence stems from proximal venous outflow obstruction. The proximal outflow obstruction results in a back pressure on the distal deep system and perforator valves rendering them incompetent, which in turn, results in secondary superficial system reflux. Correction of the superficial venous insufficiency in this case usually does not correct the reflux in the perforator and/or deep system. Untreated proximal venous outflow obstruction can also result in recanalization of the treated superficial veins.

Determining which type of deep/perforator reflux your patient has and how to treat the superficial system accordingly is not always easy. However, the presence of a venous leg ulcer (VLU) should raise the suspicion for the retrograde/blowout variety. Although there are few studies examining the correlation between VLUs and proximal venous outflow obstruction, a prospective study out of Turkey found up to 93% of patients with VLUs had some degree of proximal venous outflow obstruction, most significantly in those with ultrasound evidence of infrainguinal postthrombotic changes.⁴ I make it a habit to discuss this possibility with my VLU patients prior to offering them treatment of their superficial venous disease.

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**Nasim Hedayati, MD, MAS, FACS,
DFSVS**

Professor of Surgery
Department of Cardiovascular and
Thoracic Surgery
Dell Medical School, The University of
Texas at Austin
Austin, Texas
nasim.hedayati@austin.utexas.edu
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The most important factor in determining when superficial venous reflux requires treatment is a thorough understanding of the patient's symptoms and medical comorbidities. A comprehensive evaluation begins with a detailed history and physical examination, including inquiry into prior thromboembolic events, pregnancies, trauma, leg surgeries, previous venous procedures, and a family history of venous disease. This information is particularly important when evaluating patients with unilateral leg edema or venous ulceration, as additional imaging (CT venography, abdominal duplex ultrasound) may be required to rule out ilio-femoral obstruction. Because not all superficial venous reflux requires treatment, I ask targeted questions to better understand a patient's symptoms. I often begin by asking, "What bothers you about your legs?" It is crucial to distinguish lower extremity complaints—such as hip, knee, or ankle pain; ankle edema; and foot numbness—that may have etiologies unrelated to venous disease and therefore require careful differentiation.

In general, treatment of axial reflux of the GSV, with or without associated saphenofemoral junction reflux, in symptomatic patients with CEAP C2 to C6 disease represents a standard approach. In general, patients with CEAP C2-C4 disease should have failed conservative measures, including compression therapy, exercise, leg elevation, and weight loss, prior to intervention. This

requirement is typically mandated by many insurance carriers. Careful attention must also be paid to identifying the underlying causes of a patient's symptoms, particularly bilateral lower extremity edema in older patients. In my practice, I frequently encounter patients with congestive heart failure who have chronic lower extremity edema, underscoring the importance of distinguishing venous pathology from systemic causes before considering intervention. Treatment of axial or segmental reflux in this population may be of little benefit in the absence of pain, heaviness, skin changes, and/or ulceration.

I treat SSV reflux with or without associated saphenopopliteal junction reflux in symptomatic patients with CEAP C2 to C6 disease. Segmental superficial venous reflux has generally been suggested to be associated with less clinical severity than axial reflux. Aching, swelling, and skin changes have been shown to be common in the presence of below-knee segmental GSV reflux, which commonly is seen in patients with chronic venous disease. In my practice, for reflux isolated to the below-knee GSV, I typically treat only patients with CEAP C4 to C6 venous disease.

Over nearly 20 years in practice, I have evaluated a large number of patients who have undergone prior superficial venous interventions and subsequently present with recurrent symptoms and painful varicose veins. In this setting, the value of a skilled ultrasound technologist cannot be overstated. Identification of an incompetent anterior accessory GSV (AAGSV) or remnant refluxing GSV is common. AAGSV reflux has been reported as a frequent cause of recurrence following GSV ablation, and treatment of the AAGSV has been shown to improve patient symptoms with low recurrence rates.

Finally, prior to any intervention, it is essential to have a thorough discussion with the patient regarding a trial of compression therapy, walking and exercise, weight management, and realistic goals and expectations for the procedure and outcomes. ■