Clinical Presentation of Venous Insufficiency

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Clinical Pearls

1. Lower extremity edema from venous insufficiency is typically worse after prolonged standing and relieved with leg elevation.
2. A trial of compression therapy can help differentiate pain from venous etiology from pain from musculoskeletal pain such as arthritis/plantar fasciitis.
3. CEAP classification is most commonly used for description of physical findings in patients with venous insufficiency.

Introduction

Chronic venous disease, whether caused by superficial and/or deep venous insufficiency, is an incredibly common condition that affects a significant portion of the population in the United States and the Western world. Being one of the most common chronic medical conditions, it is a cause of significant morbidity as well as an important socioeconomic and public health issue [1, 2]. It is estimated that more than 50% of patients over the age of 40 have spider and larger varicose veins [3]. The prevalence of varicose veins is estimated to affect approximately 30% of the population, but variable figures exist in the literature, with 2–56% of men and <1–60% of women being affected [2, 4]. Additionally, the Bonn Vein study suggests that chronic venous disease is a progressive disease, and if left untreated, a significant proportion of patients will progress from varicose veins to edema, to skin changes, and to ulceration [5]. Prevention of disease progression then is very important.

Clinical Evaluation of the Patient

Chronic venous disease is ubiquitous. Considering the entire spectrum of disease including telangiectasia, prevalence rates have been reported as high as 80% for men and 85% for women [6]. As such, the likelihood of encountering some degree of venous insufficiency in clinical practice is high. Presentation of venous insufficiency includes patient-reported symptoms in addition to physical exam findings or signs. While signs and symptoms have been shown to correlate with disease severity in some studies, others show discordance [7–9]. Venous disease is common, but it is important to recognize the idiosyncrasies of the presentation of venous insufficiency and not assume all signs and

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C.I. Ochoa Chaar (ed.), *Current Management of Venous Diseases*,
https://doi.org/10.1007/978-3-319-65226-9_6

symptoms are venous in origin, thereby missing a diagnosis or, worse, treating the wrong condition. (First, do no harm.) This chapter addresses the signs and symptoms of venous disease: symptoms being the complaints reported by the patient during the history and signs being the physical findings noted by the provider during the examination.

Risk Factors

There are certain populations where venous disease is more likely to exist. Epidemiologic studies list older age, family history of venous disease, standing occupation, obesity, and a history of phlebitis as risk factors for venous insufficiency [1]. Some studies suggest that behaviors, including occupations or activities that require prolonged immobility or standing, contribute to the risk of developing venous insufficiency. [10–12].

Clinical Presentation

What the practitioner appreciates or measures on exam is a sign. What the patient complains of is a symptom. Often patients use diagnostic terminology rather than describing symptoms. For example, "I have bad circulation," is a complaint often heard in our vein practice, which may be true, but is less helpful in understanding and making a diagnosis than a description of the pain, ache, or restlessness that the patient is experiencing.

Symptoms

Symptoms that are suggestive of venous etiology include leg aching or pain, heaviness or fatigue, itching, swelling, cramping, and restlessness [13]. Swelling is sometimes included as a symptom although it is better categorized as a sign because it can be appreciated on physical exam. However, patients certainly notice indentations on their lower legs when they remove their stockings or the absence of ankle landmarks at the end of the day and will complain of swelling or a sensation of swelling. Certainly none of these signs are exclusive to venous disease, and other causes must be considered. The patient history is useful in differentiating venous from other potential etiologies. Generally, most venous symptoms are more pronounced in the lower leg and sometimes in the location of the varicosities. Symptoms that are venous are typically worse at the end of the day or, if a patient works nights, at the end of a day's work. Often prolonged immobility (standing or sitting) can exacerbate the symptoms. Walking or other activities that activate the calf muscle pump can provide some relief; however, prolonged activity may actually increase symptoms. Patients frequently report that their legs feel better with rest, but this is different than the rest that relieves arterial insufficiency. Rest required to relieve venous symptoms is not just a pause in activity or sitting down but rather a night in a supine position with legs elevated to the level of the heart or higher. Therefore, patients that sleep in recliners may report no relief with rest. Another consideration for female patients is hormones. Some women report worsening symptoms with cyclical hormone fluctuations or pregnancy or when taking hormone medication. Relief with measures such as compression stockings and leg elevation is also suggestive of a venous etiology.

When assessing patient symptoms, it may be helpful to consider the differential for each complaint. Aching or pain may be from venous, arterial, musculoskeletal, infectious, or neurologic pathology. Often patients will describe the ache as dull or "like a toothache in the leg." There are several common masqueraders of venous symptoms. Patients frequently present with knee arthritis or plantar fasciitis believing their symptoms are related to their varicose veins. Another mimicker is lumbar spine pathology or meralgia paresthetica with radiculopathy causing the leg pain. Usually there are varicosities in the area of pain which leads the patient to believe that the symptoms are venous in origin. In the case of arthritis and plantar fasciitis, activities that exacerbate the pain can help to distinguish between musculoskeletal and venous sources. For example, knee pain

when climbing stairs or foot pain with the first step are not typical venous symptoms. Physical exam eliciting tenderness at the knee joint space, crepitation with knee flexion and extension, or tenderness with palpation of the medial calcaneal tuberosity can provide clues to the actual source of the pain. A history of claudication or rest pain is more suggestive of arterial issues. Known lumbar pathology, weight gain, or clothing that compresses the lateral femoral cutaneous nerve can assist in identifying radicular causes. Other culprits of lower extremity pain are infection, be it osteomyelitis or cellulitis, and fibromyalgia.

Leg heaviness and fatigue are frequent venous symptoms. Patients with lymphedema, lipedema, or obesity may also have symptoms of leg heaviness. History is minimally useful for distinguishing the cause of this symptom since heaviness tends to be worse at the end of the day for all of these conditions. Physical examination can be helpful in differentiating the cause of leg heaviness as the non-venous entities present with non-pitting edema. Although lipedema and lymphedema present with non-pitting edema, lymphedema may have pitting edema in its early stages. Lymphedema also presents with a dorsal hump on the foot, while lipedema typically spares the foot.

Leg cramping, while potentially venous, can be secondary to electrolyte abnormalities, hypoparathyroidism, or low iron levels. If the remainder of the history does not point to venous disease, laboratory evaluation may be useful in ruling out these causes.

Another complaint of patients with venous disease is itching. The itching may be secondary to swelling or located at the site of varicosities. Other considerations would include dermatitis which is difficult to distinguish particularly in large patients.

Restlessness can be a manifestation of venous disease. There are also neurogenic causes, and venous treatment will do little to alleviate this symptom if not related to venous insufficiency. Fortunately, low-risk treatments such as compression stockings are generally well tolerated and can relieve lower extremity restlessness. A trial of compression therapy can aid in diagnosis and is relatively safe.

The most dramatic symptom for patients with varicose veins is bleeding. Variceal hemorrhage is unique and typically memorable for the patient. The history usually includes water, either swimming or showering, with the patient standing in a warm environment. This provides macerated skin, increased hydrostatic pressure, and vasodilation. Upon drying off, the skin breaks and the varix will bleed. Patients like to show video or pictures on their phones of the impressive mess a variceal hemorrhage makes in their bedroom or bathroom.

Physical Exam

The initial clinical presentation of the patient with venous insufficiency varies widely. Physical findings can include telangiectasia, reticular veins, varicose veins, edema, inflammation, dermatitis, and/or ulceration. A patient may have none, some, or all of these findings.

To facilitate meaningful communication about chronic venous disorders, the CEAP classification, a descriptive classification, was developed in 1994 by an international ad hoc committee of the American Venous Forum, endorsed by the Society for Vascular Surgery, and incorporated into "Reporting Standards in Venous Disease" in 1995. In 2004, the classification system was revised and refined, and a basic CEAP version was introduced to be used as an alternative to the full (advanced) CEAP classification. Today, the classification is widely accepted, and most published clinical papers on chronic venous disease use all or portions of CEAP [14].

CEAP Classification

C: Clinical Classification

C_0: no visible or palpable signs of venous disease

It is estimated that 20% of patients with symptoms consistent with chronic venous disease have no visible or palpable signs of venous disease. However, venous reflux is identified

by duplex ultrasound in approximately 20% of these patients [7].

C_1: telangiectasias or reticular veins (Fig. 6.1)

Telangiectasias are a confluence of dilated intradermal venules less than 1 mm in caliber. Synonyms include spider veins, hyphen webs, and thread veins. Reticular veins are dilated bluish subdermal veins, usually 1 mm to less than 3 mm in diameter. They are usually tortuous. Normal visible veins in persons with thin, transparent skin are not considered reticular veins. Synonyms include blue veins, subdermal varices, and venulectasies [15].

C_2: varicose veins (Fig. 6.2)

Varicose veins are distinguished from reticular veins by a diameter of 3 mm or more, measured in the upright position. They are subcutaneous, dilated, and usually tortuous and may involve saphenous veins, saphenous tributaries, or nonsaphenous superficial leg veins. Synonyms include varix, varices, and varicosities [15].

C_3: edema (Fig. 6.3)

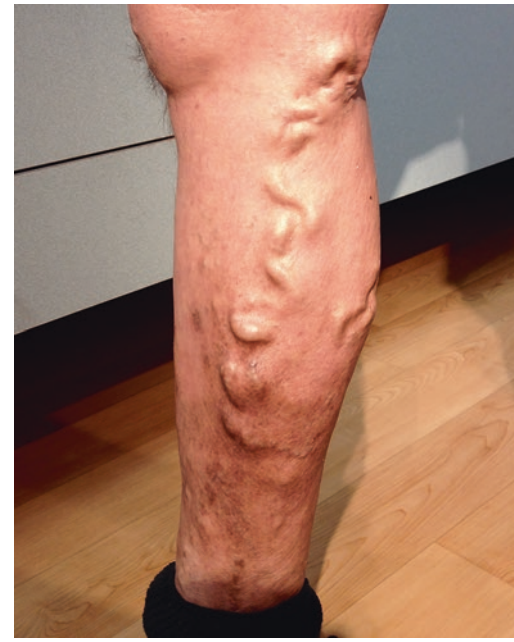

Fig. 6.2 Large varicose veins over medical aspect of the calf

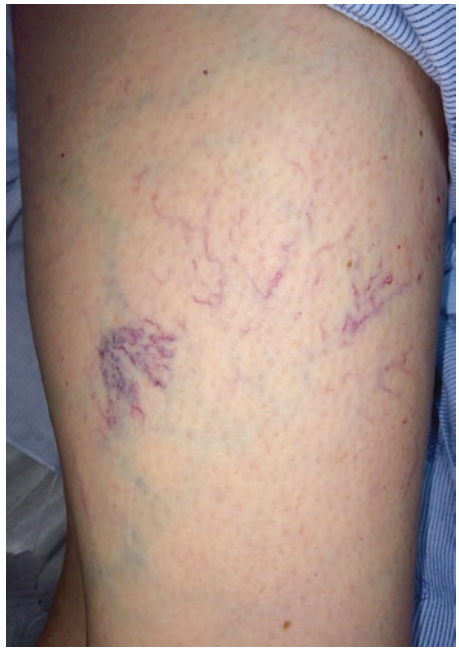

Fig. 6.1 Telangiectasias/spider veins affecting the posterior calf

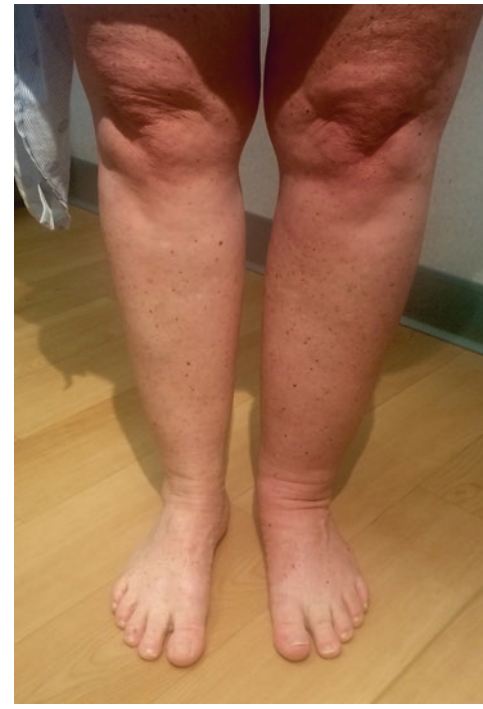

Fig. 6.3 Swelling at the ankle *left* worse than *right*

Edema is a perceptible increase in volume of fluid in the skin and subcutaneous tissue, characteristically indented with pressure. Venous edema usually affects the ankle region but may also extend into the leg and foot [15].

However, there are many causes of lower extremity edema. Edema caused by venous insufficiency is typically limited to the lower extremities and often affects only one leg, and other signs of venous disease (i.e., varicose veins, hyperpigmentation) are typically present. In contrast, generalized edema is usually bilateral and not limited to the lower extremities. Venous edema typically improves with recumbency, in comparison to edema due to lymphatic disease, which does not subside with recumbency. Central venous pressure is normal with venous edema, unless there is concomitant heart failure. Venous edema also responds poorly to the use of diuretics.

C_4: changes in skin and subcutaneous tissue secondary to chronic venous disease

C_{4a}: pigmentation or eczema

Pigmentation is defined and brownish darkening of the skin, resulting from extravasation of blood. It usually occurs in the ankle region but may extend to the leg and foot. It is due to hemosiderin deposition due to the extravasation of red blood cells through damaged capillaries into the dermis [15].

Eczema is described as an erythematous dermatitis, which may progress to blistering, weeping, or scaling eruption of the skin of the leg. It is most often located near varicose veins but may be located anywhere along the leg. It is usually seen in uncontrolled chronic venous disease but may also reflect sensitization to local therapy. The pruritus associated with venous eczema is often difficult to relieve. Patients can present with excoriations, making them vulnerable to skin infections [15].

C_{4b}: lipodermatosclerosis or atrophie blanche (Fig. 6.4)

Lipodermatosclerosis (LDS) is localized, chronic inflammation and fibrosis of the skin and subcutaneous tissues of the lower leg, sometimes associated with scarring or contracture of the Achilles tendon. It is characterized by areas of firm induration that can begin at the medial ankle but can progress to involve the entire leg circumferentially. There is usually heavy pigmentation and fibrosis that constricts the leg, impeding venous and lymphatic flow. LDS is sometimes preceded by diffuse inflammatory edema of the skin, which may be painful and which is often referred to as hypodermitis. LDS should be differentiated from lymphangitis, erysipelas, or cellulitis. However, patients with LDS are prone to cellulitis caused by staphylococcal and streptococcal organisms. LDS is a sign of severe chronic venous disease, and in its most advanced form, the limb can begin to resemble an inverted champagne bottle. The fibrosed ankle area represents the neck of the bottle and, the edematous leg, the rest of the bottle [15].

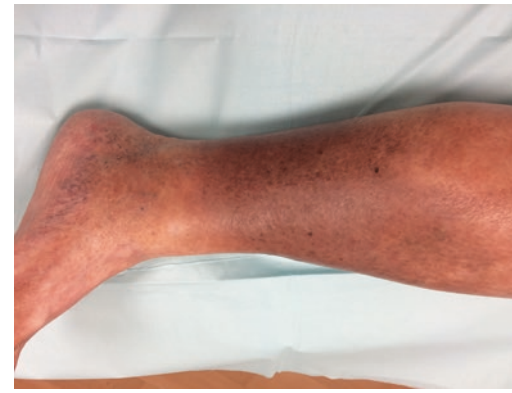

Fig. 6.4 Lipodermatosclerosis affecting the *left leg*

Atrophie blanche (white atrophy) is localized, often circular whitish and atrophic skin areas surrounded by dilated capillaries and sometimes hyperpigmentation. Healed ulcer scars may have a very similar appearance but are distinguishable from atrophie blanche by a history of ulceration [15].

C_5: healed venous ulcer (Fig. 6.5)

C_6: active venous ulcer (Fig. 6.6)

Venous ulcers are full-thickness defects of the skin, most frequently found in the ankle region. They fail to heal spontaneously and are caused by chronic venous hypertension, the most common cause of lower extremity

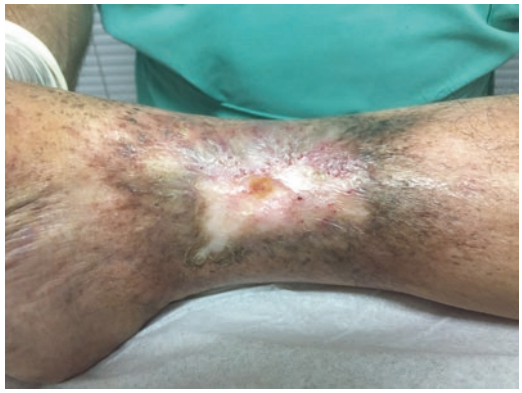

Fig. 6.5 Healed large area of venous ulceration over medial malleolus

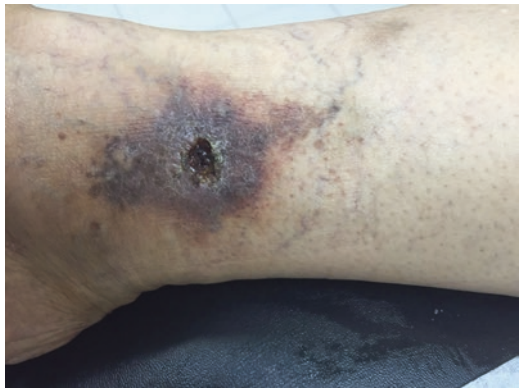

Fig. 6.6 Venous ulcer over medial malleolar area

ulcers [15]. It is estimated that venous insufficiency accounts for about 45–80% of chronic leg ulcers. Venous ulcers are often located over a perforator vein or along the course of the great or small saphenous vein. They do not affect the forefoot nor do they present above the knee. They can be single or multiple, tender, shallow, and exudative. They have irregular, but not undermined borders and a granulated base. If advanced, they can affect the leg circumferentially [7].

It is important to distinguish venous ulcers from other lower extremity ulcers or other lower extremity skin abnormalities. Arterial insufficiency is the cause of approximately 5–20% of chronic leg ulcers. Arterial ulcers are usually found over pressure points and over the toes. They are painful, full-thickness wounds and have a punched-out appearance. Often, other signs of arterial insufficiency are present, including shiny, atrophic, hairless skin; poor or absent peripheral pulses; diminished capillary refill; and hypertrophic deformed toenails. Symptoms of arterial insufficiency, including claudication and rest pain, are also usually present.

Diabetic or other neuropathic foot ulcers account for about 15–25% of all chronic leg ulcers. They occur over bony prominences or areas of increased pressure. They are often hyperkeratotic with undermined borders. There is usually accompanying diminished sensation of the ulcer as well as the extremity.

There are other causes of lower extremity ulcers, including rheumatoid arthritis, systemic sclerosis, vasculitis, sickle cell disease, pyoderma gangrenosum, and skin cancer, including squamous and basal cell carcinoma. Biopsy may be necessary to determine the etiology of a lower extremity ulcer.

S: symptomatic

Symptoms may include aching, pain, tightness, skin irritation, heaviness, muscle cramps, and other complaints attributable to venous dysfunction.

A: asymptomatic

No symptoms or complaints attributable to venous dysfunction are present.

E: Etiologic Classification

E_c: congenital

Congenital etiologies may include arteriovenous malformations and avalvulia, the hereditary absence of venous valves [15].

E_p: primary

Primary valvular reflux is present. There is no other known cause of the chronic venous disease.

E_s: secondary (postthrombotic)

Secondary etiologies are any known cause of the chronic venous disease. Typically the cause is thrombosis, but trauma and surgical alteration are also considered secondary etiologies.

E_n: no venous cause identified

If there is not an evident etiology of chronic venous disease, the n subscript is used.

A: Anatomic Classification

Basic CEAP assigns a limb to one or more of three commonly recognized anatomic venous systems—superficial, perforator, and/or deep.

A_s: superficial veins

The superficial system includes the great and small saphenous systems and any branch varicosities.

A_p: perforator veins

The perforator system includes veins that communicate between the superficial and deep systems.

A_d: deep veins

The deep system includes the calf veins and sinuses; popliteal, femoral, and iliac veins; and the vena cava.

P: Pathophysiologic Classification

Basic CEAP describes the presence of reflux and/or obstruction. They may occur alone or in combination.

P_r: reflux

Reflux is defined as the reversal of venous blood flow with a duration >0.5 s by duplex analysis [10].

P_o: obstruction

Obstruction is confirmed by visualization of an occluded vein segment by imaging or by demonstrating prolonged outflow via a noninvasive study such as plethysmography [10].

P_n: no venous pathophysiology identifiable

If no venous pathophysiology can be identified, the subscript "n" is used (Table 6.1).

Advanced CEAP is used for precise reporting because the anatomic location of the venous abnormality (P) is specifically described [15, 17]. *See* Table 6.2.

Date of CEAP Classification

Because the CEAP classification can be reclassified at any time, the date of any assessment should be included in the CEAP classification. Limbs should be reclassified after any form of medical or surgical treatment [15].

Table 6.1 CEAP classification for chronic venous disorders

Clinical classification	
C_0	No visible or palpable signs of venous disease
C_1	Telangiectasias or reticular veins
C_2	Varicose veins
C_3	Edema
C_4	Skin changes related to venous disease
C_{4a}	Pigmentation or eczema
C_{4b}	Lipodermatosclerosis or atrophie blanche
C_5	Healed venous ulcer
C_6	Active venous ulcer
S	Symptomatic, including ache, pain, tightness, skin irritation, heaviness, and muscle cramps, and other complaints attributable to venous dysfunction
A	Asymptomatic
Etiologic classification	
E_c	Congenital
E_p	Primary
E_s	Secondary (postthrombotic)
E_n	No venous cause is identified
Anatomic classification	
A_s	Superficial veins
A_p	Perforator veins
A_d	Deep veins
A_n	No venous location identified
Pathophysiologic classification	
P_r	Reflux
P_o	Obstruction
$P_{r,o}$	Reflux and obstruction
P_n	No venous pathophysiology identifiable

Level of Investigation

The diagnostic evaluation of chronic venous disease can also be assigned a level based on the type(s) of testing performed [15].

Level I: This would include an office visit with history and clinical examination and may also include the use of a handheld Doppler.

Level II: This would include noninvasive vascular laboratory testing, including duplex color scanning and possibly plethysmographic testing as well.

Level III: This would include invasive or more complex imaging, including ascending and

Table 6.2 Advanced CEAP: anatomic localization of pathology

Superficial veins
1. Telangiectasias/reticular veins
2. Great saphenous vein (above the knee)
3. Great saphenous vein (below the knee)
4. Small saphenous vein
5. Nonsaphenous veins
Deep veins
6. Inferior vena cava
7. Common iliac vein
8. Internal iliac vein
9. External iliac vein
10. Pelvic: gonadal, broad ligament and other veins
11. Common femoral vein
12. Deep femoral vein
13. Femoral vein
14. Popliteal vein
15. Crural: anterior tibial, posterior tibial, and peroneal veins (all paired)
16. Muscular: gastrocnemial and soleal veins, others
Perforator veins
17. Thigh
18. Calf

descending venography, venous pressure measurements, CT, MRI, and others.

CEAP Classification Examples

A patient evaluated on February 11, 2012 has aching legs, varicose veins, and ankle swelling. An ultrasound demonstrated reflux affecting the popliteal and small saphenous veins, as well as an incompetent calf perforator. There was no evidence of deep or superficial venous thrombosis.

Basic CEAP: $C_{3,s,}E_{p,}A_{s,p,d}P_r$

Advanced CEAP: $C_{2,3,s,}E_{p,}A_{s,p,d,}P_{r,4,14,18}$ (2012-02-11, L II)

Prevalence of CEAP Clinical Classifications

Recently, the more current epidemiologic studies of venous diseases in which the CEAP classification was used were reviewed. Based on this review, the prevalence of CEAP clinical classes C_0 and C_1 was estimated to be 60–70%, C_2 and C_3 was approximately 25%, and C_4 to C_6 was up to 5%. The incidence of varicose veins was approximately 2% per year [16].

Clinical Assessment of Disease Severity and Quality of Life

The purpose of collecting complaints and symptoms from patients is to secure an accurate diagnosis and to assess the impact of disease on their quality of life. Tools for assessing quality of life can be useful in evaluating disease severity and measuring treatment success. Several scores exist; some are physician reported, and some obtain responses from patients. Venous disease-specific instruments include the Chronic Venous Insufficiency Quality of Life Questionnaire (CIVIQ) in the 20 and 14 question versions; the Venous Insufficiency Epidemiological and Economic Study (VEINES-QOL/Sym); the Aberdeen Varicose Vein Questionnaire (AVVQ); the Charing Cross Venous Ulceration Questionnaire (CXVUQ); the Villalta scale; and the Venous Clinical Severity Score (VCSS) [17]. All have strengths and weaknesses, and from their names, it can be determined that the instruments are specific to particular disease situations such as varicose veins, ulceration or thrombosis. The CIVIQ-20, CIVIQ-14 and AVVQ are patient reported and assess superficial and chronic venous insufficiency. CXVUQ is also patient reported but specific for venous ulcers. The Villalta scale is physician reported and assesses the severity of post thrombotic syndrome. The physician reported VCSS covers superficial and chronic venous insufficiency. The VEINES-QOL/Sym is patient reported and is applicable to the full range of venous disease including varicose veins, thrombosis and ulceration. In a recent comparison of these instruments the VEINES-QOL/Sym was considered the most valid with the broadest application to venous disease [18]. Not included in this comparison is the VVSymQ™, a patient-reported outcome tool intended to measure quality of life outcomes

after great saphenous vein treatment. The VVSymQ™ was used to measure symptoms reported by 40 patients who received outpatient treatment for varicose veins. The patient-reported symptoms were compared to clinician-reported outcomes and there was no clear correlation between the patient-reported symptoms and the clinician-reported outcomes [19]. This suggests that acquiring symptom information directly from the patient may be more accurate and perhaps useful than what the clinician interprets and records.

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