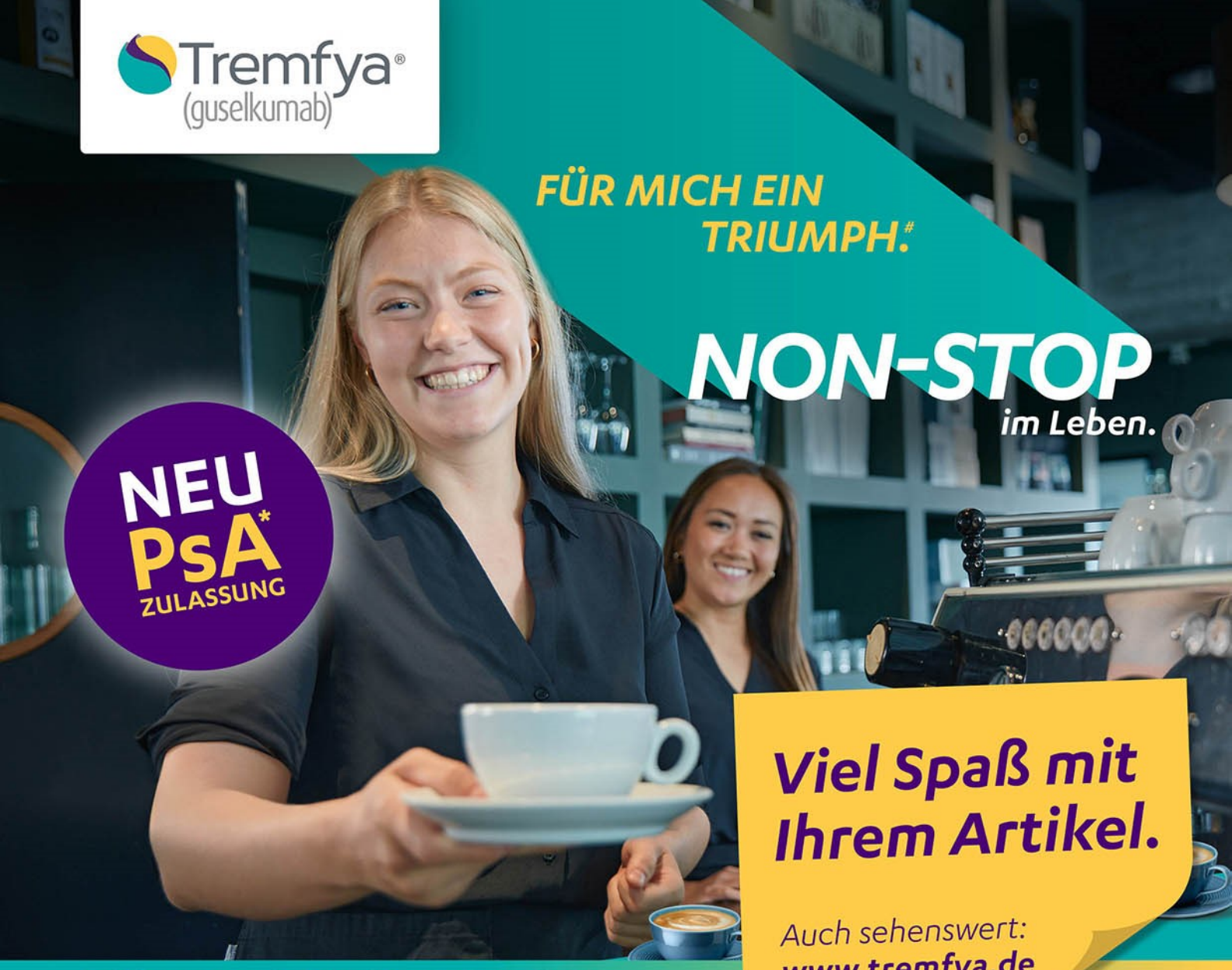


## Bei Plaque-Psoriasis und Psoriasis-Arthritis*

* TREMFYA® ist indiziert: 1) für erwachsene Patienten mit mittelschwerer bis schwerer **Plaque-Psoriasis**, die für eine systemische Therapie in Frage kommen; 2) allein oder in Kombination mit MTX für die Behandlung der aktiven **Psoriasis-Arthritis** bei erwachsenen Patienten, wenn das Ansprechen auf eine vorherige nicht-biologische krankheitsmodifizierende antirheumatische (DMARD-)Therapie unzureichend gewesen ist oder nicht vertragen wurde.[1]

\# PASI 90: 84% (Wo 48; n=534) Non Responder Imputation (NRI)[2]; PASI 100: 52,7% (Wo 252; n=391) Treatment Failure Rules (TFR)[3]; Signifikante Überlegenheit vs. Placebo in Bezug auf ACR20 (64% vs. 33%, p<0.0001; NRI) nach 24 Wochen in der 8-Wochen-Dosierung (n=248) in bionaiven Patienten mit aktiver PsA.[4]


1. Aktuelle Fachinformation TREMFYA®.
2. Reich K et al. Lancet. 2019;394(10201):831-839.
3. Griffiths CEM et al. Poster Presentation Coastal Dermatology Symposium 2020, October 15-16th.
4. Mease P et al. The Lancet 2020; https://doi.org/10.1016/S0140-6736(20)30263-4 (Supplementary)


▼ Dieses Arzneimittel unterliegt einer zusätzlichen Überwachung. Daher ist es wichtig, jeden Verdacht auf Nebenwirkungen in Verbindung mit diesem Arzneimittel zu melden.

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# Chronic venous insufficiency – a review of pathophysiology, diagnosis, and treatment

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## Summary

Chronic venous disease is a common disorder associated with a variety of symptoms in later disease stages but also with complications such as venous leg ulcer. This, in turn, has substantial socioeconomic effects and significantly impacts patients' quality of life. While there are a number of diagnostic procedures available, color-flow duplex ultrasound has become the gold standard. As regards therapeutic options, major advances have been made in recent decades. Today, there are alternatives to saphenofemoral ligation and stripping of the great saphenous vein, including endovenous thermal ablation techniques. However, treatment selection continues to depend on many factors such as individual anatomical circumstances and disease stage. The following article provides an overview of the anatomy and pathophysiology as well as current diagnostic and therapeutic standards.

## Introduction

Though initially asymptomatic, chronic venous disease is a common disorder that can be associated with a variety of symptoms. Classes C3 and above (according to the CEAP classification) are designated as chronic venous insufficiency (CVI) (see clinical features and classification), which – by definition – is associated with clinical symptoms.

The high prevalence of chronic venous disease has significant socioeconomic impact, especially due to the treatment-related cost of the – occasionally – irreversible sequelae caused or promoted by the condition, including venous leg ulcers. In addition, the effects of CVI on patients' quality of life should not be underestimated, particularly in advanced disease stages [1].

CEAP classes C3 and above are designated as chronic venous insufficiency (CVI).

## Epidemiology and risk factors

The reported prevalence of chronic venous disease and CVI shows great variability, depending on the study population, classification, and methodology. Overall, however, varicose veins with or without edema (CEAP stage C2–C3) are found in about 25 % of the population; trophic skin changes including leg ulcers (C4–C6), in up to 5 % [2].


 

Varicose veins with or without edema (CEAP stage C2–C3) are found in about 25 % of the population; trophic skin changes including leg ulcers, in up to 5 % (C4–C6).

The most important risk factors for developing chronic venous disease include advanced age [3], obesity, and a positive family history [4, 5].

While chronic venous disease appears to occur somewhat more frequently in women [3, 6, 7], there are also studies that failed to show any significant difference in the prevalence between women and men [8]. Nevertheless, pregnancy significantly increases a woman's risk of developing chronic venous disease [3].

## Anatomy

In order to provide a better understanding of chronic venous disease, the following is a brief recap of the anatomy of leg veins. A distinction is made between the superficial and deep venous systems. While the superficial leg veins run between the dermis and the muscle fascia, the deep veins are located below the muscle fascia; the two systems are linked by perforating veins that pass through the muscle fascia. Superficial veins include the great and lesser saphenous veins as well as the anterior, posterior, and superficial accessory saphenous veins. Unless otherwise specified, chronic venous disease or CVI usually refers to the superficial venous system. Deep veins include the femoral vein, the common femoral vein, the deep femoral vein, the popliteal vein as well as the anterior and posterior tibial veins and the fibular veins. The majority – roughly 85 % – of the total volume is transported by the deep venous system [9–11].

*Trunk incompetence* refers to reflux in the great and lesser saphenous veins. *Tributary varicosis* designates incompetence of individual side branches of the saphenous veins, while reflux in veins connecting the deep and superficial systems is called *perforator incompetence*. Reflux in the deep venous system – frequently as a consequence of thrombosis [12] – is referred to as *deep vein incompetence* [13].

## Pathophysiology

The pathogenesis of chronic venous disease is not yet fully understood. In the CEAP classification, the pathogenesis is divided into "reflux", "obstruction", or a combination thereof.

Although venous reflux is based on several mechanisms, the main players are venous valve incompetence, inflammation of the vessel wall, hemodynamic factors as well as venous hypertension. These mechanisms can be further aggravated by dysfunctional pump mechanisms (muscle pump, vascular pump), for instance, in immobile patients or those with stiff joints. Whether the inflammatory changes in the vessel wall and venous valves precede the venous incompetence or whether they are a consequence thereof has not yet been conclusively elucidated [14]. Changes in shear stress play a key role in the development of vessel wall inflammation. There is evidence that normal shear stress promotes antiinflammatory effects, whereas low shear stress or other hemodynamic changes – especially reflux – lead to increased release of proinflammatory messengers [15–18].

Venous hypertension and the aforementioned hemodynamic changes are associated with the release of vasoactive substances from the endothelium, and give rise to the expression of adhesion molecules (E-selectin, ICAM-1), chemokines, and inflammatory mediators as well as damage to the endothelial glycocalyx. The glycocalyx, in turn, plays a very pivotal role in shear stress transmission [19], and may also prevent leukocyte adhesion [20, 21]. By contrast, increased ICAM-1 expression results in increased leukocyte adhesion, followed by a local inflammatory response [14, 22, 23]. The infiltration of venous valves and vessel walls by monocytes and macrophages is likewise associated with ICAM-1 [24]. In addition, studies

 

The pathogenesis of chronic venous disease is based on venous reflux, obstruction, or a combination thereof. In this context, venous valve incompetence, inflammatory changes of the vessel wall, hemodynamic factors, and venous hypertension play a key role.

have shown collagen to be increased in the vessel walls of patients with chronic venous disease, whereas the amount of elastin and laminin is lower than usual [25–27]. This state of chronic inflammation ultimately leads to the clinical picture of CVI with lipodermatosclerosis and leg ulcer [28, 29].

Obstruction, on the other hand, occurs as a result of thrombosis, for example, deep leg vein or pelvic vein thrombosis, which may subsequently be associated with postthrombotic syndrome [12]. A combination of venous reflux and obstruction is a common finding in patients with venous ulcers [30].

## Clinical features and classification

### Clinical manifestations and symptoms

Patients with CVI frequently complain of 'heavy legs' and a tendency for evening edema, as well as pruritus, pain, or nocturnal leg cramps.

Patients with CVI frequently complain of 'heavy legs' and a tendency for evening edema, as well as pruritus, pain or nocturnal leg cramps [31]. The initial stages (C1–C2) of chronic venous disease, on the other hand, are not associated with any specific symptoms.

Initial signs of chronic venous disease frequently include telangiectases (commonly known as spider veins) and reticular veins, usually around the ankles (paraplantar corona phlebectatica). These are considered to be "warning veins". Telangiectases are dilated intradermal veins with a diameter of less than 1 mm, whereas reticular veins run subcutaneously and have a diameter of 1–3 mm [13]. However, they do not constitute definitive proof of CVI and are primarily a cosmetic problem for patients [3, 13].

The next stage of chronic venous disease (CEAP class C2 [Table 1]) refers to the development of varicose veins. These are incompetent subcutaneous veins with a diameter of more than 3 mm [32]. If the dysfunction remains untreated, their diameter can markedly increase up to a point where the varicose veins can be perceived with the naked eye.

The presence of leg edema – which is initially spontaneously reversible overnight but may persist in untreated cases – in combination with varicose veins (class C3) defines the onset of CVI. Venous hypertension results in erythrocyte extravasation and dermal hemosiderin deposition, thus giving rise to the typical hyperpigmentation. Chronic edema may lead to stasis dermatitis, characterized by erythematous, scaly, and sometimes pruritic lesions on the lower legs [13] (Figure 1). It is occasionally mistaken for erysipelas/cellulitis.

Continued progression of CVI subsequently results in lipodermatosclerosis, a condition caused by chronic inflammatory processes in the dermis and subcutis.

**Table 1** C (clinical) classes of the CEAP classification.

| | |
|---|---|
| C0 | No visible signs of venous disease |
| C1 | Spider veins, telangiectases or reticular veins (diameter < 3 mm) |
| C2 | Varicose veins (with a diameter > 3 mm) without clinical signs of CVI |
| C3 | Varicose veins with edema |
| C4 | Varicose veins with trophic skin lesions |
| C4a | Pigmentation, purpura, eczema |
| C4b | Lipodermatosclerosis, atrophie blanche |
| C5 | Healed venous ulcer |
| C6 | Active venous ulcer |


 

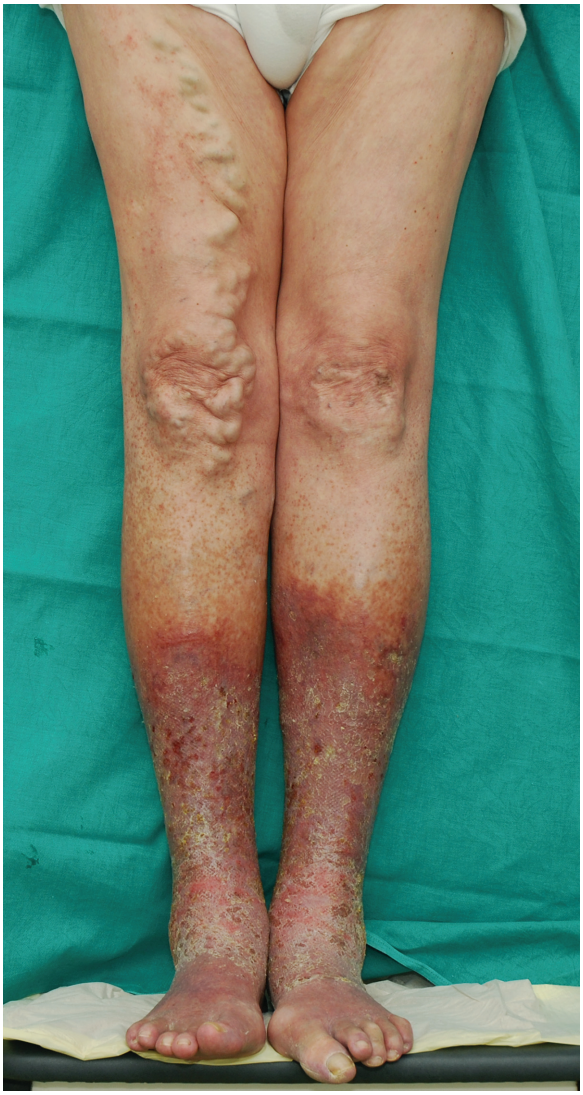

**Figure 1** Massive stasis dermatitis of both lower legs as well as a dilated, incompetent accessory saphenous vein on the right thigh. Such a clinical presentation is only seen after many years without treatment.

Lipodermatosclerosis can be a warning sign of imminent ulceration.

It is associated with erythema, induration, fibrosis, and – in acute phases – pain. Lipodermatosclerosis can be a warning sign of imminent ulceration [33].

## Complications

With a prevalence of roughly 0.7 %, venous leg ulcer is a dreaded complication of CVI [3], the medial malleolus most commonly affected; complete healing of leg ulcers frequently requires prolonged wound treatment (Figure 2).

Acute complications of CVI include thromboembolic events. In rare cases, superficial thrombophlebitis may develop, presenting as erythematous, tender, indurated, and warm cord or nodule [34]. It can be associated with deep vein thrombosis (DVT) in about 18–25 % of patients and with pulmonary embolism in about 7 % [35, 36]. Following deep vein thrombosis, 20–50 % of patients develop

**Figure 2** Venous leg ulcer on the right ankle with lipodermatosclerosis and asteatotic eczema of the surrounding skin.

postthrombotic syndrome (PTS) [37, 38]. PTS is characterized by obstruction of the deep venous system, which can be associated with venous valve incompetence, venous hypertension, and pathological reflux. Given the complexity of the pathogenesis and, in particular, the treatment of PTS, we would like to refer the interested reader to the following review articles [12, 39, 40].

## Classification

Today, the CEAP classification is the internationally accepted standard classification of chronic venous disease.

The most commonly used classification of chronic venous disease is the CEAP classification, which includes clinical, etiological, anatomical, and pathophysiological aspects and stages. Generally, only the C-classification (clinical features) is used in everyday clinical practice (Table 1). Although Widmer's classification is still occasionally used, it reflects the actual disease stage less accurately and only includes CVI (Table 2).

## Diagnosis

The diagnosis of chronic venous disease is based on history, clinical presentation, and diagnostic tests. While duplex ultrasound is currently the gold standard [41], there is a number of other diagnostic procedures that may be employed in special circumstances.

### Doppler and duplex ultrasound

Continuous-wave (CW) Doppler ultrasound using a pencil probe is a method that allows for exploratory and inexpensive examination of the leg veins. Here,

**Table 2** Widmer's classification.

| | |
|---|---|
| Stage 1 | Reversible edema, corona phlebectatica, perimalleolar reticular veins |
| Stage 2 | Persistent edema, hemosiderosis and purpura on the lower leg, lipodermatosclerosis, atrophie blanche, stasis dermatitis |
| Stage 3 | Leg ulcer |
| Stage 3a | Healed leg ulcer |
| Stage 3b | Active leg ulcer |


 

acoustic signals are used to render venous blood flow. Using this technique, incompetence of the great saphenous vein can be identified relatively well. However, the diagnostic accuracy diminishes in case of incompetence of the lesser saphenous vein or the deep venous system, the reason being that – due to anatomical variations and examiner-dependent differences – it is difficult to assign a given reflux to a specific vessel without imaging [42]. CW Doppler ultrasound can, however, be employed as a screening test for chronic venous disease. In addition, it is useful in assessing the arterial blood supply by determining the ABI (ankle-brachial index).

Color-flow duplex ultrasound, on the other hand, provides a noninvasive and comparatively simple method for morphological and functional assessment of the venous system. Thromboembolic events in the leg veins can be diagnosed with a high degree of accuracy by compressing the veins with the ultrasound probe [43]. Exact measurement of the reflux times of incompetent veins is also possible; a vein is considered to be incompetent if the reflux time is greater than 0.5–1 s, depending on the vein segment examined. For superficial veins, the corresponding figure is > 0.5 s [44].

Color-flow duplex ultrasound is currently the gold standard in the diagnosis of chronic venous disease.

Duplex ultrasound has its diagnostic limitations in the assessment of pelvic veins. Deep veins in the lower leg, too, are sometimes impossible to definitively evaluate due to patients' individual anatomical constitution.

### Phlebography

Phlebography is an X-ray imaging technique that involves the use of a contrast medium to study the leg veins [45]. Today, it is hardly ever employed as duplex ultrasound has at least the same diagnostic accuracy [46]. In special circumstances, however, phlebography may still provide helpful information.

## Plethysmography

There are various forms of plethysmography, including photoplethysmography (also called: light reflection rheography), air plethysmography, and venous occlusion plethysmography. Photoplethysmography is based on the measurement of the amount of infrared light reflected by hemoglobin in order to determine the venous filling time of the subcutaneous venous plexus [47]. Venous occlusion plethysmography involves the interruption of venous drainage by placing a cuff around the upper leg. Lower-leg circumference is then assessed using a strain gauge, thus providing information about venous capacity and venous drainage [48]. In air plethysmography, a cuff with air chambers is placed around the patient's lower leg, which enables the measurement of volume changes [49]. This method is hardly used in German-speaking countries.

Plethysmographic methods can be employed in cases where hemodynamically relevant parameters such as ejection fraction or pump performance are involved. They are not suitable for the diagnosis of venous reflux as they are inferior to color-flow duplex ultrasound in terms of accurate detection and reproducibility [50].

### Phlebodynamometry

Phlebodynamometry refers to the intravascular measurement of peripheral venous pressure. Given its invasiveness, this method is employed only rarely today, mainly to establish the indication for surgery in the context of postthrombotic syndrome or deep vein incompetence [51].

### Other methods

Although other diagnostic methods such as CT and MRI are suitable for leg vein imaging [52], their value in routine clinical practice is limited. They are, however, important methods in the diagnostic workup of conditions involving the pelvic veins, for example, following pelvic vein thrombosis.

## Treatment

The goal of every form of treatment is the improvement of symptoms, the prevention of sequelae and complications of CVI, and the promotion of ulcer healing.

There is a wide range of options – both conservative and invasive – for the treatment of chronic venous disease. The goal of every form of treatment is the improvement of symptoms, the prevention of sequelae and complications of CVI, and the promotion of ulcer healing.

## Conservative treatment options

*Medical compression therapy* is the basis of any treatment of chronic venous disease.

Conservative treatment of chronic venous disease primarily consists of compression therapy and supportive measures such as physical therapy, manual lymphatic drainage, and the use of phlebotonics. *Medical compression therapy* is the basis of any treatment of chronic venous disease. It is relatively easy to use, noninvasive, and counteracts the primary pathophysiological mechanism of chronic venous disease – venous reflux and hypertension – by mechanical venous compression and improving muscle pump function. Compression therapy is particularly important in the treatment of leg ulcers [53, 54]; in early-stage CVI, it can play a pivotal role in greatly relieving symptoms such as the tendency for edema and the feeling of heaviness in the legs [55].

There are various options to achieve the desired compression, the most common being compression stockings [56] and compression bandages. Compression bandages are predominantly employed in the treatment of leg ulcers and in the acute decongestion phase of chronic leg edema. Medical compression stockings are available in different compression classes, lengths, knitting methods, and designs (including models especially designed for leg ulcer treatment). There are also various compression bandage systems. It is as yet unclear whether multi-layer compression systems lead to faster ulcer healing than single-layer systems. While some studies have shown single-layer and multi-layer systems to be equivalent [57, 58], others have found ulcers to heal more rapidly using multi-layer systems [59, 60]. It is essential that patients be familiar with how to properly use the system they are prescribed [57].

Long-term compression therapy following ulcer healing markedly contributes to a lower recurrence rate, especially in combination with surgical treatment of the underlying venous insufficiency [61].

Although compression therapy ranks among the most important therapeutic measures in patients with venous leg ulcers, up to one-third of individuals affected are not prescribed adequate compression [62].

Supplementary measures such as *physical therapy, manual lymphatic drainage,* and *phlebotonics* are able to improve CVI symptoms and promote ulcer healing. However, they are no substitute for compression therapy or surgery. Physical therapy can help improve muscle pump function and ankle mobility [63], while manual lymphatic drainage with subsequent compression bandaging can be used to reduce chronic leg edema [64].

Especially in immobile venous leg ulcer patients, decongestion may also be achieved by intermittent pneumatic compression (IPC). The latter, however, can

replace neither compression nor manual lymphatic drainage. Moreover, it remains unclear whether IPC does actually result in more rapid ulcer healing [65, 66]. Symptomatic treatment may also include phlebotonics, which may have positive effects on symptoms such as leg cramps, paresthesias, or *restless legs*. Flavonoids in particular may also help reduce the tendency for edema. Thus, phlebotonics can be prescribed for symptom relief but they have no effects on the underlying disease [67–69].

## Sclerotherapy

Sclerotherapy involves the injection of a liquid into the incompetent vein, which gives rise to an inflammatory response in the endothelium of the vessel wall, subsequently resulting in localized thrombosis. In Germany, the only substance approved for this indication is polidocanol (trade name: Aethoxysklerol, manufacturer: Kreussler, Chemische Fabrik Kreussler & Co GmbH, Wiesbaden). Depending on the size of the vein, it is injected as either liquid or foam; polidocanol is available in various concentrations [70, 71].

The advantages of sclerotherapy include that it is easy to carry out and that treatment may be repeated without restriction; it is generally associated with minor side effects and a comparatively short downtime [72]. Sclerotherapy is a good alternative in elderly multimorbid patients or individuals who decline surgical and endovenous procedures. Although post-sclerotherapy compression is usually carried out for a few days to a few weeks [73], one study failed to find any differences in outcome between patients treated with and those without compression [74].

The most common side effects include hyperpigmentation, telangiectatic matting, and transient pain associated with indurations in the area treated. In very rare cases, complications such as deep vein thrombosis or skin necrosis can occur [75, 76]. Neurological complications have also been described, for example, stroke in patients with patent foramen ovale, which is an absolute contraindication for sclerotherapy [77, 78].

While sclerotherapy may be used for trunk incompetence, it does show high recurrence rates after five years [79]. It is therefore advisable to treat the saphenous veins with surgical or endovenous procedures. Sole sclerotherapy, on the other hand, may exhibit good long-term results in the treatment of isolated tributary or perforator incompetence as well as in recurrent varicose veins [80, 81]. In addition, sclerotherapy may also be successfully employed in the treatment of venous malformations [82] (Figures 3 and 4).

## Surgical procedures

The goal of surgical and endovenous procedures in the treatment of chronic venous disease is to remove or obliterate incompetent veins or to isolate the reflux source from the rest of the vascular system.

The goal of surgical and endovenous procedures in the treatment of chronic venous disease is to remove or obliterate incompetent veins or to isolate the reflux source from the rest of the vascular system. Compared to conservative measures, these procedures lead to a significant decrease in symptoms and to an improvement in patients' quality of life [83]. Similar to compression and sclerotherapy, surgical and endovenous techniques are meant to prevent sequelae and to reduce the risk of superficial thrombophlebitis.

The first variants of *classic saphenofemoral ligation and stripping* were introduced as early as the beginning of the 20th century, and for many years continued to be the surgical standard treatment for chronic venous disease [84]. Here, the great saphenous is ligated and dissected from the femoral vein, followed by the removal of tributaries. Following the insertion of a wire, the great saphenous vein is

 

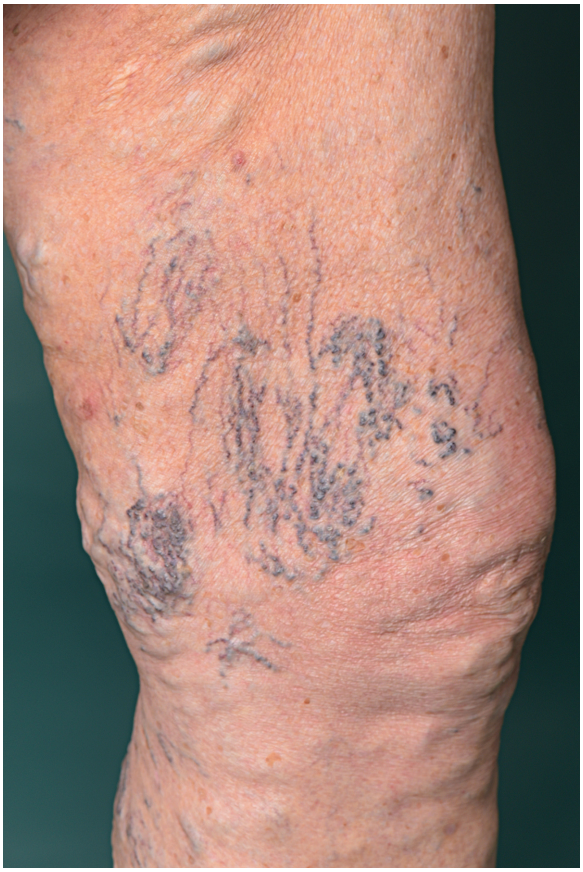

**Figure 3** Distinctly visible, incompetent tributary veins and telangiectases prior to sclerotherapy.

pulled out. The lesser saphenous vein is dissected from the popliteal vein, with the ligation frequently placed close to the junction [85]. Today, invagination stripping with tumescent anesthesia is frequently used, which is less traumatic and causes less bleeding than the "classic" method [86].

High ligation without stripping is sometimes performed to preserve the saphenous vein but this procedure shows much higher recurrence rates than saphenofemoral ligation with stripping [87].

The *CHIVA method* is a surgical procedure that aims to alter the hemodynamic conditions of the venous system in the legs so that volume-loaded vein segments are relieved by selectively dissecting incompetent tributaries. Dilations regress [88] and the saphenous veins may be preserved. This is in part achieved by ligating venovenous shunts and pathological recirculating circuits. Given the complexity of this method, we would like to refer our readers to the following review articles [89, 90]. Some authors ascribe a somewhat greater efficacy and patient satisfaction to this method than to classic saphenofemoral ligation and stripping. However, larger studies are needed for a conclusive assessment, especially with respect to efficacy and recurrence rates compared to the classic method [90].

Another surgical option involves direct epi- or subfascial *ligation of incompetent perforators*. There is evidence that perforator interruption promotes ulcer healing and may reduce recurrence rates. However, given that this method is often used in combination with other surgical procedures such as saphenofemoral ligation, no definitive conclusions can be drawn about its effects if used alone [91, 92].


 

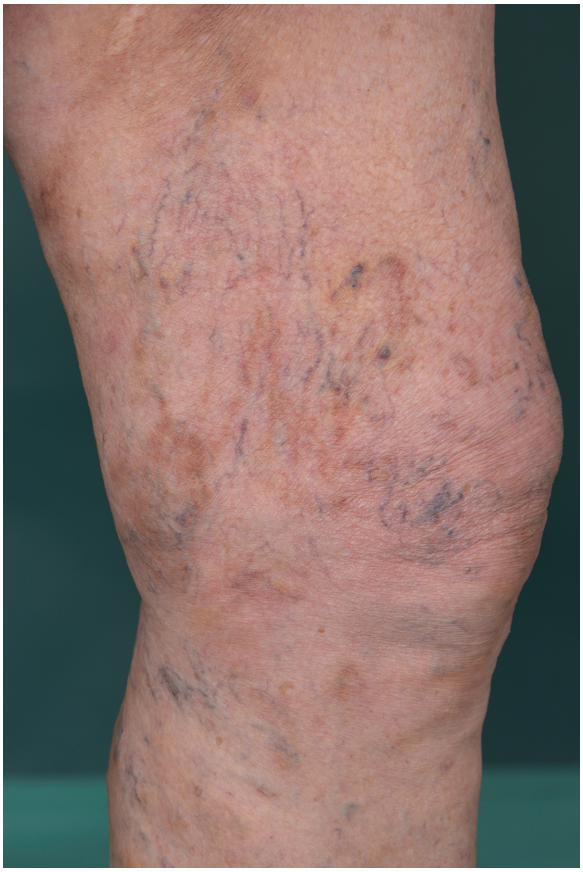

**Figure 4** Status post multiple sclerotherapy sessions: mild hyperpigmentation.

*Phlebectomy* describes the stripping of individual incompetent tributaries through small incisions. This procedure is frequently performed on an outpatient basis under local anesthesia but can also be combined with saphenofemoral ligation and stripping or endoluminal procedures [93, 94].

## Endovenous thermal and chemical procedures

The two most commonly used endovenous thermal procedures are radiofrequency ablation (RFA) and endovenous laser therapy (EVLT).

Interventional endoluminal procedures have been around since 1999. Over the past ten years, there have been major developments and improvements. The two most commonly used endovenous thermal procedures are radiofrequency ablation (RFA) and endovenous laser therapy (EVLT).

These methods are primarily used for trunk incompetence as they involve the endoluminal advancement of a catheter, which is difficult or impossible in veins that are not straight or even convoluted [95].

Under ultrasound guidance, the vein is punctured (usually distally) and the RFA catheter or EVLT laser fiber is proximally advanced to the site of venous incompetence. This usually means that the great saphenous vein is punctured just distal to the knee and the lesser saphenous vein in the mid-lower leg region. Using procedure-specific safety margins, the catheter/laser fiber is then advanced up to the saphenofemoral respectively saphenopopliteal junction. Tumescent anesthesia solution is then injected along the vein, which – apart from its local anesthetic effects – protects the surrounding tissue from thermal damage [96]. The vascular

endothelium is destroyed by the heat released from the tip of the catheter/laser fiber, resulting in venous occlusion.

The effectiveness of radiofrequency ablation and laser therapy is about the same, however, RFA tends to be associated with fewer side effects and more rapid recovery [97–99]. Given that the corresponding studies compared RFA with lasers with shorter wavelengths, this statement may not apply to current laser systems. Based on other studies, lasers with longer wavelengths are associated with fewer side effects [100]. With respect to laser fiber types, a distinction can be made between bare tip fibers and radial systems. They differ in the manner in which light is emitted, and may therefore be associated with different outcomes.

The side effects of RFA and EVLT include thrombophlebitis, hyperpigmentation, paresthesias, and bruising [101]. The most significant complication, which can always occur in the context of vascular procedures, is deep vein thrombosis, with a reported incidence of 0.2–1.3 % [102]. Here, endovenous heat-induced thrombosis (EHIT) in particular must be mentioned as this complication is exclusively associated with endovenous thermal procedures. EHIT designates the development of a thrombus that extends from the previously occluded vein segment into the deep venous system [103, 104].

## Novel procedures

Apart from RFA and EVLT, there is also endovenous steam ablation (EVSA) as well as newer methods such as venous occlusion using cyanoacrylate adhesive [105] and mechanochemical endovenous ablation (MOCA) [106]. Given the paucity of data with regard to these methods, no unequivocal recommendation can be issued at this time. Unlike RFA, EVLT, and EVSA, tumescent anesthesia is no longer required, and paresthesias seem to occur less commonly. While endovenous steam ablation appears to be associated with similar outcomes after one year as RFA and EVLT, here, too, data is still too sketchy [107].

## Comparison of treatment options

When selecting a therapeutic option, individual anatomical circumstances, underlying diseases as well as the patient's wishes should always be taken into account.

There is a host of options available for the treatment of chronic venous disease. When selecting a therapeutic option, individual anatomical circumstances, underlying diseases as well as the patient's wishes should always be taken into account. Only in exceptional cases should patients with more advanced CVI be treated with compression therapy alone. However, in combination with surgical or endovenous procedures, adequate compression therapy is one of the therapeutic mainstays.

Sclerotherapy and phlebectomy are primarily used for isolated tributary or perforator incompetence, recurrent varicose veins, as well as in combination with other procedures [80, 81].

In the case of trunk incompetence, classic surgical methods such as saphenofemoral ligation and stripping or the newer endovenous methods should be employed. The efficacy and recurrence rates of endoluminal procedures – especially those of established methods such as RFA and EVLT – are comparable to the postoperative outcome following saphenofemoral ligation and stripping [97, 101, 108, 109]. Although some studies have found classic surgical procedures to be more efficacious, the validity of these studies is limited due to the use of older catheter systems.

The efficacy and recurrence rates of endoluminal procedures – especially those of established methods such as RFA and EVLT – are comparable to the postoperative outcome following saphenofemoral ligation and stripping.

The advantages of endoluminal procedures include fewer side effects, the possibility of local anesthesia, and a shorter downtime [98]. Given the great international and also regional (within Germany) variability in terms of cost and

  

reimbursement of RFA and EVLT by health insurers, a final cost assessment cannot be made, especially in comparison with saphenofemoral ligation and stripping. In any case, endoluminal methods tend to be associated with shorter downtimes, and the vast majority of procedures can be performed on an outpatient basis [110], making them a good alternative in suitable patients.

## Summary

- Chronic venous disease is a very common condition caused by venous reflux and obstruction.
- Given that CVI can be associated with considerable complications and sequelae, including venous leg ulcer, early diagnosis and adequate treatment are of great importance.
- Symptoms typically include a tendency for edema and a feeling of heaviness in the legs, as well as pruritus, pain, and nocturnal cramps.
- Color-flow duplex ultrasound is the gold standard for nearly all diagnostic issues related to chronic venous disease.
- There is a wide range of therapeutic options, including sclerotherapy as well as surgical and endovenous procedures. Compression is a fundamental treatment principle in all disease stages. Despite great therapeutic advances, there is to date no intervention that can definitively prevent the recurrence of chronic venous disease.

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# Fragen zur Zertifizierung durch die DDG

**1. Welcher der folgenden Mechanismen ist kein Bestandteil der Pathophysiologie der CVI?**

a) insuffiziente Pumpmechanismen (Muskel-/Gelenkpumpe)
b) insuffiziente Venenklappen
c) arterielle Hypertonie
d) eine stattgefundene tiefe Beinvenenthrombose oder Beckenvenenthrombose
e) venöser Reflux

**2. Wann spricht man von einer Stammveneninsuffizienz? Im Falle einer ...**

a) Insuffizienz der V. femoralis
b) Insuffizienz der Perforansvenen
c) Insuffizienz der Seitenäste
d) Insuffizienz der V. poplitea
e) Insuffizienz der V. saphena magna

**3. Was ist kein Risikofaktor für die Entstehung einer chronischen Venenerkrankung?**

a) fortgeschrittenes Alter
b) Migräne
c) Schwangerschaft
d) positive Familienanamnese
e) Adipositas

**4. Was ist kein typisches Symptom der CVI?**

a) Schweregefühl
b) Schwellneigung
c) nächtliche Wadenkrämpfe
d) Claudicatio intermittens
e) Juckreiz

**5. Welche der folgenden Aussagen ist richtig?**

a) Teleangiektasien (Besenreiser) sind beweisend für das Vorliegen einer CVI ($C_3$–$C_6$).
b) Ödeme im Zuge der CVI treten vor allem morgens auf.
c) Die Dermatoliposklerose wird als Warnhinweis für die mögliche Entstehung eines Ulcus cruris gesehen.
d) Hyperpigmentierungen sind untypisch für fortgeschrittene Stadien der CVI.
e) Das Ulcus cruris venosum hat eine Prävalenz von etwa 10 %.

**6. Ein Patient mit sichtbaren Varizen an den Beinen stellt sich bei Ihnen vor und fragt, ob er etwas aufgrund seiner Krampfadern machen soll und falls ja, was. Welche Empfehlung ist richtig?**

a) Die Therapie mit Kompressionsstrümpfen ist in jedem Fall auch dauerhaft ausreichend.
b) Der Patient sollte sich umgehend um einen operativen Eingriff kümmern, da es keine anderen Alternativen gibt.
c) Aktuell besteht kein Handlungsbedarf, Kontrolle in sechs Monaten.
d) Bevor eine Therapieempfehlung abgegeben werden kann, sollte der Patient mittels farbkodierter Duplexsonographie untersucht werden.
e) Eine Sklerotherapie ist in diesem Fall sicher ausreichend und sollte daher unmittelbar durchgeführt werden.

**7. Welche der folgenden Aussagen bezüglich der Klassifikation der chronischen Venenerkrankung ist richtig?**

a) Die C-Stadien nach CEAP erlauben Rückschluss auf die Ätiologie der chronischen Venenerkrankung.
b) Die Klassifikation nach Widmer enthält das Ergebnis der Duplexsonographie.
c) $C_5$ nach CEAP entspricht der Varikose mit abgeheiltem Ulcus cruris.
d) Die CEAP-Klassifikation ist die einzige Klassifikation, die zur Anwendung kommt.
e) Das Stadium 1 nach Widmer entspricht der Varikose mit trophischen Hautveränderungen.

**8. Eine Patientin erkundigt sich, was passieren kann, wenn sie ihre nachgewiesene CVI nicht behandeln lässt. Welche der folgenden Symptome oder Komplikationen sind typischerweise nicht assoziiert mit einer CVI?**

a) oberflächliche Venenthrombose
b) Dermatoliposklerose
c) chronische Beinödeme
d) Ulcus cruris
e) Apoplex

**9. Ein 45-jähriger Patient mit im Vorfeld diagnostizierter Stammveneninsuffizienz der V. saphena magna links möchte sich bezüglich Therapieoptionen beraten lassen. Welche Aussage ist richtig?**

a) Endoluminale Verfahren (RFA, EVLT) können ambulant und in Tumeszenzanästhesie durchgeführt werden.
b) Die Sklerotherapie weist keine höhere Rezidivrate bei Stammveneninsuffizienz als andere Verfahren auf.
c) Die operative Therapie mit klassischer Crossektomie und Exhairese führt in jedem Fall zu besseren Ergebnissen als die endoluminalen Verfahren.
d) Die alleinige Kompressionstherapie führt zu einem anhaltenden Rückgang der Insuffizienz auch nach Beendigung der Kompressionstherapie.
e) Endoluminale Verfahren sind der Crossektomie mit Exhairese immer überlegen.

**10. Welche Aussage bezüglich der therapeutischen Möglichkeiten der chronischen Venenerkrankung ist falsch?**

a) Die Sklerotherapie kann zur Therapie von Seitenastinsuffizienzen eingesetzt werden.
b) Die Phlebektomie kann ergänzend zur Crossektomie mit Exhairese bzw. den endoluminalen Verfahren eingesetzt werden.
c) Die Sklerotherapie wird vorwiegend in Intubationsnarkose durchgeführt.
d) Die Kompression stellt eine Grundsäule in der Therapie der

chronischen Venenerkrankung dar, sollte bei Bedarf jedoch mit weiteren Therapiemaßnahmen kombiniert werden.

e) Die RFA und EVLT können in Tumeszenzanästhesie durchgeführt werden.

Liebe Leserinnen und Leser,
der Einsendeschluss an die DDA für diese Ausgabe ist der 30. Juni 2017.
Die richtige Lösung zum Thema „Prä- und perioperative Aspekte der Versorgung dermatochirurgischer Patienten“ in Heft 2 (Februar 2017): (1b, 2d, 3b, 4c, 5c, 6c, 7d, 8d, 9d, 10b).

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