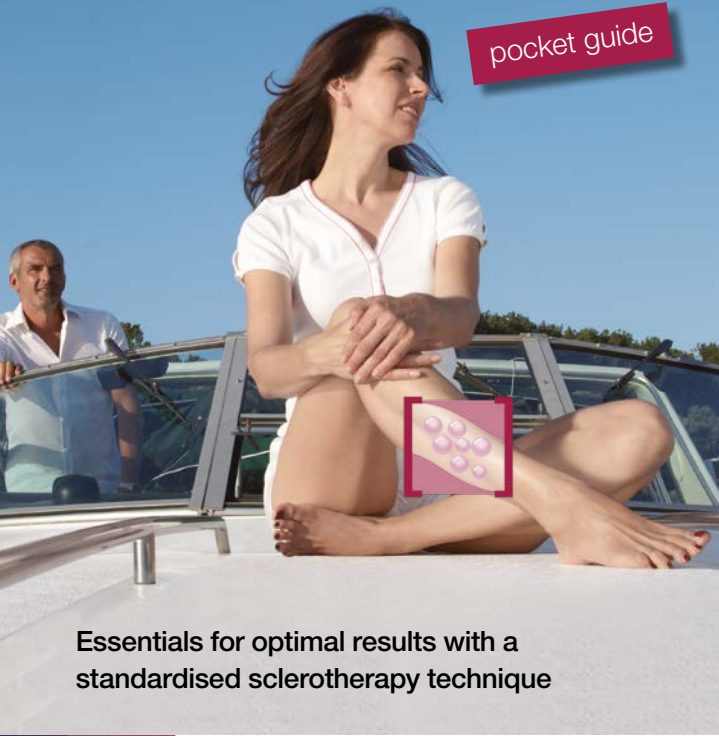
Best Practice
[Foam Sclerotherapy]

pocket guide



Essentials for optimal results with a standardised sclerotherapy technique

kreussler | International School of Sclerotherapy

Introduction

The greater effectiveness of ultrasound-guided foam sclerotherapy compared to liquid sclerotherapy has been demonstrated in numerous clinical studies in the treatment of larger varicose veins. Since its introduction and approval, foam has been used for larger varicose veins, so that all types of varicose veins can be successfully treated with sclerotherapy. Foam sclerotherapy has also proven to be indispensable in combination with other methods in the sense of a complete leg treatment.

A good sclerotherapy technique is essential for optimal treatment success and for minimising side effects.

The objective of the Kreussler International School of Sclerotherapy is to harmonise the sclerotherapy technique on an international level and to establish standards of diagnostics and injection technique. This pocket guide summarises the most important standards for foam sclerotherapy.

Table of contents

Foam sclerotherapy

Foam sclerotherapy is a safe and effective method for the treatment of larger varicose veins. The sclerosing foam is produced with a special syringe system and injected into the varicose veins.

Foam sclerotherapy is approved for the treatment of medium and large varicose veins (1–3%) and is considered the first-line treatment for tributary and recurrent varicose veins, as well as a good alternative to the surgical and thermal methods for saphenous varicose veins.

Foam sclerotherapy

Advantages:

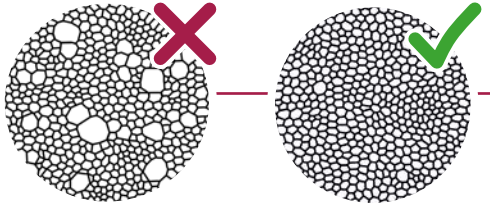
The fine-bubbled sclerosing foam displaces the blood in the affected vein more effectively after injection, so that it takes longer for the sclerosing agent to mix with the blood and get inactivated compared to liquid sclerotherapy. This achieves the largest possible contact area between the active ingredient and the vein wall, prolongs the contact time, and the contact of the sclerosing agent with the vein wall takes place in a more concentrated form. In addition, a homogeneous distribution of the foam within the varicose vein is possible.

Foam sclerotherapy increases the effectiveness of sclerotherapy by 30–50% while reducing the required amount of sclerosing agent for successful treatment!

Standardised production of microfoam

Liquid sclerosing agent and gas are mixed using a double syringe system with a 3-way tap or 2-way connector (e. g. EasyFoam® Set). Systems with a 2-way connector usually produce a slightly finer-bubbled foam. Automated devices are also available for standardised foam production (e. g. Varixio®).

Required quality of microfoam:
The foam must be viscous, fine-bubbled and homogeneous. No gas bubbles and unmixed liquid and/or air must be visible to the naked eye.



Important for the production of foam:

- Produce the foam exclusively according to the respective instructions of the various systems
- The most commonly used gas component in practice is air
- **The mixing ratio is 1 part liquid Aethoxysklerol® and 4–5 parts gas (for Fibrovein® 3–4 parts gas)**
- Use low-silicone syringes, as the sclerosant can dissolve silicone from the materials, which can destroy the foam
- The injection cannula should be no smaller than 25 gauge (21–25 G) to prevent partial degradation of the foam as it passes through the cannula
- Inject the foam within 60 s after production; as the foam gradually reverts to liquid form, delayed use may lead to larger bubbles being injected, potentially compromising safety and effectiveness

Pre-therapeutic management

A detailed medical history, a careful consideration of the contraindications of the sclerosing agent, a comprehensive clinical examination, an ultrasound examination, and a good patient information are indispensable for a successful and safe treatment (see also flyer “Best Practice Micro-Sclerotherapy’’, pages 8–9).

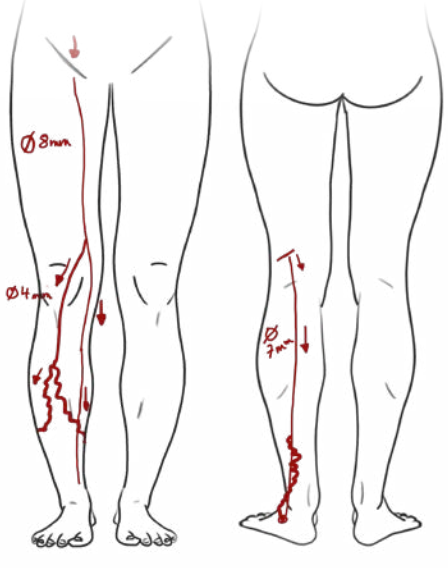
A **duplex ultrasound** examination of the veins in the standing patient is mandatory for the diagnosis and strategic planning of foam sclerotherapy and provides information about anatomy, patency, venous wall pathology and blood flow in the veins.

Important for ultrasound examination:

- Use a high-frequency linear probe for the superficial veins (10–16 MHz)
- Use the following modes: B-Mode, pulsed Doppler and colour Doppler
- Examine the superficial and deep venous system
- Use transverse and longitudinal views to examine the veins
- Look for reflux and leakage points; reflux must be provoked by Valsalva manoeuvre or by manual compression of the thigh or calf: **reflux in the superficial veins ≥ 0.5 seconds is considered pathological**
- Determine the vein diameter (e.g. in the case of the saphenous vein: intima-intima, 15 cm from the saphenofemoral junction); this is helpful in determining the optimal concentration of the sclerosing agent
- Identify the segments to be treated

Strategic treatment plan

Successful foam sclerotherapy requires thoroughly planning. Therefore, create an accurate graphical representation of the ultrasound findings of the superficial and deep veins (vein mapping), develop an intervention plan of the area to be treated and plan the injection points in advance.



Examples of vein mapping

Important for treatment success:

Treat all reflux points from proximal to distal and treat first the larger varicose veins or the reflux points with the highest pressure (saphenous varicose veins and other larger varicose veins with reflux)**!**

- Further varicose veins in this area then either close spontaneously or can be effectively treated by further treatment
- Inflammatory reactions and the number of necessary sclerotherapy sessions are reduced

For treatment of longer vein segments, always perform multiple (“fractional”) injections along the varicose vein.

Dosage for foam sclerotherapy

As with liquid sclerotherapy, it is crucial for successful and safe treatment that you use the dose with the optimal efficacy and a minimum complication rate. Please note that foam sclerotherapy is not approved for the treatment of C1 varicose veins and is therefore off-label use!

Picture with friendly permission of
Dr Univ. Parma S. Guggenbichler

Aethoxysklerol®
(active ingredient polidocanol)

In general, the **maximum daily dose of 2 mg polidocanol per kg of body weight** should not be exceeded. This limit should be observed especially at higher concentrations, as it can be exceeded in light-weight patients.

Volume per injection: 2–4 ml of foam (until venous spasm occurs)

Maximum foam volume and session per day: The total dose of 10 ml of foam should not be exceeded, as the incidence of complications may increase with higher foam volumes

Approved indications and concentrations for foam sclerotherapy according to German product information:

Saphenous varicose veins: Aethoxysklerol® 2–3%

Tributary varicose veins: Aethoxysklerol® 1%

Perforating varicose veins: Aethoxysklerol® 1–2%

Please refer to the product information of the respective countries!

In the European guideline for sclerotherapy (2014), the following concentrations are recommended for the production of the foam, depending on the diameter and severity of the varicose veins:

Indication	Concentration % polidocanol
Tributary varicose veins	up to 2%
Perforating varicose veins	1–3%
Saphenous veins (measured on the standing patient)	
< 4 mm ≥ 4 mm and ≤ 8 mm > 8 mm	up to 1% 1–3% 3%
Recurrent varicose veins	1–3%

Fibrovein®
(active ingredient sodium tetradecyl sulphate)

In some countries, another sclerosing agent called Fibrovein® is approved for foam sclerotherapy. This sclerosing agent has also proven its effectiveness in clinical studies, and its side effect profile is comparable to that of Aethoxysklerol®.

Volume per injection: 0.5–2 ml of foam (until venous spasm occurs)

Maximum foam volume per session and day: 10 ml (up to a maximum of 16 ml according to the product information); however, it is recommended not to exceed the total amount of 10 ml, as the frequency of complications can increase with higher foam volumes

Approved indications and concentrations for foam sclerotherapy according to the product information: Uncomplicated, primary varicose veins, recurrent or residual varicose veins after surgical treatment: Fibrovein® 1% and 3%

Please refer to the product information of the respective countries!

Cell experiments lead to the conclusion that **liquid sodium tetradecyl sulphate (STS) solution is about 2 times more potent than the polidocanol solution of the same concentration**. The sclerosing foam is also reported to have a stronger effect at the given concentration, though this has not been sufficiently proven.

In the European guideline for sclerotherapy (2014), the following concentrations are recommended for the production of the foam, depending on the diameter and severity of the varicose veins:

Indication	Concentration % STS
Tributary varicose veins	up to 1%
Perforating varicose veins	1–3%
Saphenous veins (measured on the standing patient)	
< 4 mm	up to 1%
≥ 4 mm and ≤ 8 mm	1–3%
> 8 mm	3%
Recurrent varicose veins	1–3%

In differentiation to Aethoxysklerol®, Fibrovein® is generally recommended for C2 varicose veins of larger calibre, especially for saphenous veins and in cases where sclerotherapy with polidocanol has not been successful.

For the production of foam with Fibrovein®, please refer to the product information of the respective countries.

Good sclerotherapy technique

- The injection is carried out on the lying patient after disinfection of the treatment area
- Only incompetent vein segments are treated
- No evidence supports improved efficacy or safety with leg elevation or compression of the junction during injection

Picture with friendly permission of
Dr Univ. Parma S. Guggenbichler

Duplex ultrasound examination

A duplex ultrasound examination should be performed before, during, and after treatment.

Ultrasound control during sclerotherapy is particularly important for high-risk location veins and/or veins that are not visible or at least palpable (inguinal and popliteal veins, veins near perforating veins and in the malleolar area):

- To confirm the diagnosis and extent of reflux
- To select/confirm (the safest) injection sites and the optimal concentration
- To detect existing arteries near the treatment area
- To monitor the position of the cannula during puncture and during injection
- To verify the required foam volume, assess venous spasm and ensure homogenous distribution of the foam within the varicose vein or vein segment

Selection of the first injection site

It is important that the injection sites are always safe and easily accessible.

Saphenous varicose veins: the first injection should not be too far from the junction for good effectiveness, but for safety reasons it should also not be too close to the junction (arteries in the groin or in the popliteal fossa).

- Great saphenous vein with reflux from the groin to the calf: in the upper third of the thigh
- Small saphenous vein: in the upper third of the calf

Varicose veins of the anterior saphenous vein: the first injection should be made in the upper third of the thigh

Insufficient perforating veins: do not inject directly into the perforating vein, but into the varicose vein draining blood through the perforating vein into the deep venous system

Varicose veins without reflux throughout the entire vein: the injection should be made in the upper area of the reflux

Puncture of the vena saphena magna
Picture with friendly permission of Dr F.-X. Breu

Puncture of the vena saphena parva
Picture with friendly permission of Dr C. Hamel-Desnos

Injection techniques

Foam sclerotherapy usually involves direct puncture or the technique with a short catheter. Using the example of saphenous veins, both techniques are explained in detail below.

Direct puncture

In direct puncture, the cannula is attached to the syringe filled with sclerosing foam. The foam is then injected directly into the varicose veins. This technique is considered to be quick and the most flexible method for complex networks, but it requires some experience. Several injections are necessary for the treatment of longer veins (vein segments), and the foam should be freshly prepared for each injection site.

Always perform multiple injections with smaller volumes at different locations along the vein and never a single, large-volume injection at one site!

The entire procedure is carried out under ultrasound guidance:

- The venous wall and cannula are clearly visible, while the venous lumen and its contents are hypoechoic
- Position the probe so that the vein segment can be clearly visualised
- Identify the target veins/target segments of the vein, recheck the planned injection sites, and mark them if necessary

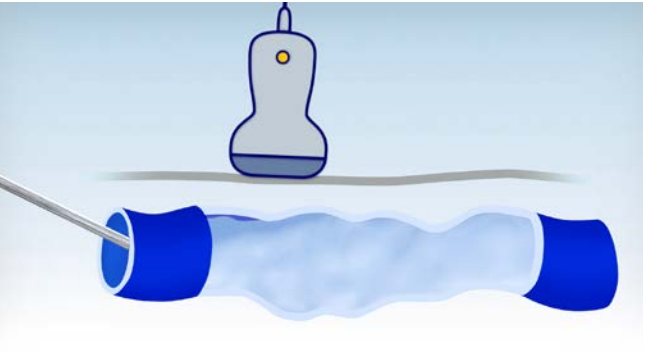
Puncture (mode B):

The puncture is carried out at a distance of 0.5–1 cm from the probe at an angle of 30–45°. Advance the cannula until visible in the vein and position it centrally in the lumen. If the cannula is not visible, retract slightly and reposition it.

Do not penetrate the posterior vein wall with the tip of the cannula!

Injection (mode B):

The dominant hand performs the injection, while the second hand holds the ultrasound probe. The injection usually takes no more than 10–20 seconds. After the puncture, you can first check the intravenous position by aspirating some blood into the conus of the cannula.



Optimal sclerotherapy technique

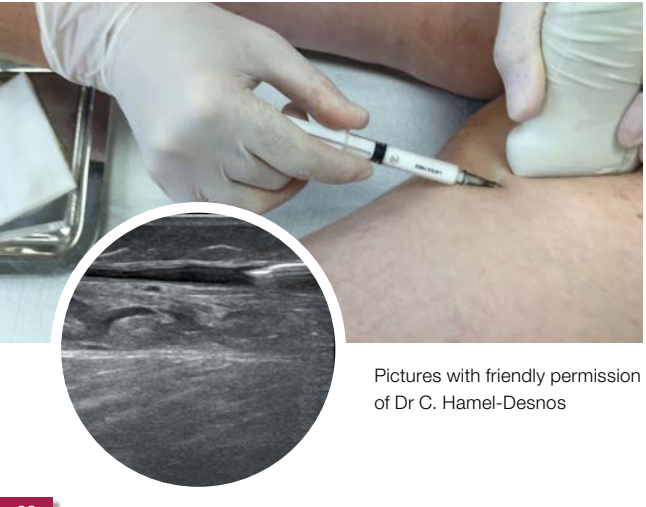
- Inject only a small volume of foam at first; as the foam is hyperechoic, the intravenous position of the cannula can be reconfirmed by injecting a small amount of foam
- Stop the injection as soon as a venous spasm occurs and/or the target vein or vein segment is homogeneously and compactly filled with foam, i.e. the spasm and filling determine the maximum injection volume
- If resistance occurs during the injection, the position of the cannula must be checked again

Immediate check after injection (mode B):

Ideally, the vein displays a venous spasm, is filled with foam and appears as a simple hyperechoic line with the smallest possible diameter. If part of the target vein/vein segment is not completely filled with foam, an additional injection can be made in the same session.

In the case of direct puncture, puncture and injection can in principle be carried out longitudinally or cross-sectionally.

Longitudinal section:
The probe is positioned along the axis of the vein, and the cannula is inserted at an angle of 30–45° to the skin, depending on the depth of the vein. The cannula is visible in shape of a tube when positioned under the ultrasound beam.



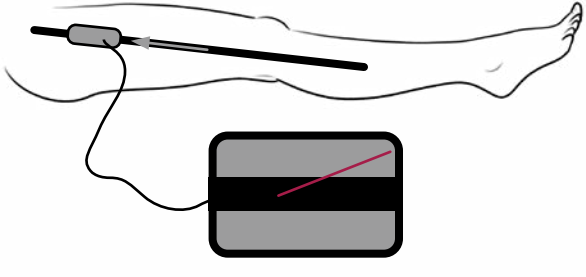
Pictures with friendly permission of Dr C. Hamel-Desnos

Advantages of longitudinal section:

- Anterior and posterior walls of the vein and venous lumen are visible
- Good visibility of the cannula, the distribution of foam and the extent of venous spasm during injection

Disadvantages of longitudinal section:

- Lateral walls of the veins are not visible
- The ultrasound beam is thin and more difficult to find



Cross section:

The probe is placed perpendicular to the axis of the vein, and the cannula is inserted at an angle of approx. 45° to the skin and not too close to the probe. In order to be visible in the form of a point, the cannula must meet the ultrasound beam.

Pictures with friendly permission of Dr F.-X. Breu and Dr C. Hamel-Desnos

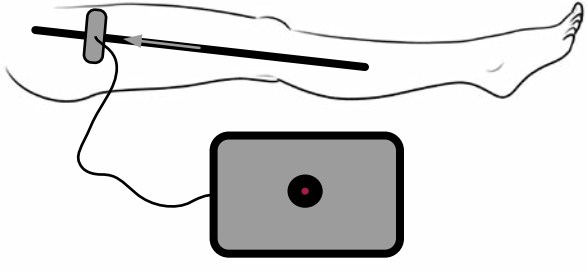
Advantages of cross section:

- Ultrasound beam easier to find
- All walls are visible

Disadvantages of cross section:

- There is a greater risk of penetrating the posterior wall
- Venous lumen, cannula, distribution of foam and venous spasm are less visible during injection

According to Hamel-Desnos C. Use of duplex ultrasound during the procedure: foam sclerotherapy. Phlébologie 2016; 69(3):14-26



Short catheter technique

As an alternative to direct puncture, wing cannulas (butterflies) with a short tube can be used for puncture and application of the foam. The cannulas are inserted into the vein and the tube is fixed with a plaster.
The syringe with the freshly prepared foam is then connected to the catheter, and the foam is injected. Indwelling venous cannulas without a tube are sometimes also used.

Beginners often find this technique easier, as it allows more time between puncture, foam preparation, and injection, with the access securely fixed intravenously. Once the cannulas have been placed, treatment of several sites is possible within a very short time, although the technique usually takes a little longer overall compared to direct puncture. Direct puncture may be more suitable for deeper varicose veins.

The same principles apply as for direct puncture.

Picture with friendly permission of Prof. Dr E. Rabe

Picture with friendly permission of PD Dr F. Pannier

- Check the correct intravenous position before injection
- Use short tubes, otherwise the foam quality may deteriorate
- **Do not inject large volumes per injection site, but insert several cannulas/catheters along the vein if necessary**

Prevention of complications

- Use ultrasound before, during and after treatment, especially for varicose veins that are difficult to puncture, invisible and non-palpable
- Use the lowest concentrations and volumes required for effectiveness, depending on the diameter of the target vein or the length of the vein segment
- Choose a safe and easily accessible injection site
- Do never inject intra-arterially
- Be careful in the groin and popliteal fossa, near perforating veins, and in the ankle and foot area
- Adjust the injection volume during the injection based on the occurrence of the venous spasm and the complete filling of the vein with foam
- Never inject a large volume of foam in one site
- Do not inject directly into a perforating vein or junction
- Observe the contraindications of foam sclerotherapy and thrombosis prophylaxis if necessary

Post-treatment procedure

Compression

5–10 minutes after the injection, local eccentric compression is performed along the treated vein for 24 hours. In some countries (such as Germany), it is then recommended to wear compression for 2–5 weeks for medium and larger varicose veins, depending on the extent of the disease; compression is not recommended in other countries.

For a few minutes after the foam sclerotherapy, avoid movement of the patient and/or the leg, a Valsalva manoeuvre, strong muscle activation and direct compression in the injection area!

For safety reasons, compression is applied after 5 minutes when treating tributary varicose veins, recurrent and perforating varicose veins, and after 10 minutes when treating saphenous varicose veins.

Post-treatment procedure

Before the treatment

1.5 years after the treatment

Pictures with friendly permission of Dr A. Kuschmann

Within reach of practice:

Watch for signs of allergic reactions and ask patients to walk for 20–30 minutes as a precaution against deep vein thrombosis.

For the first two weeks after sclerotherapy, the patient should avoid:

- Sitting for longer periods of time, such as during long car journeys and flights
- Hot baths, sauna visits and strong UV radiation

Further treatment:

- A thrombectomy should be performed during the follow-up appointment, if necessary
- Re-treatment of partially recanalised and clinically relevant vein segments at a follow-up appointment is recommended
- Several sessions may be necessary for an optimal treatment result

NEVER FORGET

A good sclerotherapy technique is essential to attain optimal treatment results!

Kreussler Pharma

Chemische Fabrik Kreussler & Co. GmbH
PO-Box 12 04 54 • 65082 Wiesbaden, Germany
Telefon: +49 (0)611 9271-0 • Fax: +49 (0)611 9271-111
info@kreussler.com

www.aethoxysklerol-international.com

www.healthy-veins.com

Date of publication: 2024