

Foam Sclerotherapy: Indications and Limitations

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Foam versus Liquid Sclerotherapy

- Disadvantage

- Liquid mixes with blood and dilutes the concentration

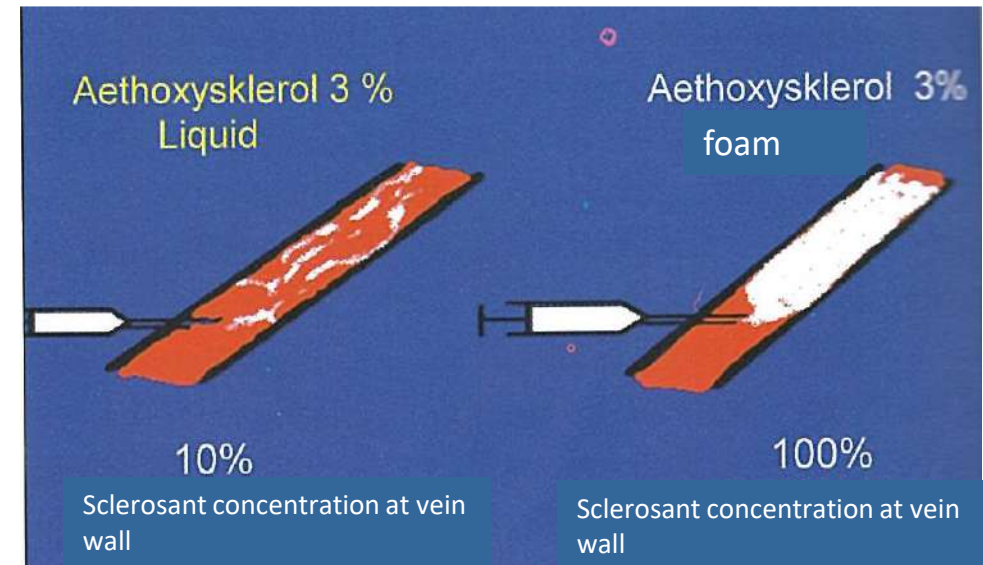
+ Advantage

+ Foam displaces the blood allowing direct contact of the sclerosant with the endothelium

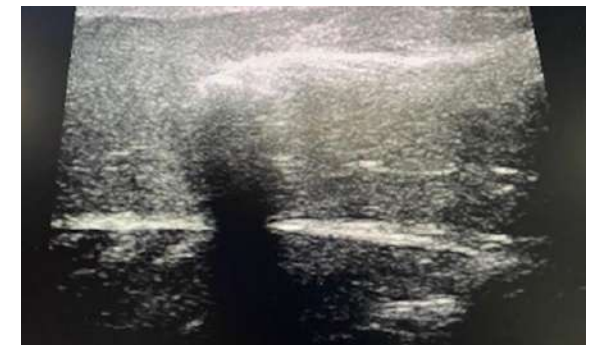
+ Increased efficacy

+ Lower concentration needed

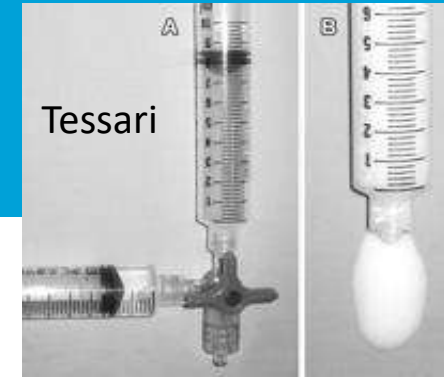
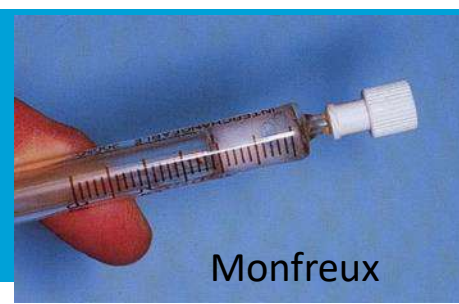
+ Echogenic



Hübner et al. Praktische Sclerotherapie. Viavital Verlag 2013

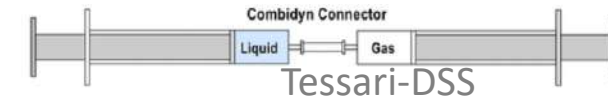


Preparation of Foam

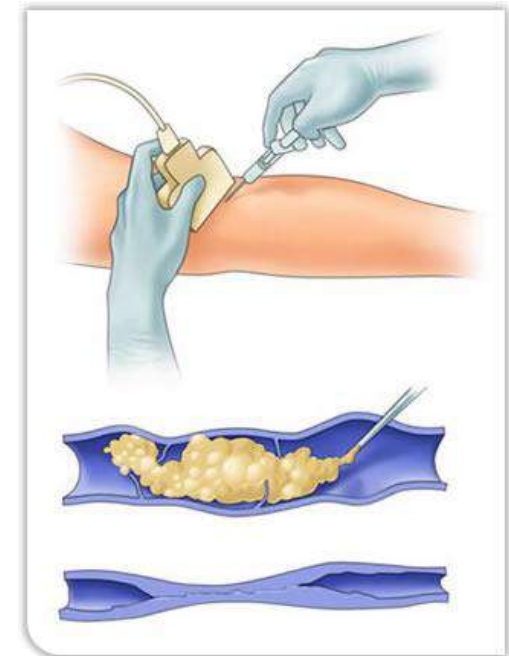


A variety of techniques exist:

- Sclerosant agents: **polidocanol (POL)** and **sodium tetradecyl sulphate (STS)**
- Various concentrations: 0,5%-3% POL and 0,2%-3% STS
- Foam production: Monfreaux, **Tessari**, **Tessari-DSS** (double syringe system)
- Preferred ratio: liquid to gas: **1:4** (1:1 up to 1:5)
- Various gases: air, CO₂ or mixture of CO₂ and O₂
- Interval between production and injection as short as possible



- Foam can be applied with or without ultrasound guidance
- To increase efficacy and safety, ultrasound guidance should be used.
 - Non-clinically visible VVs.
 - To avoid inadvertent intra-arterial sclerosant injection.
 - Control of foam distribution



Recommendation 32		New
For patients with <u>superficial venous incompetence</u> treated with <u>foam sclerotherapy</u> , the procedure should be performed <u>under ultrasound guidance</u> .		
Class	Level	References
I	C	Consensus



**Direct puncture or
open needle**



Butterfly



**Intravenous
cannula**



**Catheter
directed**

- Low silicon materials should be used
- If a silicon tube is used it should be as short as possible, otherwise the foam quality will be affected

Sclerotherapy can be used for all types of varices veins:

- Telangiectasias (spider veins)
- Reticular varicose veins
- Incompetent saphenous vein
- Tributary varicose veins
- Residual and recurrent varicose veins after previous interventions
- Incompetent perforating veins
- Varicose veins (refluxing veins) in proximity of leg ulcers
- Varicose veins of pelvic origin
- Venous malformations

Improvement of venous symptoms and aesthetic appearance

Indication: reticular veins and telangiectasis

- **Liquid sclerotherapy** is the gold standard for patients with C1 disease



- **Foam sclerotherapy** is an additional treatment option for C1 varicose veins
- Improvement > 90%

Recommendation 40 New			
For patients with <u>reticular veins</u> , where treatment is planned, <u>sclerotherapy</u> is recommended, as <u>the first choice treatment</u> .			
Class	Level	References	ToE
I	A	Hamel-Desnos <i>et al.</i> (2009), ²¹⁹ Rabe <i>et al.</i> (2010), ²⁶⁶ Munia <i>et al.</i> (2012), ²⁷¹ Zhang <i>et al.</i> (2012), ²⁴² Parlar <i>et al.</i> (2015), ²⁷² Bertanha <i>et al.</i> (2017), ²⁶⁹ Ianos <i>et al.</i> (2019) ²⁶⁸	



Excellent choice :

- For elderly frail population (no anesthesia)
- Additional to endovenous ablation of saphenous vein
- Varicose bleeding or preventing bleeding
- Skin changes (eg: lipodermatosclerosis)

⇒ Several foam injections might be needed

⇒ Tributaries with larger diameter or very pronounced
=> phlebectomies

Recommendation 36			Changed
For patients with chronic venous disease requiring treatment of varicose tributaries, <u>ambulatory phlebectomy, ultrasound guided foam sclerotherapy or a combination of both</u> are recommended.			
Class	Level	References	ToE
I	B	de Roos <i>et al.</i> (2003), ²⁴⁵ Michaels <i>et al.</i> (2006), ²⁴³ Zhang <i>et al.</i> (2012), ²⁴² Vasquez <i>et al.</i> (2017) ²⁴⁷	

Recommendation 90			New
For patients with chronic venous disease who have suffered from an episode of <u>acute bleeding of superficial veins or telangiectasias</u> , <u>local foam sclerotherapy</u> should be considered to prevent recurrent bleeding.			
Class	Level	References	ToE
IIa	C	Hamahata <i>et al.</i> (2011), ⁴⁸³ Serra <i>et al.</i> (2018) ³⁴	

Most widely used for all kinds of recurrent varicose veins

UGFS: neovascularisation of the SFJ and SPJ

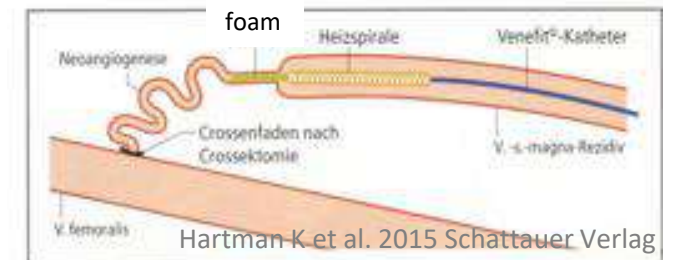
- Darvall et al (2014): Occlusion rate 87% to 91% at 1 year for recurrent saphenous truncal reflux
- Pavei et al (2011): 20% recurrences at 4.4 years after foam sclerotherapy of recurrent VVs to groin neovascularisation

Advantage of foam:

- Saphenous trunks with intraluminal changes
- Highly tortuous veins
- Combination with other techniques (eg. Foam through radiofrequency catheter)

Recommendation 55		Unchanged	
For patients with <u>symptomatic recurrent varicose veins due to saphenous trunk incompetence, endovenous thermal ablation or ultrasound guided foam sclerotherapy with or without phlebectomy</u> should be considered.			
Class	Level	References	ToE
Ila	B	Hinchliffe <i>et al.</i> (2006), ³⁵¹ Theivacumar <i>et al.</i> (2011), ³⁵² van Groenendael <i>et al.</i> (2009), ³⁴⁹ van Groenendael <i>et al.</i> (2010), ³⁴⁸ Nwaejike <i>et al.</i> (2010), ³⁵⁰ Darvall <i>et al.</i> (2011) ³⁵⁴	

Recommendation 57		New	
For patients with <u>symptomatic recurrent varicose veins without truncal incompetence, ultrasound guided foam sclerotherapy and/or ambulatory phlebectomy</u> should be considered.			
Class	Level	References	ToE
Ila	C	Consensus	



Additional foam treatment can accelerate ulcer healing

- Bush et al (2013):
90% ulcer healing after 4 months
(4-8 weeks after initial treatment)
- Kamhawy et al (2020):
95% ulcer healing after 8 weeks
90% ulcer free after 1 year

Recommendation 78 New			
For patients with <u>active venous leg ulceration</u> , <u>ablation of the sub-ulcer venous plexus using ultrasound guided foam sclerotherapy</u> should be considered as part of the treatment strategy.			
Class	Level	References	ToE
IIa	C	Bush <i>et al.</i> (2010), ⁴⁵⁶ Bush <i>et al.</i> (2013), ⁴⁵⁷ Kamhawy <i>et al.</i> (2020) ⁴⁵⁸	



First choice endovenous thermal ablation

- Alternative:
 - patients not eligible for endovenous ablation or surgery
 - Saphenous trunks with intraluminal changes
 - Great saphenous vein below midcalf

Recommendation 28		Unchanged	
For patients <u>with great saphenous vein incompetence</u> requiring treatment, <u>endovenous thermal ablation</u> is recommended as <u>first choice treatment</u> , in preference to high ligation/stripping and <u>ultrasound guided foam sclerotherapy</u> .			
Class	Level	References	ToE
I	A	Siribumrungwong <i>et al.</i> (2012), ¹⁹⁸ Rasmussen <i>et al.</i> (2013), ¹⁷⁵ Hamann <i>et al.</i> (2017), ²⁰¹ Kheirleisid <i>et al.</i> (2018), ²⁰² Brittenden <i>et al.</i> (2019), ¹²⁹ Cao <i>et al.</i> (2019) ¹⁹⁵	

Limitation: Diameter Great Saphenous Vein

Myers KA (EJVS 2007): 1189 treatment sessions of saphenous veins and tributaries
 => worse results for veins greater 6 mm diameter

Valuable alternative:

- saphenous trunks < 6mm in diameter
- provided the use of an adequate injection strategy:
 - several injections along target vein
 - catheter directed foam
 - peri-venous tumescent solution

Recommendation 31 New			
For patients with <u>saphenous trunk incompetence</u> undergoing treatment, <u>ultrasound guided foam sclerotherapy</u> may be considered for treating saphenous trunks with a diameter less than 6 mm.			
Class	Level	References	ToE
IIb	B	Myers <i>et al.</i> (2007), ¹⁶⁴ Shadid <i>et al.</i> (2015), ²²¹ Venermo <i>et al.</i> (2016) ²²²	

Recommendation 33 New			
For patients with <u>great saphenous vein incompetence</u> requiring treatment, <u>catheter directed foam sclerotherapy with or without the use of peri-venous tumescent solution</u> may be considered.			
Class	Level	References	ToE
IIb	B	Lim <i>et al.</i> (2020), ²²⁴ Dos Santos <i>et al.</i> (2020) ²²⁵	

Limitation: Amount of Foam



- No evidence-based specification for maximum volume of foam per session
- European consensus: 10 ml of foam per day/session
- Higher foam volumes according to individual risk benefit assesment
- Thromboemblic complications and temporary side effects rises with larger volumes of foam
- Dosage: POL: 2mg per kg body weight

Aethoxysklerol®	0,25%	0,5%	1%	2%	3%
Polidocanol 2ml amp	5mg	10mg	20mg	40mg	60mg

Absolute contraindications:

- *allergy* to the sclerosant
- acute deep vein *thrombosis* and/or *pulmonary embolism*
- *infection* in the area of sclerotherapy or severe general infection
- Lasting *immobility*
- **Foam:** known *symptomatic foramen ovale* (right-to left shunt)

Relative contraindications:

- *Pregnancy, breast feeding*
- Severe *peripheral arteriel occlusive disease*
- *Poor general health*
- Strong *predisposition to allergies*
- High *thromboembolic risk*
- **Foam:** neurological disturbance en migraine following previous foam sclerotherapy

Complications: Type and Frequency

Type of adverse event	Frequency	
	With liquid	With foam
Severe complications[†]		
Anaphylaxis	*Isolated cases	*Isolated cases
Large tissue necrosis	*Isolated cases	*Isolated cases
Stroke and TIA	*Isolated cases	*Isolated cases
Distal DVT (mostly muscular)	**Rare	***Uncommon
Proximal DVT	*Very rare	*Very rare
Pulmonary Embolism	*Isolated cases	*Isolated cases
Motor nerve injury	*Isolated cases	*Isolated cases

Designation	Incidence
****Very common	≥ 10%
***Common	≥ 1% – < 10%
**Uncommon	≥ 0.1% – < 1%
*Rare	≥ 0.01% – < 0.1%
*Very rare and isolated cases	< 0.01%

Type of adverse event	Frequency	
	With liquid	With foam
Benign Complications		
Visual disturbances	*Very rare	***Uncommon
Headaches and migraines	*Very rare	***Uncommon
Sensory nerve injury	*Not reported	**Rare
Chest tightness	*Very rare	*Very rare
Dry cough	*Very rare	*Very rare
Superficial phlebitis	Unclear [‡]	Unclear [‡]
Skin reaction (local allergy)	*Very rare	*Very rare
Matting	****Common	****Common
Residual pigmentation	****Common	****Common
Skin necrosis (minimal)	**Rare	*Very rare
Embolia cutis medicamentosa	*Very rare	*Very rare

Complication: Hyperpigmentation, Intravascular Coagulum

Hyperpigmentation: combination of melanin (inflammatory process) and hemosiderin (extravasated red cells) pigment

- 10%-30% in short term,
- 70% resolution at 6 months
- may persist longer than 1 year in up to 10%

- Risk factors:
 - larger vessel size
 - more superficial veins
 - darker skin
 - higher concentration and volume,



Complication: Hyperpigmentation, Intravascular Coagulum

- Residual blood coagulum removal should be performed when feasible at the follow up visit 2-4 weeks after treatment
- Needle +/- syringe: manual extraction or aspiration
 - => Reduces tenderness and inflammation
 - => Prevention of discoloration
- Can help: mild exfoliation with mild peeling agents
intense pulse light



Complication: Matting

= proliferation of new small vessel (<0,2mm) in the areas of a sclerosed vein 4-6 weeks after sclerotherapy

- Incidence: 2-24%, resolves spontaneously in 3-12 months

- Risk factors: - obesity, females, oestrogen treatment, family history of telangiectasia, long lasting spider veins

- Causing factors: - High concentration, high volume, high infusion pressure,

Residual reflux

- Treatment: - Elimination of underlying reflux



Post Sclerotherapy Compression

Table 10. Post-sclerotherapy compression recommendations according to different guidelines.

	INDIA 2011	USA AVF/SVS 2011	UK 2013	USA AVLS/AVF/ SVM/SIR 2014	USA DERMATOLOGIC SURG 2014	EUROPE 2014	AUSTRALIA 2016	LATAM 2016	USA 2019 AVF/SVS/AVLS
Grade of evidence	Not reported	Not reported	Not reported	Declared Unknown Benefit	Not reported	2B	Not reported	IA	2C
mmHg	Smaller veins: 16 mmHg Larger veins: 20–30 mmHg	Liquid (aesthetic): 30–40 mmHg Foam: 30–40 mmHg stockings and/or bandage	Bandages or graduated compression stockings: Undefined pressure level	Bandages or graduated compression stockings: Undefined pressure level	Telangiectasia: 15–20 mmHg Reticular: 20–30 mmHg Small varices: 20–30 mmHg Truncal: 30–40 mmHg	23–32 mmHg	Class 2 (Unspecified mmHg)	Not reported	Not reported
Duration	2 weeks (up to 3 weeks based on the vessel caliber). Declared lack of consensus	Liquid (aesthetic) 1–3 Days Liquid (treatment): At least 1 week Foam: 1 or 2 weeks (eventually less than 1 week)	1 week to 1 month	Not reported	24–48 h	3 weeks	Not reported	Not reported	Best clinical judgment
Reason for compression	Not reported	Not reported	Anti-inflammatory	Not reported	Wall apposition	Aesthetic improvement	Not reported	Not reported	Wall apposition, reduction of bruising and pigmentation



The grade of evidence varied from lack of proper scientific data according to NICE⁴⁰ to the grade IA recommendation of the Latin America guideline.⁸ The pressure values ranged from 16 to 40 mmHg,^{2,10,165,166,169} while NICE,⁴⁰ European¹⁶⁸ and Latin America guidelines⁸ did not indicate a specific.

Recommended by most physicians, but type, strength, duration is highly variable.

Gianesini S et al. Global guidelines trends and controversies in lower limb venous and lymphatic disease. *Phlebology* 2019;34(1S)4-66.

¹Hamel-Desnos C et al. Foam sclerotherapy of the saphenous veins: a randomized controlled trial with or without compression. *Eur J Vas Endovasc Surg* (2010);39:500-507.

²Kern P et al. Compression after sclerotherapy for telangiectasias and reticular leg veins: A randomized controlled study. *J Vasc Surg* 2007;45:1212-16.

Conclusion: Foam Sclerotherapy

In the hands of an experienced physician is an excellent option for treating varicose veins.

Advantage	Limitation
+ Safe and effective	- Diameter vein
+ Minimally invasive, no recovery phase	- PFO
+ No anesthesia	- Amount of foam /session
+ Ambulatory setting	- Hyperpigmentation
+ Cost-effective	
+ Anatomical challenging configurations	
+ Repeatable	
+ Elderly, overweight, frail patient under anticoagulation	
+ combination with other techniques	



Thank you for your attention!



I have no conflicts of interest to disclose