Foam Sclerotherapy: Indications and Limitations

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- **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


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 of mixture of CO2 and O2
- Interval between production and injection as short as possible
Application of Foam

- 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

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Recommendation 32

For patients with superficial venous incompetence treated with foam sclerotherapy, the procedure should be performed under ultrasound guidance.

<table>
<thead>
<tr>
<th>Class</th>
<th>Level</th>
<th>References</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>C</td>
<td>Consensus</td>
</tr>
</tbody>
</table>

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.
Indications

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

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

  ![Image of reticular veins](image1)

- **Foam sclerotherapy** is an additional treatment option for C1 varicose veins

  ![Image of varicose veins](image2)

- Improvement > 90%

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Indication: Varicose Tributaries

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

⇒ Several foam injections might be needed

⇒ Tributaries with larger diameter or very pronounced
    => phlebectomies
Indication: Recurrent varicose veins

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 scleroherapy of recurrent VVs to groin neovascularisation

Advantage of foam:
- Saphenous trunks with intraluminal changes
- Highly tortuous veins
- Combination with other techniques (eg. Foam through radiofreqency catheter)
Indication: Chronic venous ulcer

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

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Indication: Great Saphenous Vein Incompetance

First choice endovenous thermal ablation

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

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

Myers K et al. Outcome of ultrasound-guided sclerotherapy for varicose veins: Eur J Vasc Endovasc Surg 2007;33:116-121
- 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 assessment
- Thromboembolic complications and temporary side effects rises with larger volumes of foam

- Dosage: POL: 2mg per kg body weight

<table>
<thead>
<tr>
<th>Aethoxysklerol®</th>
<th>0,25%</th>
<th>0,5%</th>
<th>1%</th>
<th>2%</th>
<th>3%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Polidocanol 2ml amp</td>
<td>5mg</td>
<td>10mg</td>
<td>20mg</td>
<td>40mg</td>
<td>60mg</td>
</tr>
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</table>

Contraindications

**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


<table>
<thead>
<tr>
<th>Type of adverse event</th>
<th>Frequency</th>
<th>With liquid</th>
<th>With foam</th>
</tr>
</thead>
<tbody>
<tr>
<td>Severe complications†</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Anaphylaxis</td>
<td>&quot;Isolated cases&quot;</td>
<td>&quot;Isolated cases&quot;</td>
<td></td>
</tr>
<tr>
<td>Large tissue necrosis</td>
<td>&quot;Isolated cases&quot;</td>
<td>&quot;Isolated cases&quot;</td>
<td></td>
</tr>
<tr>
<td>Stroke and TIA</td>
<td>&quot;Isolated cases&quot;</td>
<td>&quot;Isolated cases&quot;</td>
<td></td>
</tr>
<tr>
<td>Distal DVT</td>
<td>&quot;Rare&quot;</td>
<td>&quot;Uncommon&quot;</td>
<td></td>
</tr>
<tr>
<td>(mostly muscular)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Proximal DVT</td>
<td>&quot;Very rare&quot;</td>
<td>&quot;Very rare&quot;</td>
<td></td>
</tr>
<tr>
<td>Pulmonary Embolism</td>
<td>&quot;Isolated cases&quot;</td>
<td>&quot;Isolated cases&quot;</td>
<td></td>
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<tr>
<td>Motor nerve injury</td>
<td>&quot;Isolated cases&quot;</td>
<td>&quot;Isolated cases&quot;</td>
<td></td>
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</tbody>
</table>

#### Benign Complications

<table>
<thead>
<tr>
<th>Type of adverse event</th>
<th>Frequency</th>
<th>With liquid</th>
<th>With foam</th>
</tr>
</thead>
<tbody>
<tr>
<td>Visual disturbances</td>
<td>&quot;Very rare&quot;</td>
<td>&quot;Uncommon&quot;</td>
<td></td>
</tr>
<tr>
<td>Headaches and migraines</td>
<td>&quot;Very rare&quot;</td>
<td>&quot;Uncommon&quot;</td>
<td></td>
</tr>
<tr>
<td>Sensory nerve injury</td>
<td>&quot;Not reported&quot;</td>
<td>&quot;Rare&quot;</td>
<td></td>
</tr>
<tr>
<td>Chest tightness</td>
<td>&quot;Very rare&quot;</td>
<td>&quot;Very rare&quot;</td>
<td></td>
</tr>
<tr>
<td>Dry cough</td>
<td>&quot;Very rare&quot;</td>
<td>&quot;Very rare&quot;</td>
<td></td>
</tr>
<tr>
<td>Superficial phlebitis</td>
<td>Unclear‡</td>
<td>Unclear‡</td>
<td></td>
</tr>
<tr>
<td>Skin reaction (local allergy)</td>
<td>&quot;Very rare&quot;</td>
<td>&quot;Very rare&quot;</td>
<td></td>
</tr>
<tr>
<td>Fatting</td>
<td>****Common</td>
<td>****Common</td>
<td></td>
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<tr>
<td>Residual pigmentation</td>
<td>****Common</td>
<td>****Common</td>
<td></td>
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<tr>
<td>Skin necrosis (minimal)</td>
<td>&quot;Very rare&quot;</td>
<td>&quot;Very rare&quot;</td>
<td></td>
</tr>
<tr>
<td>Embolus cutis medicamentosa</td>
<td>&quot;Very rare&quot;</td>
<td>&quot;Very rare&quot;</td>
<td></td>
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**Designation**:  
- ****Very common: ≥10%  
- ***Common: 1% - <10%  
- **Uncommon: 0.1% - <1%  
- *Rare: 0.01% - <0.1%  
- **Very rare and isolated cases: <0.01%
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,
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

Breu et al. 2nd European Consensus meeting on Foam Sclerotherapy 2006. Vasa 2008;5/71, 3-29
Reina L et al. How to manage complications after sclerotherapy. Phlebolymphology. 2017;24(3):130-143
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

Reina L et al. How to manage complications after sclerotherapy. Phlebolymphology. 2017;24(3):130-143
1Hamel-Desnos C et al. Foam sclerotherapy of the saphenous veins: a randomized controlled trial with or without compression. Eur J Vasc Endovasc Surg (2010);39:500-507.

Recommended by most physicians, but type, strength, duration is highly variable.
Conclusion: Foam Sclerotherapy

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

<table>
<thead>
<tr>
<th>Advantage</th>
<th>Limitation</th>
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<tbody>
<tr>
<td>+ Safe and effective</td>
<td>- Diameter vein</td>
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<tr>
<td>+ Minimally invasive, no recovery phase</td>
<td>- PFO</td>
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<tr>
<td>+ No anesthesia</td>
<td>- Amount of foam /session</td>
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<tr>
<td>+ Ambulatory setting</td>
<td>- Hyperpigmentation</td>
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<tr>
<td>+ Cost-effective</td>
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<tr>
<td>+ Anatomical challenging configurations</td>
<td></td>
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<tr>
<td>+ Repeatable</td>
<td></td>
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<tr>
<td>+ Elderly, overweight, frail patient under anticoagulation</td>
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<tr>
<td>+ combination with other techniques</td>
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</table>
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Thank you for your attention!
I have no conflicts of interest to disclose