



Tumescence enhances foam efficiency

- PRO -

A.Cavezzi

**Eurocenter Venalinfa
San Benedetto del Tronto(AP), Italy
info@cavezzi.it**



Disclosure

Speaker's name:

.....**Attilio Cavezzi**.....

- I have the following potential conflicts of interest to report:
- Consulting
- Employment in industry
- Shareholder in a healthcare company
- Owner of a healthcare company
- Other(s)
- I do not have any potential conflict of interest

Foam sclerotherapy techniques: different gases and methods of preparation, catheter versus direct injection

Cavezzi A, Tessari L.

Phlebology. 2009 Dec;24(6):247-51

long catheter, ultrasound guided **tumescence**
infiltration and saphenous **irrigation** in foam
sclerotherapy.....

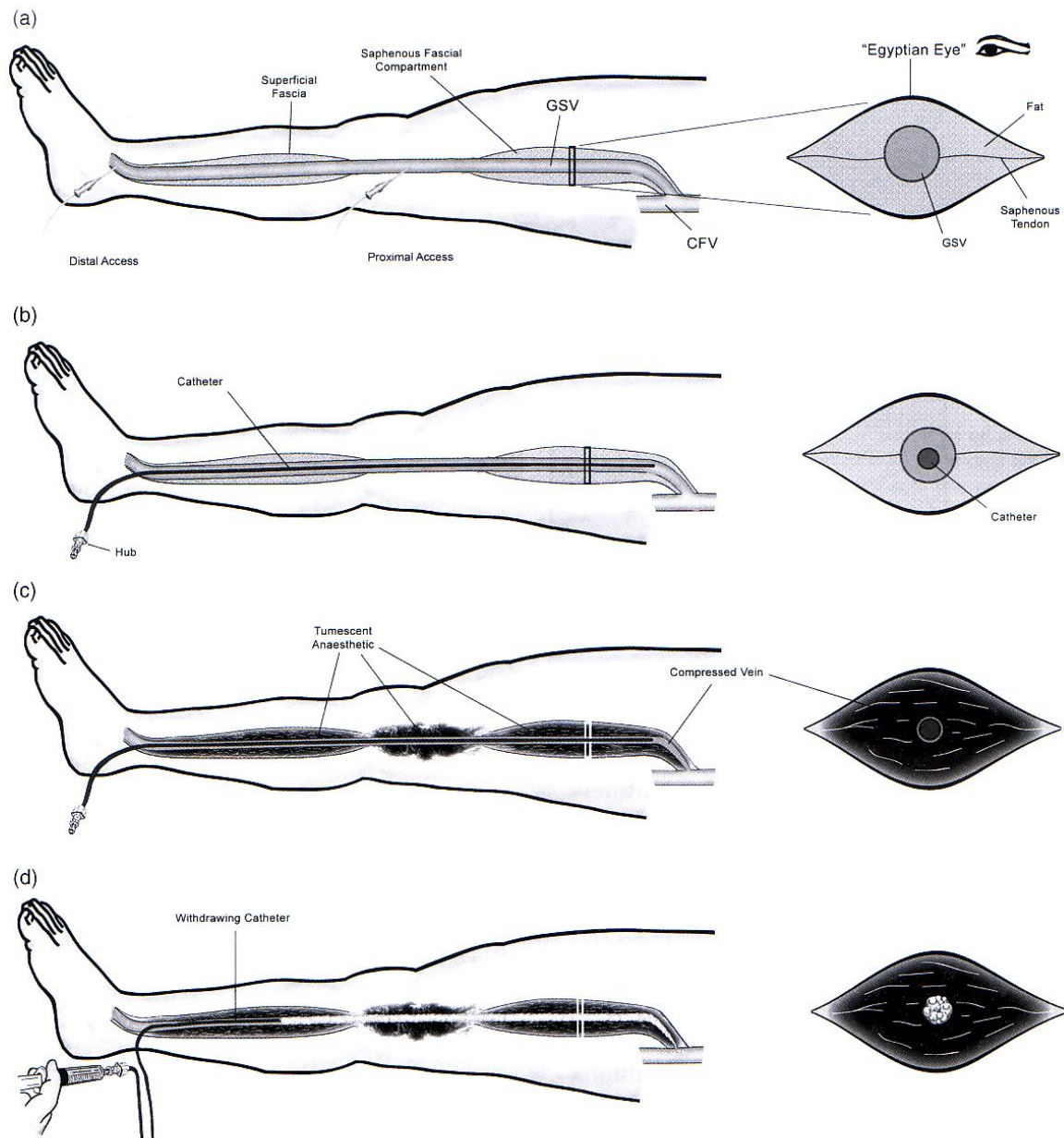


Figure 7 (a) Tumescent ELLE – access can be gained at the level of the knee to treat the proximal great saphenous vein or at medial ankle to treat the full length of the vein; (b) Tumescent ELLE – catheter is advanced to approximately 5 cm from the saphenofemoral Junction; (c) Tumescent ELLE – the administration of tumescent anaesthesia compresses the vein and achieves an ‘empty vein’; (d) Tumescent ELLE – foam is injected as the catheter is withdrawn

Biochemistry

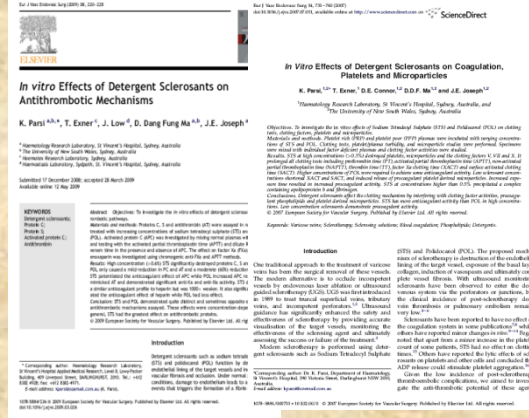
- **The higher the vein diameter, the higher the recanalisation rate**
- **The higher the blood flow, the higher the recanalisation rate**
- (Kanter and Thibault, Cavezzi et al., Myers, Coleridge-Smith, Passariello, Schadeck, Ferrara etc.)
- **...hence blood is our main enemy....**

Kurosh Parsi's studies (EJVES publications) on liquid and foamed sclerosants and blood from 2007 to date..

Albumin significantly inhibits liquid or foamed sclerosants

Detergent sclerosants are deactivated and consumed by circulating blood cells !!!!!!!!!!!!!

Chemical action of foam in GSV is inversely proportional to the distance from the entrance point !!!!!!!!!!!!!



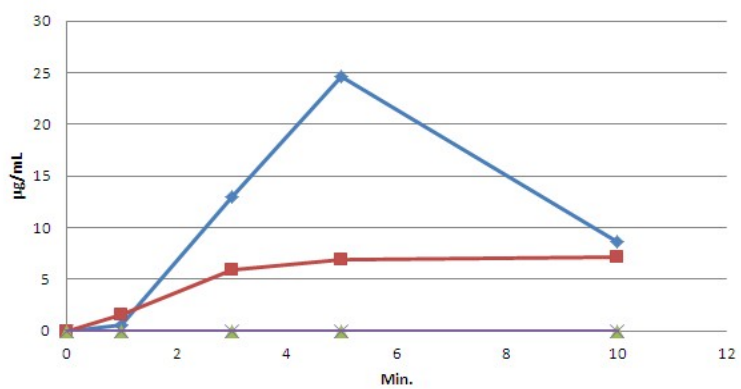
Timing and modality of the sclerosing agents binding to the human proteins: laboratory analysis and clinical evidences

**Lorenzo Tessari,¹ Marcello Izzo,²
Attilio Cavezzi,³ Francesco Zini,⁴
Mirko Tessari,⁵ Mario Ambrosino,⁶
Roberto Fanelli⁷**

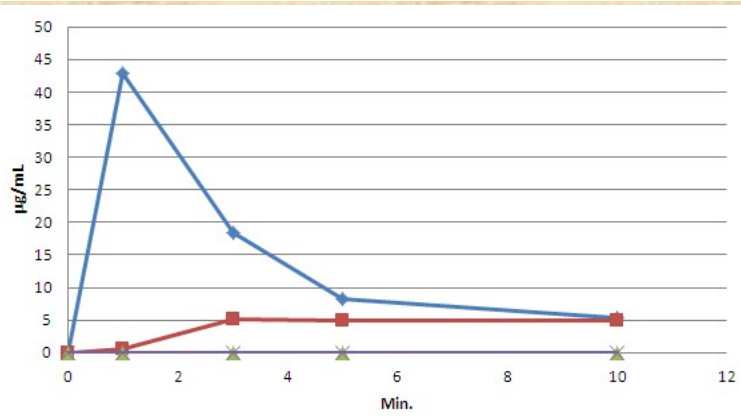
**¹Glauco Bassi Foundation, Trieste; ²Math.
Tech. Med., University of Ferrara;
³Eurocenter Venalinfa, San Benedetto del
Tronto (AP); ⁴Casa di Cura Città di
Parma, Parma; ⁵Vascular Diseases Center,
University of Ferrara; ⁶Centro Duomo
Analisi, Nola (NA); ⁷Istituto
Farmacologico Mario Negri, Milano, Italy**

www.veinsandlymphatics.org

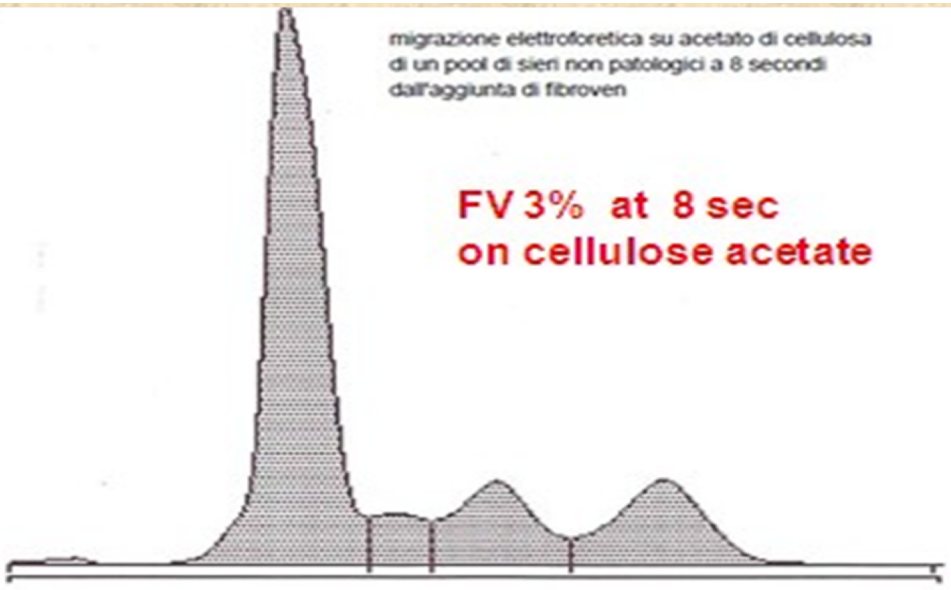
- **In vivo and in vitro studies to assess blood and protein binding on sclerosant drugs**



Min.	STSTot. Plasma femorale	STSTot. Plasma brachiale	STSlib. Plasma femorale	STSlib. Plasma brachiale
0	0	0	0	0
1	0,568	1,62	0	0
3	13	5,98	0	0
5	24,6	6,91	0	0
10	8,67	7,2	0	0



Min.	STSTot. Plasma femorale	STSTot. Plasma brachiale	STSlib. Plasma femorale	STSlib. Plasma brachiale
0	0,0542	0	0	0
1	42,9	0,683	0	0
3	18,5	5,18	0	0
5	8,33	4,96	0	0
10	5,43	4,85	0	0



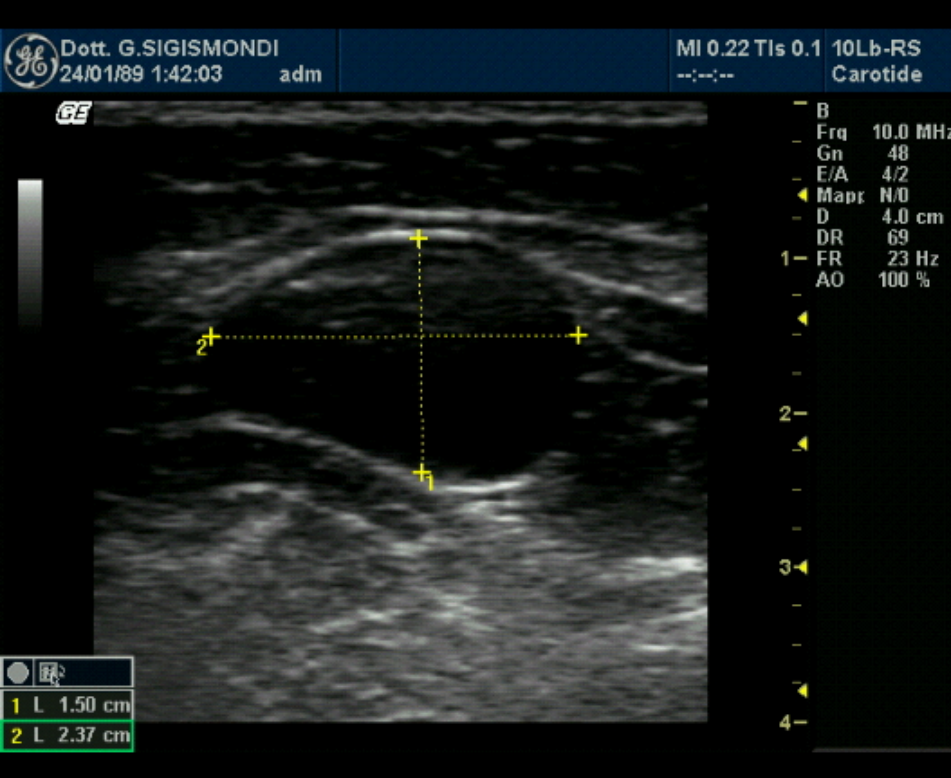
In vivo and in vitro results documented that **sclerosant drug inactivation by blood occurs just after a few seconds**

TUMESCENCE

- **Increase of Transmural Pressure (higher tissue pressure): Reduction of Vein Diameter**
- **Relevant reduction of the size of tributary/perforators orifices: decrease of inflow**

CLINICAL RESULTS:

- **Lower blood amount for a prolonged time= Lower thrombus formation = higher fibrotic component in the sclerothrombus**
- **Lower foam amount needed**



Thanks to Nick Morrison and
 Diana Neuhardt

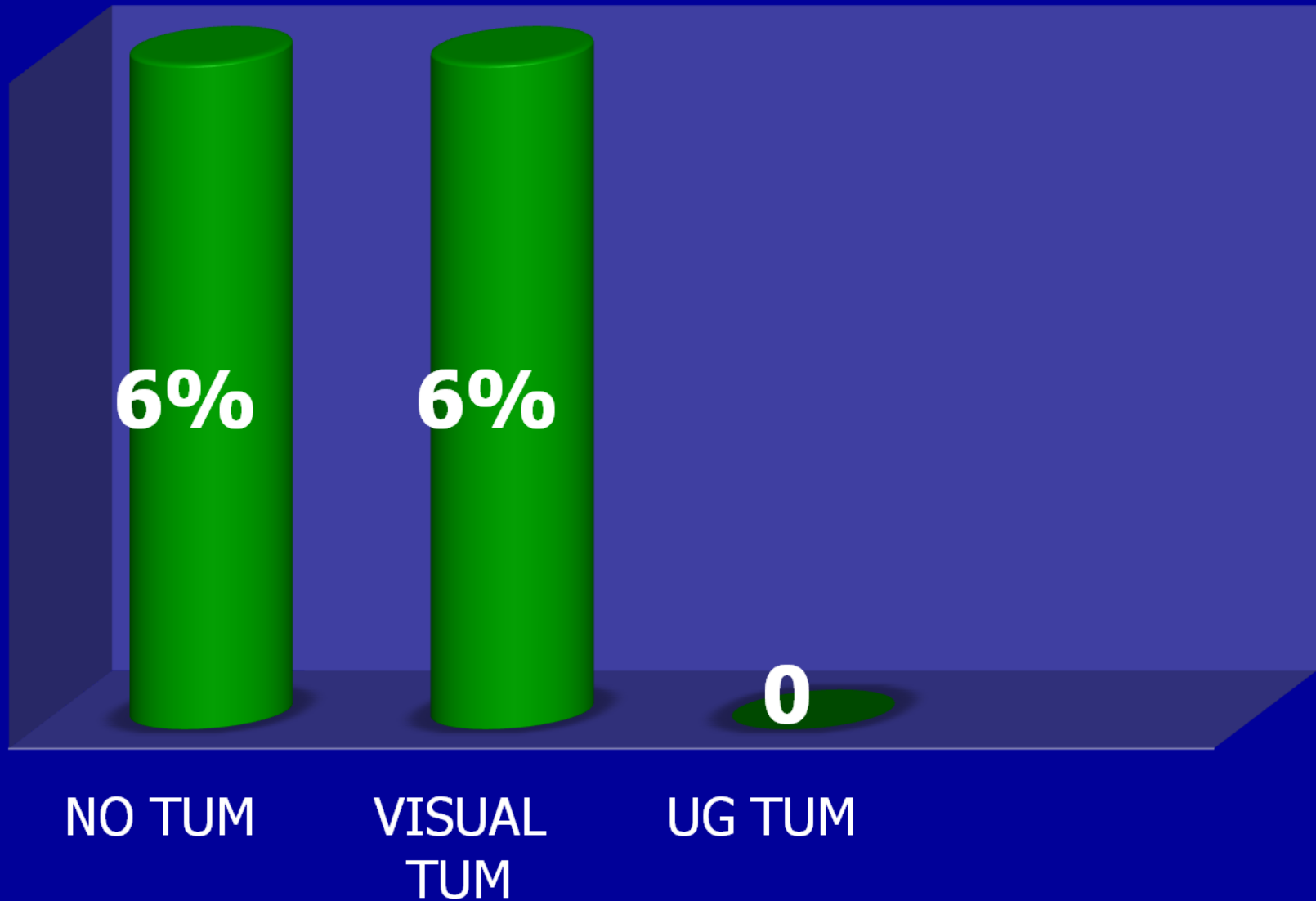
Ultrasound-guided peri-saphenous tumescence infiltration improves the outcomes of long catheter foam sclerotherapy combined with phlebectomy of the varicose tributaries

**Attilio Cavezzi,¹ Giovanni Mosti,²
Sonia Di Paolo,³ Lorenzo Tessari,⁴
Fausto Campana,⁵ Simone Ugo Urso¹**

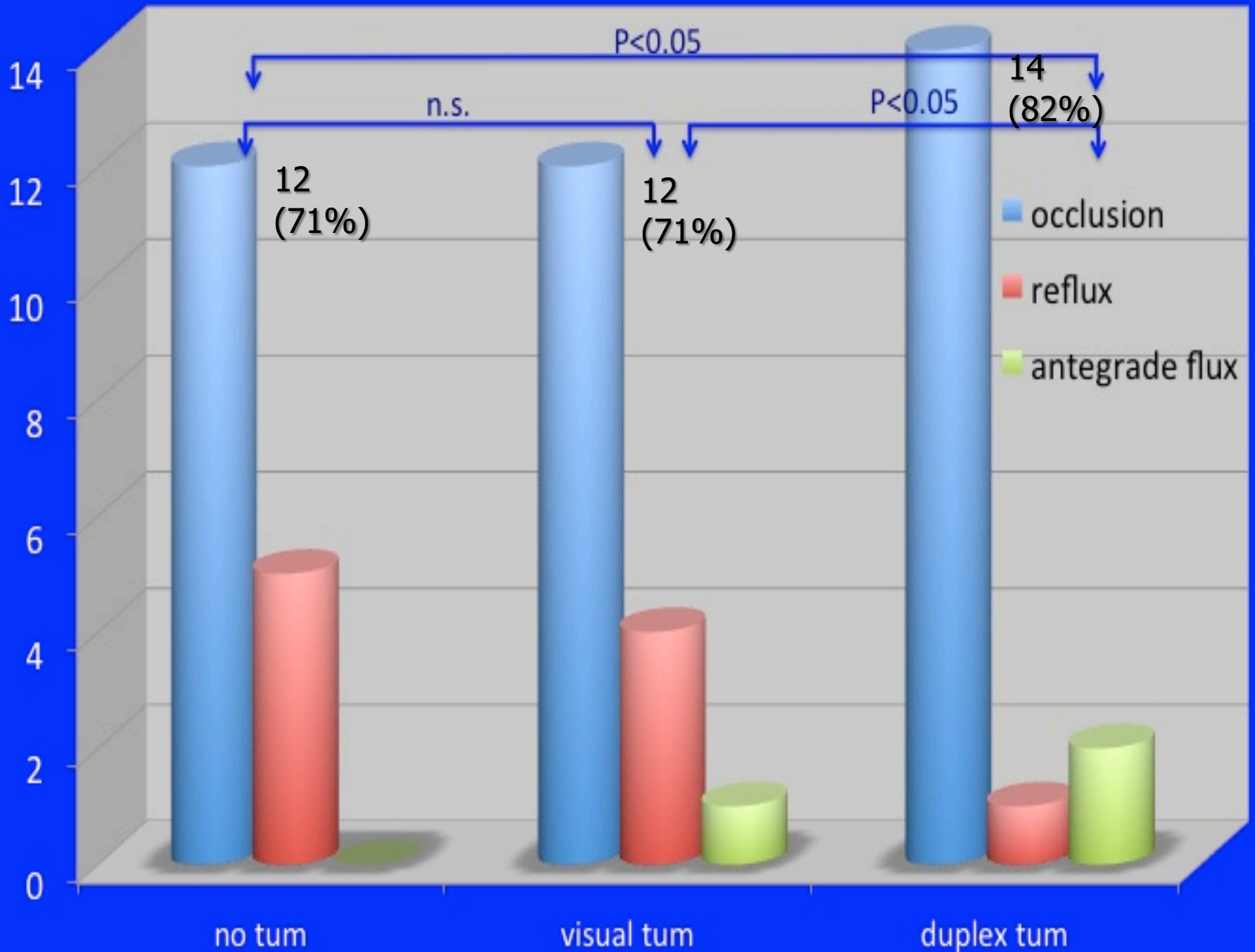
**¹Eurocenter Venalinfa, S. Benedetto del Tronto (AP); ²Clinica Barbantini, Lucca;
³Clinica Stella Maris, S. Benedetto del Tronto (AP); ⁴Fondazione Glauco Bassi, Trieste; ⁵Vascular Medicine Unit, Cesena Hospital, Cesena (FC), Italy**

- **EUROPEAN VENOUS FORUM, Florence 2012**
- **Phlebology 2012 (Abstract), PUBLISHED in 2015 in “Veins and Lymphatics” www.veinsandlymphatics.org**

Clinical Recurrence



CDU OUTCOMES



Catheter-directed Foam Sclerotherapy of Great Saphenous Veins in Combination with Pre-treatment Reduction of the Diameter Employing the Principals of Perivenous Tumescence Local Anesthesia

Devereux N, Recke AL, Westermann L, Recke A, Kahle B
EJVES 2014; 47:187-195

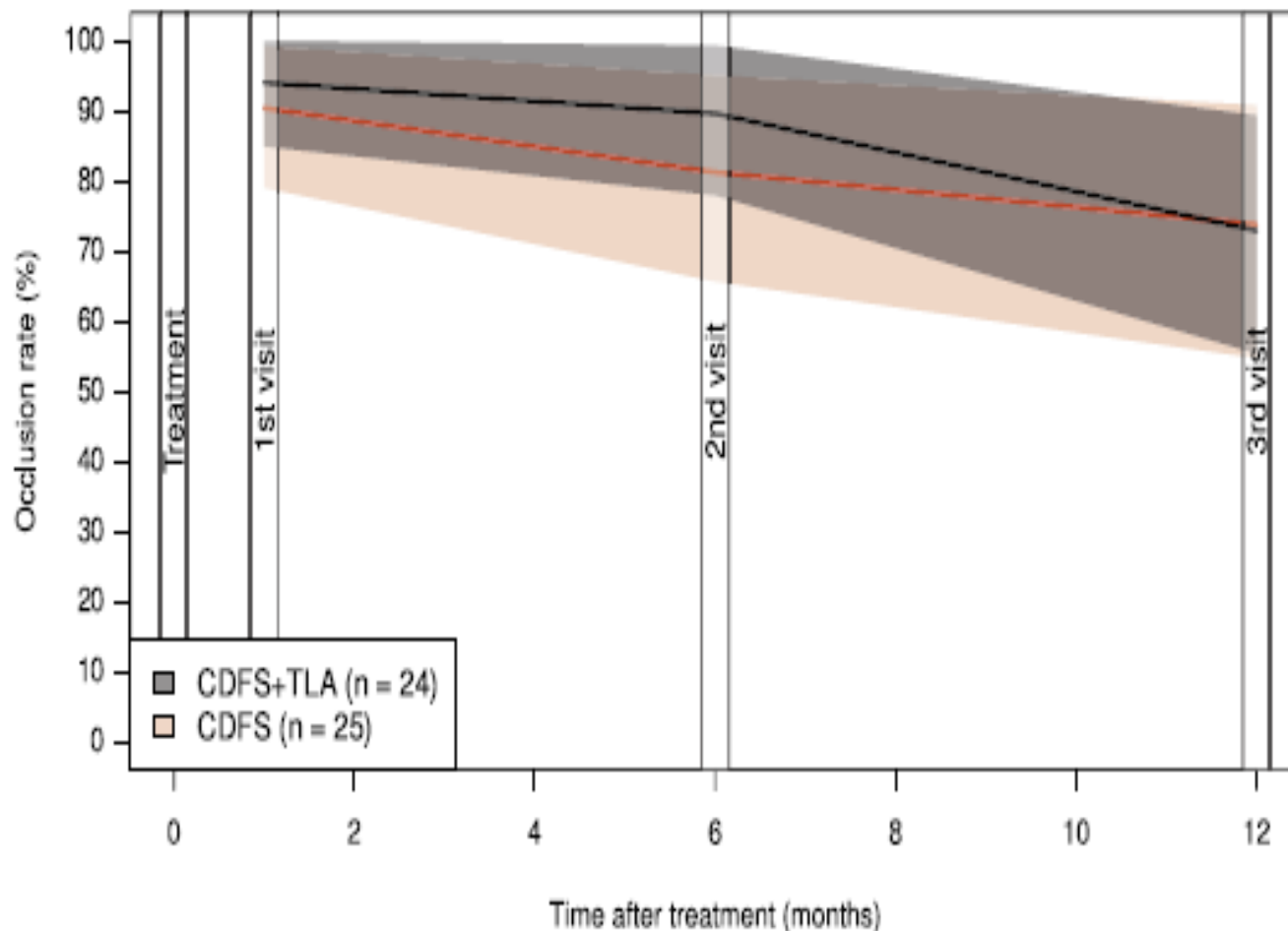


Figure 3. Means and 95% Wilson confidence interval of successfully occluded veins 1, 6, and 12 months after treatment with catheter-directed foam sclerotherapy (CDFS) in combination with tumescent application and CDFS alone. *Note.* TLA = tumescent local anesthesia.

Debatable Issues...

- The need of a strictly peri-saphenous delivery of tumescence
- **Absence of a venospasm-inducing agent**
- Quite small diameter of the treated veins (about 6.5 mm in supine position at SFJ)
- **High drop-out rate: 5 patients (20%) and 2 patients (8%)** in the non-UGTI group and in the UGTI group respectively.

Catheter Foam Sclerotherapy of the Great Saphenous Vein, with Perisaphenous Tumescence Infiltration and Saphenous Irrigation

Attilio Cavezzi ^{a,*}, Giovanni Mosti ^b, Fausto Campana ^c, Lorenzo Tessari ^d, Luca Bastiani ^e, Simone U. Urso ^f

^a Eurocenter Venalinfa, San Benedetto del Tronto (AP), Italy

^b Angiology Department, MD Barbantini Clinic, Lucca, Italy

^c Private Hospital Villa Igea, Forlì, Italy

^d “Glaucò Bassi” Foundation, Trieste, Italy

^e Institute of Clinical Physiology, Italian National Research Council and CNR, Pisa, Italy

^f Private Hospital “Professor Nobili”, Castiglione dei Pepoli (BO), Italy

WHAT THIS PAPER ADDS

This paper adds information on a new, effective, and safe approach in varicose vein treatment, which is based on duplex guided foam sclerotherapy, with additional use of a catheter to release the foam, perivenous tumescence infiltration, and flushing of the vein before foam injection. The inclusion of these three technical additions to the usual foam sclerotherapy (mostly performed by direct injection or cannula) significantly improved clinical and duplex based outcomes up to 3 years after treatment.

Objectives: This was a prospective observational study to assess the short- to mid-term efficacy and safety of catheter foam sclerotherapy (CFS) of the great saphenous vein (GSV), including peri-saphenous tumescence infiltration (PST) and intra-saphenous saline irrigation (ISI), in combination with phlebectomy of the varicose tributaries.

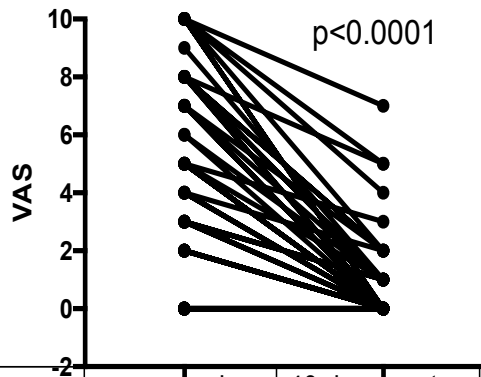
Methods: Eighty-eight limbs in 82 patients (19 male, 63 female, mean age 55.7 years) affected by varices related to GSV incompetence were submitted to CFS of the refluxing GSV segment after PST and ISI, combined with phlebectomy of the varicose tributaries. Sodium tetradecylsulfate (STS) 3% + CO₂/O₂ sclerosant foam (SF) (median 7 mL) was injected in the GSV trunk (median caliber 7.1 mm) by means of a 4F catheter. Clinical and colour duplex ultrasound (CDU) investigation was performed pre-operatively, and 40 days, 6, 12, and 36 months post-operatively. A visual analogue scale (VAS) was used to assess procedure related symptoms and venous symptoms before and 40 days after the treatment.

Results: Clinical recurrence (visible varices) at 40 days, 6 and 12 months was 0%, whereas at 36 months it was 4.7%; VAS pre-operative score of heaviness, pain, and cramps/paraesthesiae decreased from 6 (IQR 6–8) to 1 (IQR 0–3), from 3 (IQR 0–7) to 0 (IQR 0–1), and from 3 (IQR 0–7) to 0 (IQR 0–1) respectively at 40 days. The CDU based occlusion rate at 40 days, 6, 12, and 36 months was 100% (88/88), 100% (88/88), 94.3% (83/88), and 89.4% (76/85) respectively. Six of the nine patent saphenous veins (average diameter 1.4 mm) had anterograde flow (overall 96.5% reflux free GSVs). One superficial venous thrombosis was recorded without any further relevant complication.

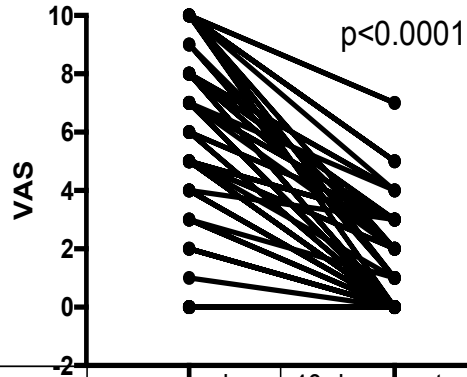
Conclusions: GSV treatment by means of CFS and adjuvant PST + ISI, combined with phlebectomy of varicose tributaries, proved to be safe and effective in terms of clinical and duplex based outcomes at short/mid-term follow-up.

pre/post-op symptoms

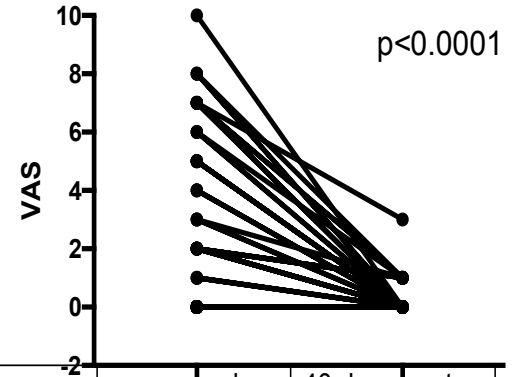
pain pre/after procedure



heaviness sensation pre/after procedure



paresthesias pre/after procedure



	pre-procedure	40 days post-op
Minimum	0.0	0.0
25% Percentile	0.0	0.0
Median	3.000	0.0
75% Percentile	7.000	1.000
Maximum	10.00	7.000

	pre-procedure	40 days post-op
Minimum	0.0	0.0
25% Percentile	3.000	0.0
Median	6.000	0.0
75% Percentile	8.000	3.000
Maximum	10.00	7.000

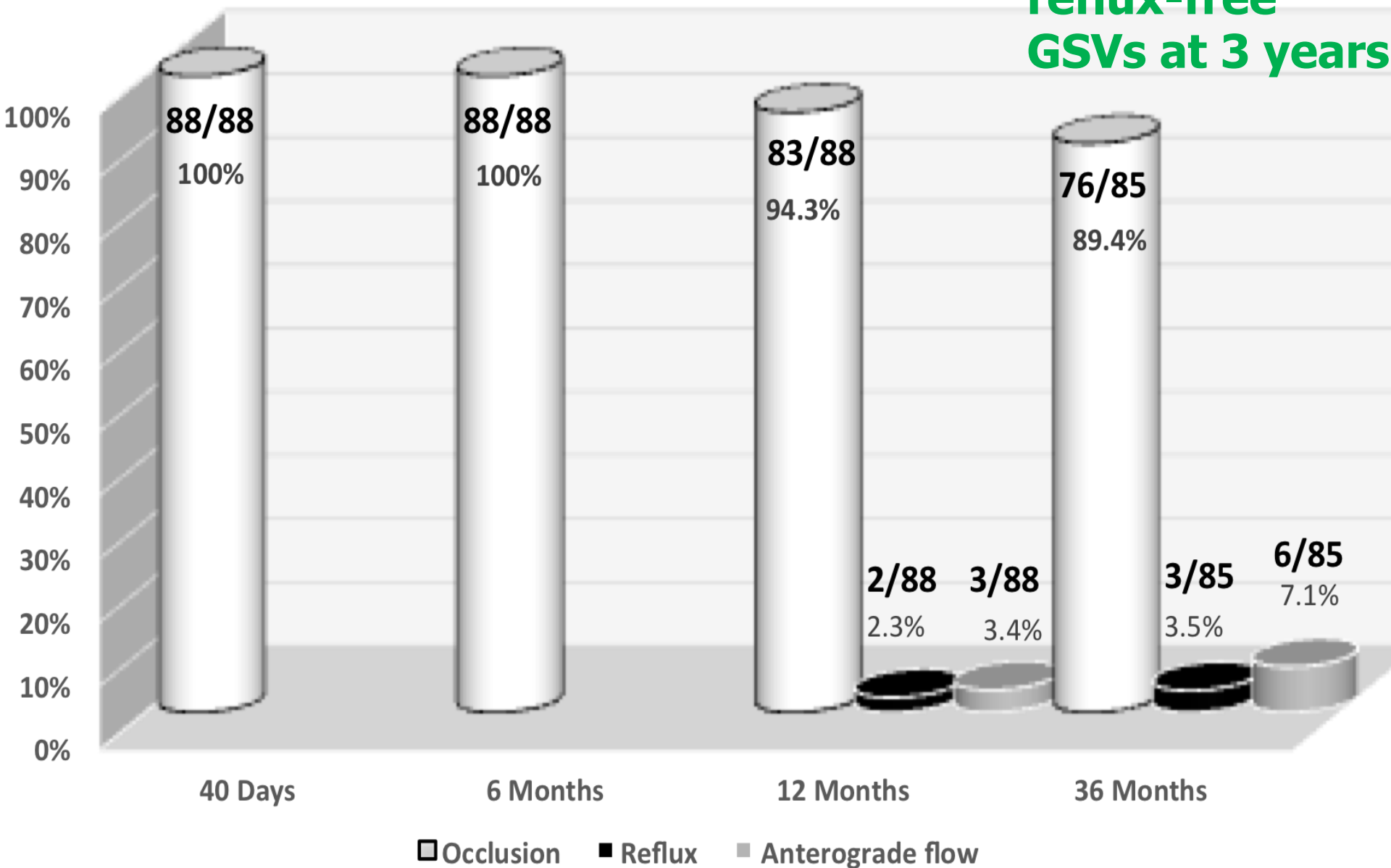
	pre-procedure	40 days post-op
Minimum	0.0	0.0
25% Percentile	0.0	0.0
Median	3.000	0.0
75% Percentile	7.000	1.000
Maximum	10.00	7.000

CLINICAL RECURRENCE (RECURRENT VARICES) at FOLLOW-UP

at 1 month:	0%
at 6 months:	0%
at 12 months:	0%
at 36 months:	5%

CDU outcomes

**Overall 96.5%
reflux-free
GSVs at 3 years**



Mid-term Results of Catheter Directed Foam Sclerotherapy Combined with Tumescant Local Anaesthesia for Treatment of Great Saphenous Vein Incompetence

Eur J Vasc Endovasc Surg 2017 Sep;54(3):363-368

[Ali H](#), [Elbadawy A](#), [Saleh M](#), [Mahmoud O](#)

3 years after a single treatment session of catheter directed foam sclerotherapy (CDFS) combined with peri-saphenous infiltration of tumescant local anaesthesia (TLA).

249 patients with symptomatic unilateral GSV incompetence

RESULTS:

GSVs obliteration 81.5%.

Freedom from above knee GSV reflux **89.6%**

Both the VCSS and CIVIQ score improved significantly (p < .0001 and <.0001, respectively)

TUMESCENT-ASSISTED ECHOSCLEROTHERAPY (TAES) IN THE TREATMENT OF GREAT SAPHENOUS VEIN INCOMPETENCE

Piotr Hawro^{1,2}, Tomasz Urbanek^{2,3}, Wojciech Mikusek^{1,2}

¹European Centre of Phlebology, Angelius Hospital, Katowice, Poland

ORIGINAL PAPER

Phlebological Review 2017; 25, 1: 81–86

DOI: <https://doi.org/10.5114/pr.2017.72537>

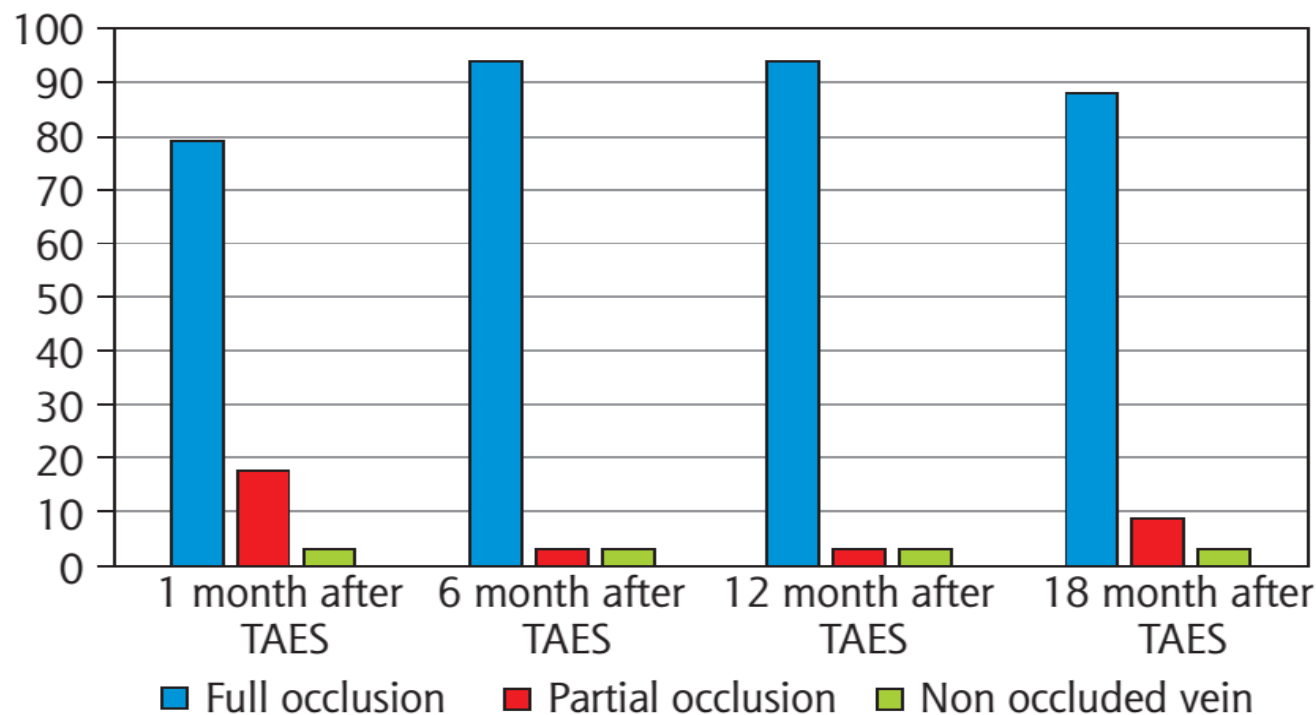


Fig. 2. Success rate 1, 6, 12 and 18 months after TAES of the great saphenous vein (34 treated veins)

Side effects / Complications of catheter foam sclerotherapy + tumescence

- **Cavezzi et al. :**

1 (1.1%) thrombophlebitis

**No relevant pain (4-5 injections for the thigh
segment...)**

- **Alì et al:**

5 (2%) thrombophlebitis

19 (7.8%) skin pigmentations/matting

2 (0.8%) transient scotomas

Costs ...few euros

Office Settings

CONCLUSIONS

- **Ultrasound-guided peri-saphenous tumescence infiltration is a safe, effective and inexpensive procedure**
- **It enhances foam sclerotherapy possibilities**
- **Larger diameters can be treated with good efficacy and safety as well**

Thanks a lot for
your kind attention



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