



Techniques of Injection for Sclerotherapy

- Long Catheter -

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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

Biochemistry

- **The higher the vein diameter and the blood amount, 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 !!!



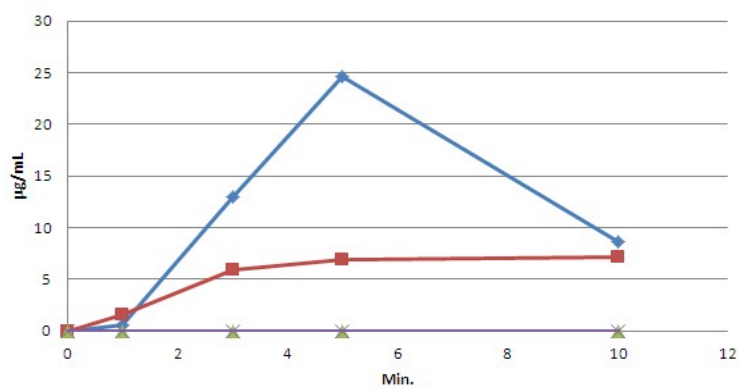
Timing and modality of the sclerosing agents binding to the human proteins: laboratory analysis and clinical evidences

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

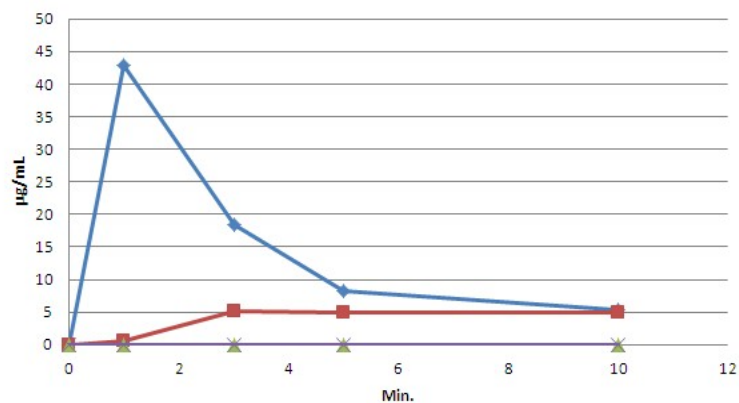
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University of Ferrara; ⁶Centro Duomo
Analisi, Nola (NA); ⁷Istituto
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www.veinsandlymphatics.org

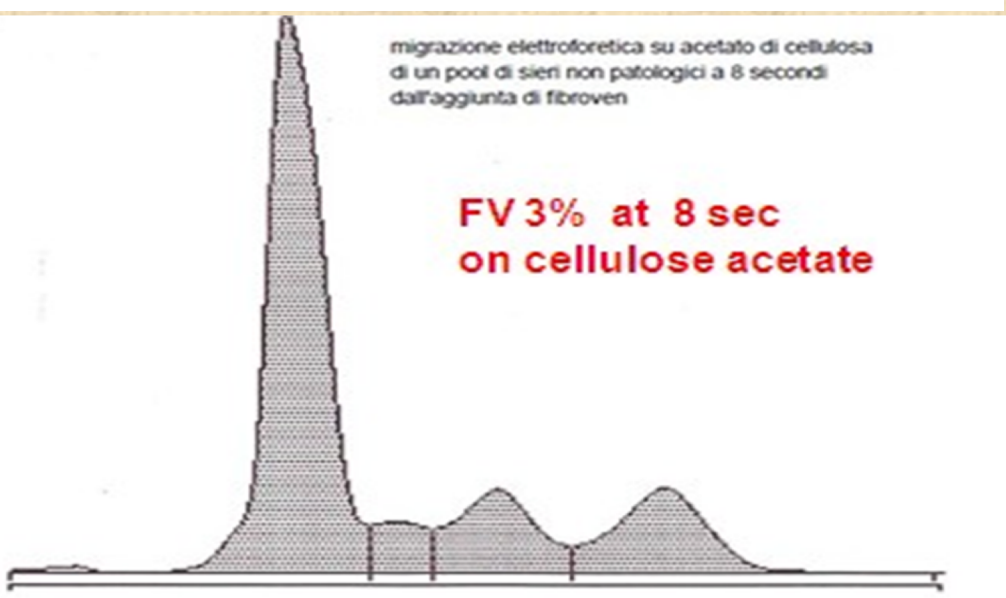
- **In vivo and in vitro studies to assess protein binding on sclerosant drugs**



Min.	STS Tot. Plasma femorale	STS Tot. Plasma brachiale	STS lib. Plasma femorale	STS lib. 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.	STS Tot. Plasma femorale	STS Tot. Plasma brachiale	STS lib. Plasma femorale	STS lib. 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**

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.....

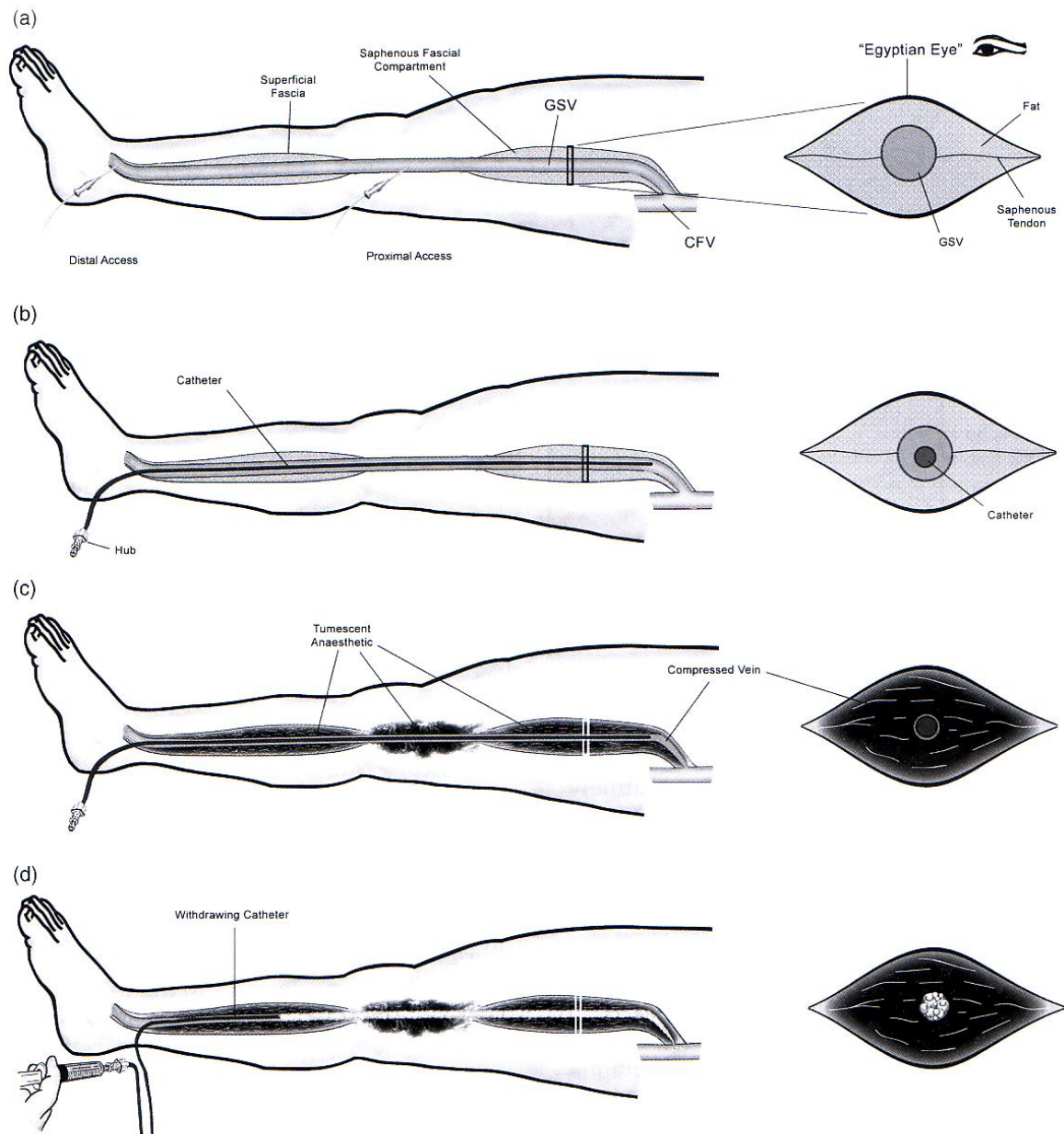
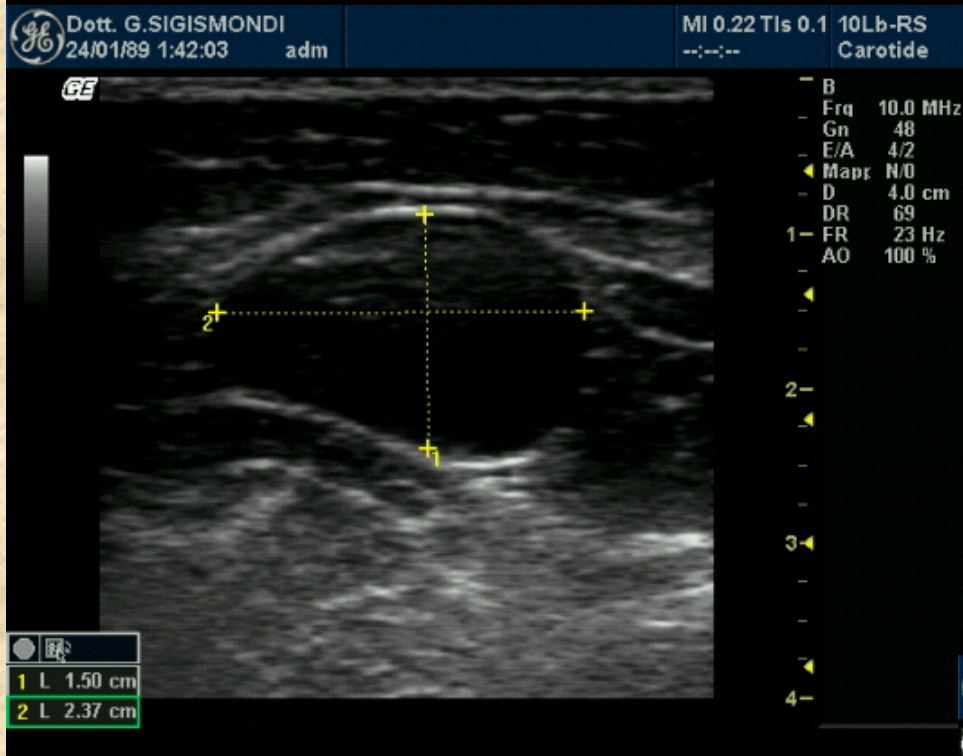


Figure 7 (a) Tumescent ELLE – access can be gained at the level of the knee to treat the proximal great saphenous vein or at medial ankle to treat the full length of the vein; (b) Tumescent ELLE – catheter is advanced to approximately 5 cm from the saphenofemoral Junction; (c) Tumescent ELLE – the administration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



Thanks to Nick Morrison and
 Diana Neuhardt

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

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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.

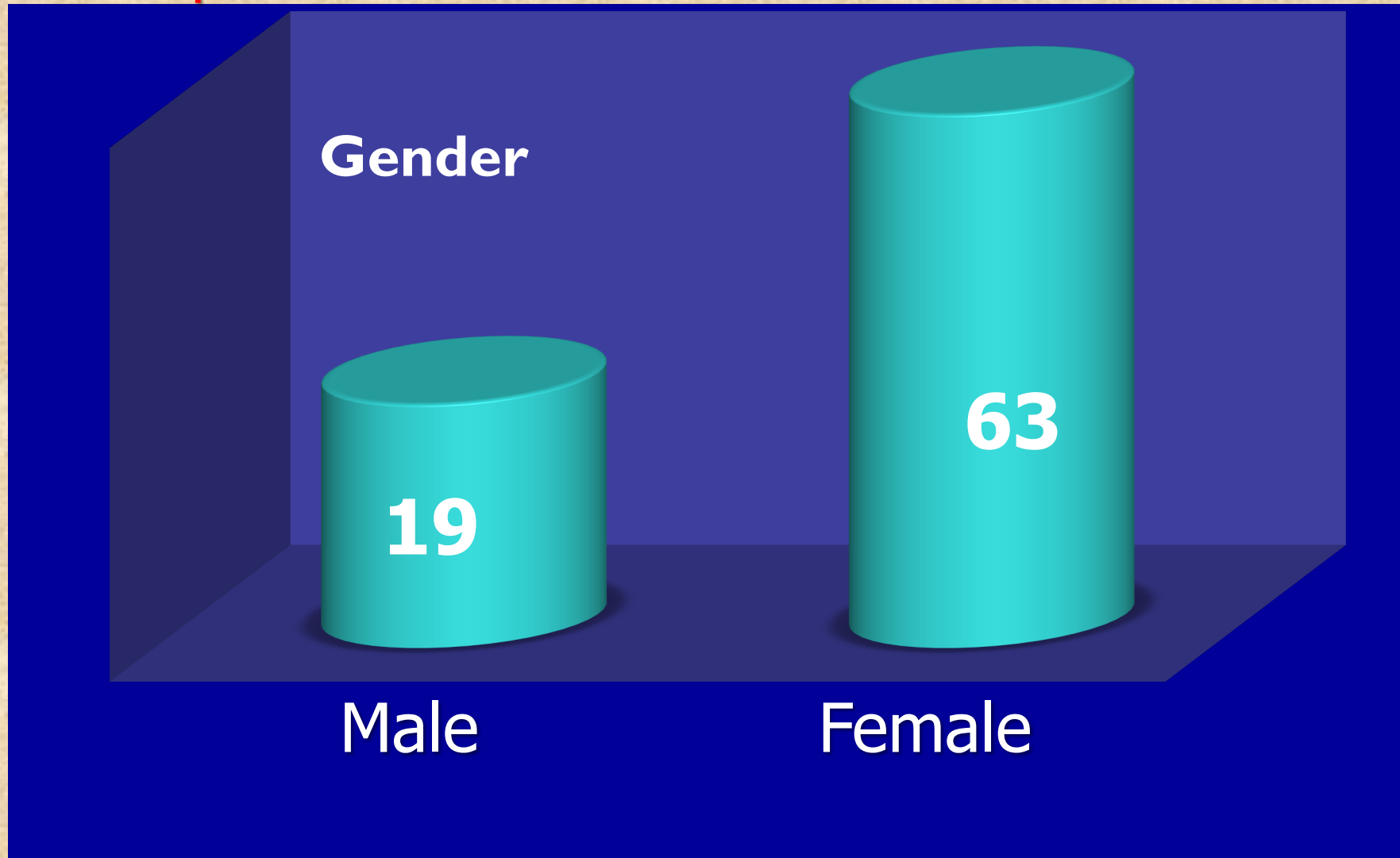
Objectives: This was a prospective observational study to assess the short- to mid-term efficacy and safety of catheter foam sclerotherapy (CFS) of the great saphenous vein (GSV), including peri-saphenous tumescence infiltration (PST) and intra-saphenous saline irrigation (ISI), in combination with phlebectomy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

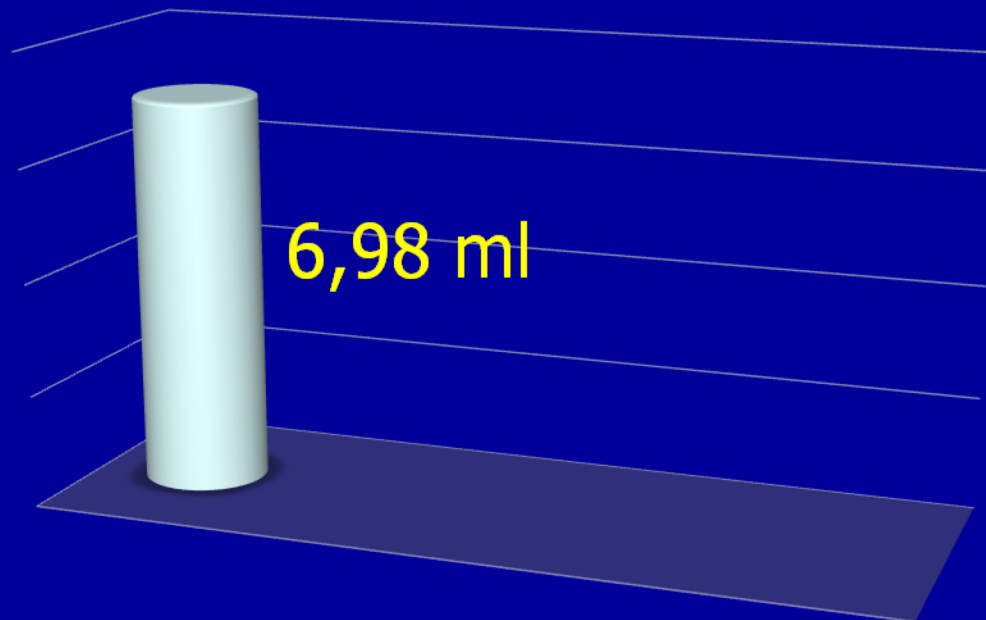
Conclusions: GSV treatment by means of CFS and adjuvant PST + ISI, combined with phlebectomy of varicose tributaries, proved to be safe and effective in terms of clinical and duplex based outcomes at short/mid-term follow-up.

82 consecutive patients (mean age 55,7 years), 88 limbs in total with primary varicose veins and GSV incompetence

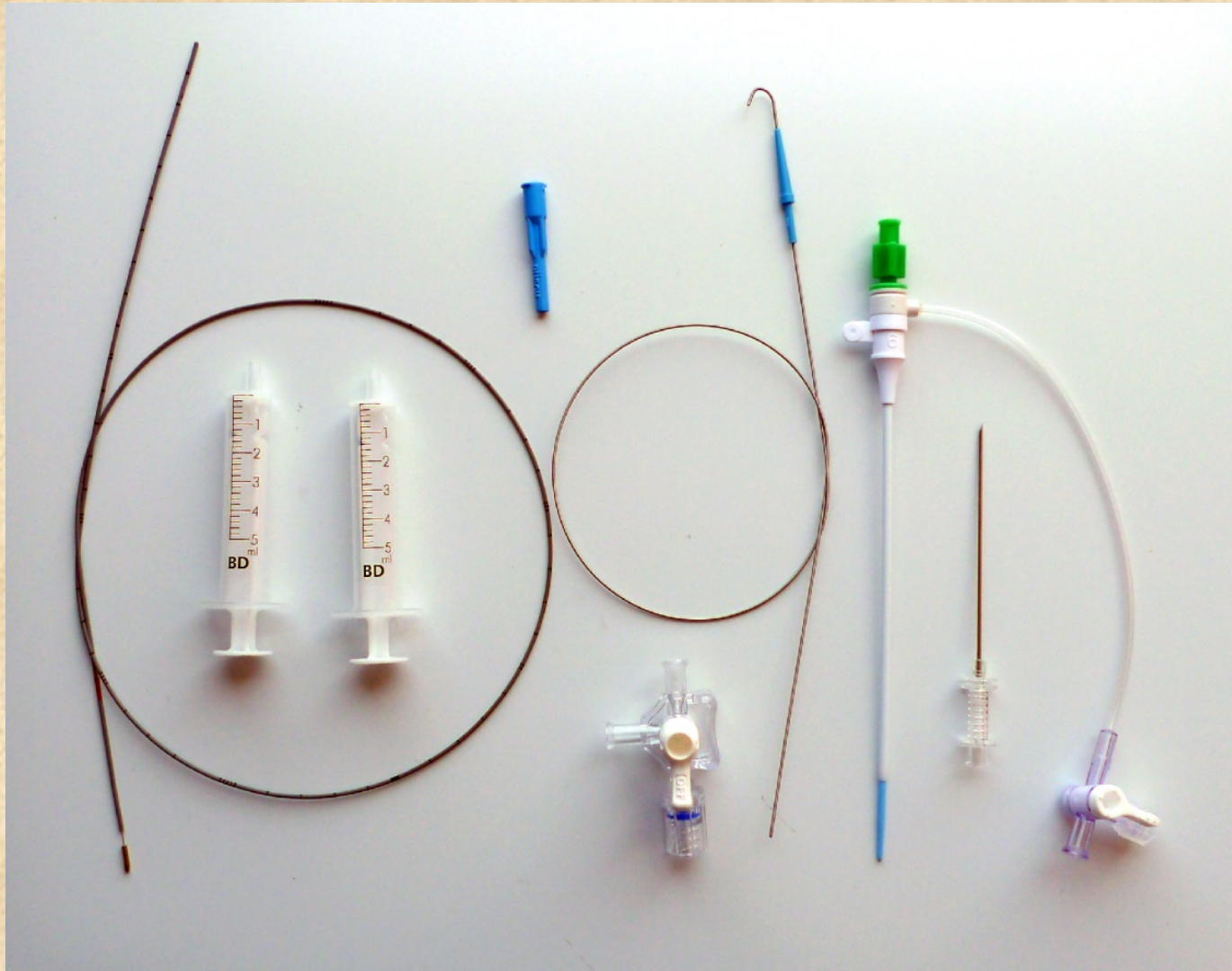


Mean caliber of GSV: 7,78mm (SD +/-1,6)

**Mean dose of
sclerosant foam**

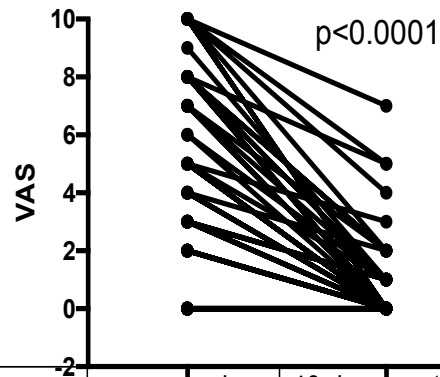


CATHETER FOAM SCLEROTHERAPY OPERATIVE KIT



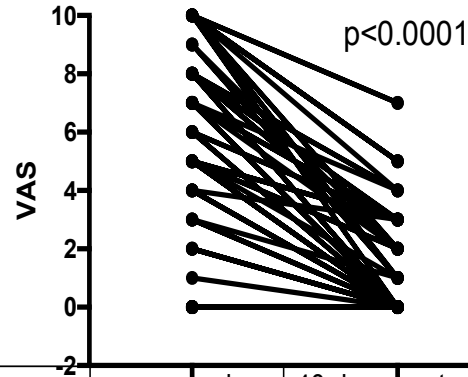
pre/post-op symptoms

pain pre/after procedure



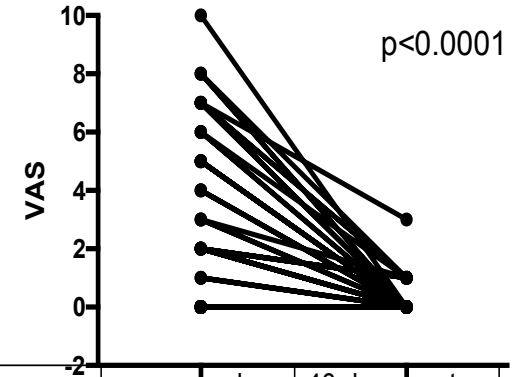
	pre-procedure	40 days post-op
Minimum	0.0	0.0
25% Percentile	0.0	0.0
Median	3.000	0.0
75% Percentile	7.000	1.000
Maximum	10.00	7.000

heaviness sensation pre/after procedure



	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

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

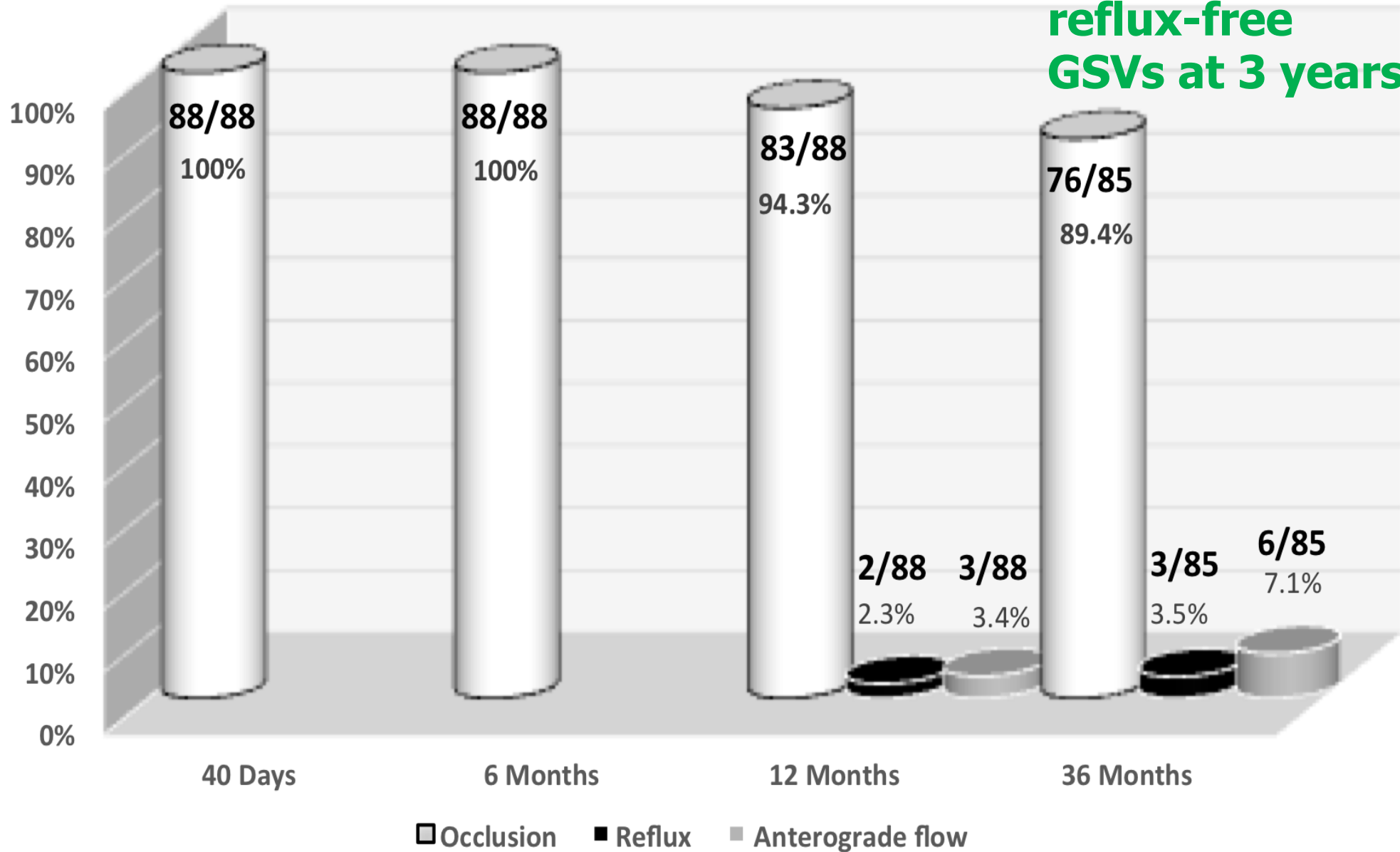
CLINICAL RECURRENCE (RECURRENT VARICES) at FOLLOW-UP

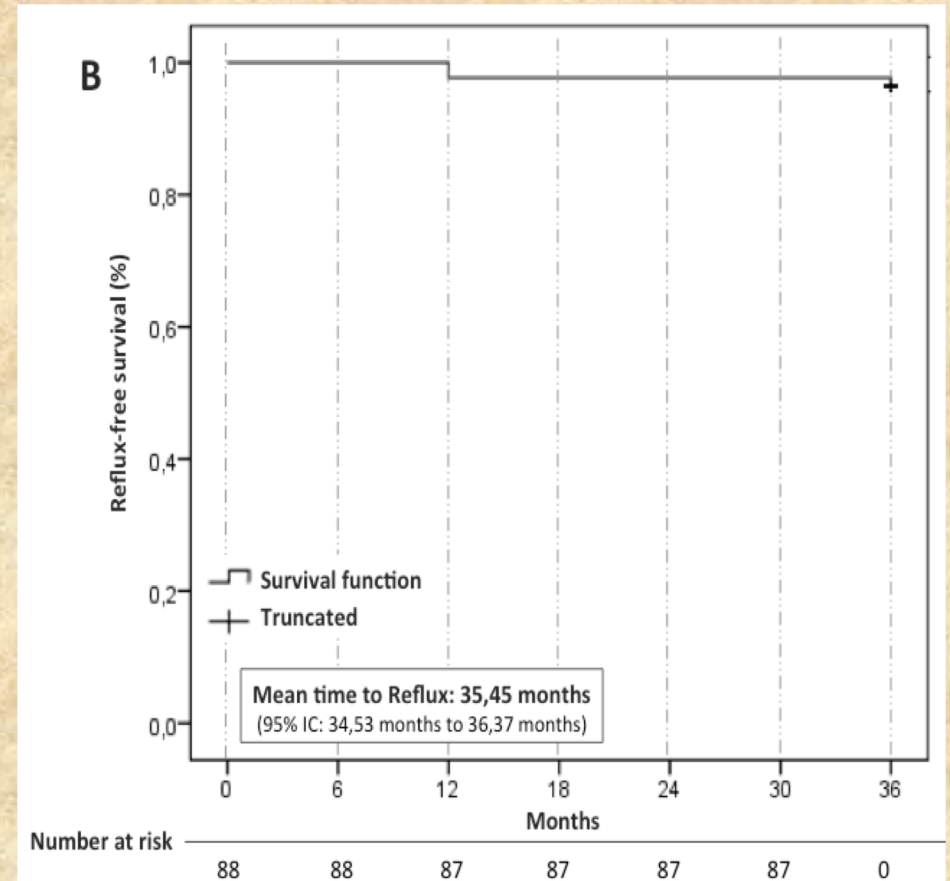
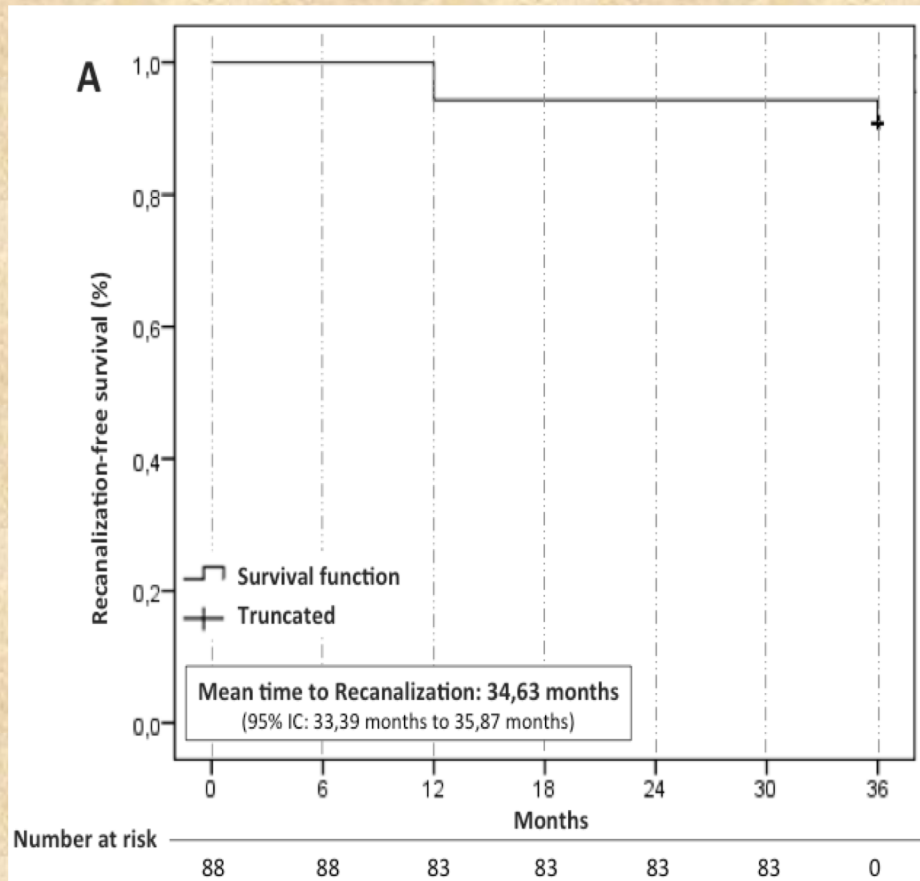
at 1 month:	0%
at 6 months:	0%
at 12 months:	0%
at 36 months:	5%

...the beneficial effect of phlebectomy..

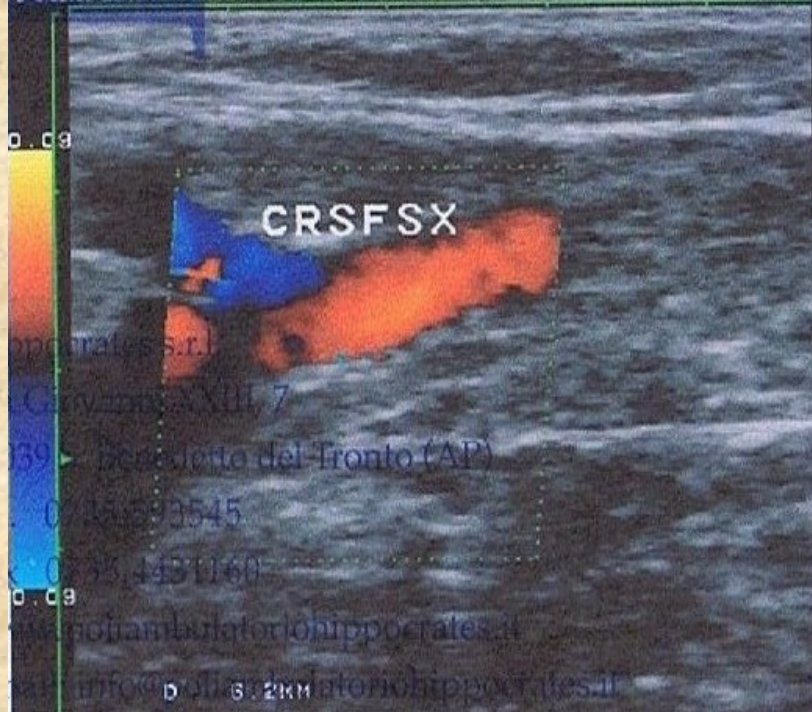
CDU outcomes

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

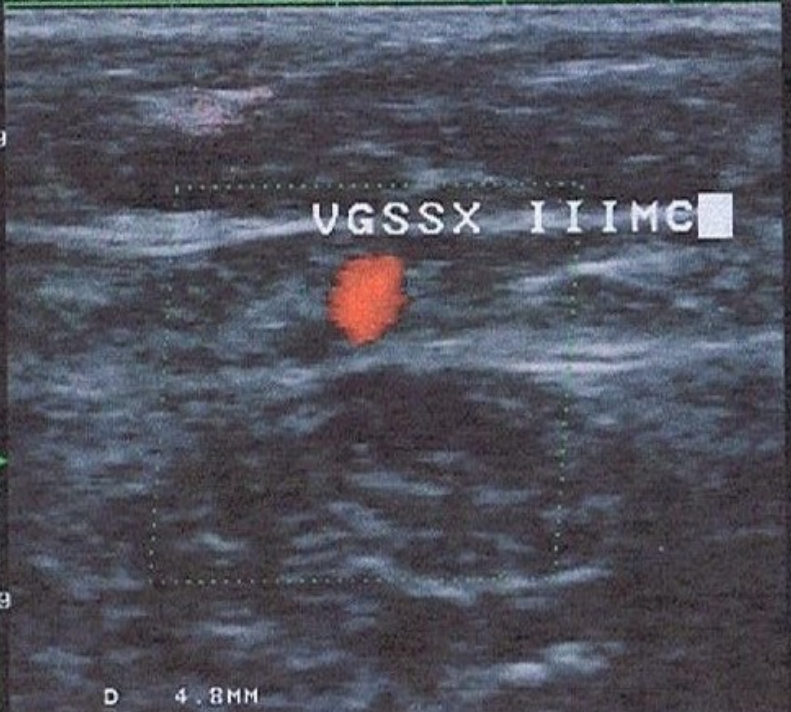




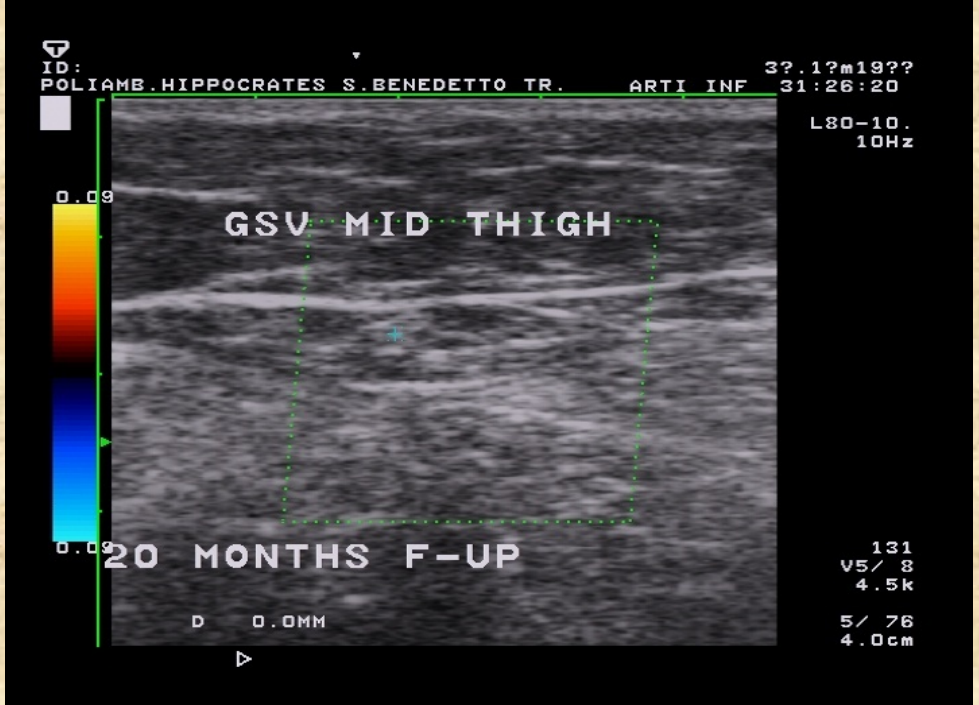
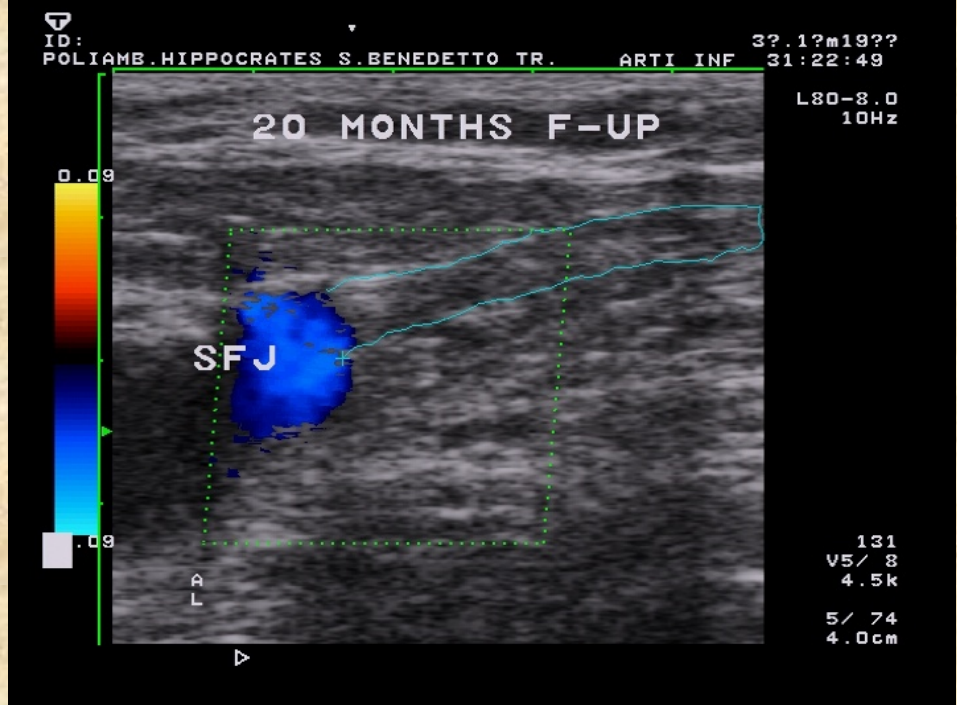
3 limbs lost to follow-up at 36 months



L80-8.0
10Hz



L80-8.0
10Hz



L80-10.0
10Hz

CATHETER FOAM SCLEROTHERAPY (without tumescence or irrigation)

Authors	N.limbs	Follow-up	Occlusion rate	PRO improvement
Brodersen 2007	30	6 m	90%	
Liu 2008	30	3 m	90%	
Tan 2012	66	12 m	80%	96%
Williamson 2012	94	12 m	70%	84%
Asciutto 2012	188	12 m	67%	92%
Devereux 2014	50	12 m	73.9 -75%	
Kurdal 2015	108	12 m	89%	

Comparative Study of Outcome of Duplex Ultrasound-Guided, Catheter-Directed Foam Sclerotherapy and Radio-frequency Ablation in the Management of Great Saphenous Varicose Veins

MK Mishra, RK Soni, RS Mohil, A Sinha

Ind J Surg, October 2016, Vol 78, 5:375–381

- * Obliteration of the treated GSV segment in all RFA pts (31/31) on days 7, 30, and 90, while in the catheter group, 28/30 pts had obliteration (P value > 0.05).
- * Improvement in the VCSS in both the study arms in every follow-up
- * Improvement in the Venous Disability Score was statistically significant and equal in both arms after the initial 1 week.

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

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ORIGINAL PAPER

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

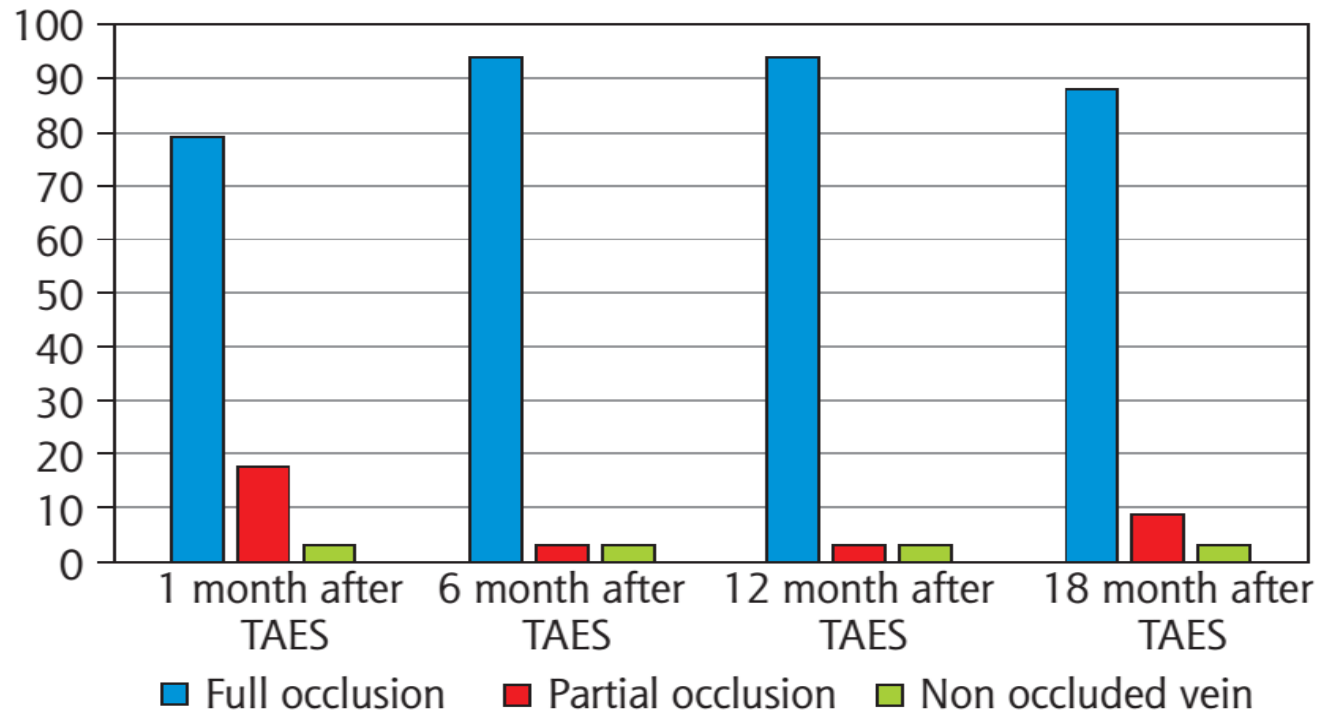


Fig. 2. Success rate 1, 6, 12 and 18 months after TAES of the great saphenous vein (34 treated veins)

Feasibility and Safety of Catheter Directed Foam Sclerotherapy Combined with Tumescant Local Anesthesia for Treatment of Axial Varicose Vein

**Mohamed Atef Bayoumi, Mohamed Yahia Zakaria,
Foad Mohamed Ahmed**

Vascular Surgery Department, Faculty of Medicine, Al-Azhar University

Table (4): Primary technical success

Primary technical success	Yes	19 (84 %)
	No	6 (16 %)

Table (6): Patients satisfaction.

		Number
Patients satisfaction	Very satisfied	9 (36 %)
	Satisfied	13 (52 %)
	Not satisfied	3 (12 %)

CONCLUSIONS

- **Long catheter permits foam delivery, where, when and how much needed**
- **It significantly reduces blood negative effect at distance**
- **It is effective, safe and inexpensive**
- **In combination with ultrasound-guided peri-saphenous tumescence infiltration + saphenous irrigation it enhances foam sclerotherapy possibilities, also in large veins**

Thanks a lot for
your kind attention
Je vous remercie pour
votre attention



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