

TREATMENT OF VARICOSE VEINS USING STEAM PULSES

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Disclosure

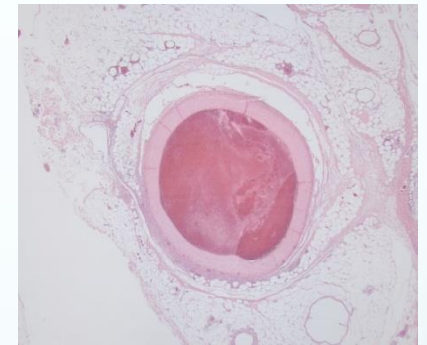
**I do not have any potential
conflict of interest**

Endovenous steam ablation



- Steam emission \rightarrow 120°C , through 2 lateral holes.

- Each pulse vaporizes 0.08 cc of water
 \Rightarrow GSV obliteration = 3 cc of water,
 \Rightarrow no hemolysis.



- 3.2 Fr flexible catheter.



Generation of Endo Venous Steam

- Water is pumped under high pressure through a microtube of 100 μ internal diameter.
- Electrical current heats the microtube.
- Steam is emitted at a temperature of 150° (120°C at the tip of the catheter).

Steam Ablation Versus Radiofrequency and Laser Ablation: An In Vivo Histological Comparative Trial

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Great Saphenous Vein Ablation with Steam Injection: Results of a Multicentre Study

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Endovenous thermal ablation for varicose veins: strengths and weaknesses

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ABSTRACT

Endovenous ablation is a frequently used method for treating varicose veins. Endovenous laser ablation is the most frequently used technique, followed by radiofrequency ablation. Endovenous thermal treatments heat the vein, leading to thrombotic occlusion and finally fibrosis of the vein wall. Endovenous steam ablation is a new technique that has not yet been extensively studied. In this article, the procedures, strengths, and weaknesses of the currently available endovenous thermal ablation treatments are discussed.

REVIEW ARTICLES

Endovenous therapies of lower extremity varicosities: A meta-analysis

Renate van den Bos, MD,^a Lidia Arends, PhD,^{b,c} Michael Kockaert, MD,^a Martino Neumann, MD, PhD,^a and Tamar Nijsten, MD, PhD,^a Rotterdam, The Netherlands

Phlebology, 2012;19:163-169

(J Vasc Surg 2009;49:230-9.)

Steam Ablation Versus Radiofrequency and Laser Ablation: An In Vivo Histological Comparative Trial

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Eur J Vasc Endovasc Surg,
2013 sept

	Intima necrosis(%)	Media necrosis(%)	Adventitia necrosis(%)	Total venous necrosis (%)	Perivenous damage (%)
EVLA (n=4)	78,3 ± 19,9	66,7 ± 24,9	56,7 ± 17,6	67,2 ± 20,0	4,4 ± 3,5
RFA (n=4)	90,0 ± 20,0	90,0 ± 20,0	86,7 ± 26,7	87,8 ± 21,6	6,3 ± 3,8
SVS (n=4)	90,0 ± 20,0	85,0 ± 19,1	70,0 ± 35,1	81,7 ± 22,1	1,9 ± 1,1

	Weight (kg)	LengthTreated (cm)	Tumescence (ml/cm)	Energy (J/cm)	Preoperative diameter (mm)	% Diameter decrease
EVLA (n=4)	50,8 ± 10,7	13,3 ± 1,5	4,13 ± 0,59	41,64 ± 3,69 *°	5,0 ± 1,0	6,35 ± 2,95
RFA (n=4)	50,6 ± 15,2	12,3 ± 3,5	3,81 ± 0,54	36,00 ± 0,00 *+	4,0 ± 0,5	15,26 ± 13,93
SVS (n=4)	49,5 ± 9,5	15,3 ± 1,5	3,10 ± 1,38	151,37 ± 26,08 ° +	4,2 ± 0,1	25,70 ± 21,71
Total (n=12)	50,3 ± 10,9	13,6 ± 2,5	3,68 ± 0,94	76,34 ± 57,15	4,4 ± 0,9	15,77 ± 15,88



Second generation of steam generator

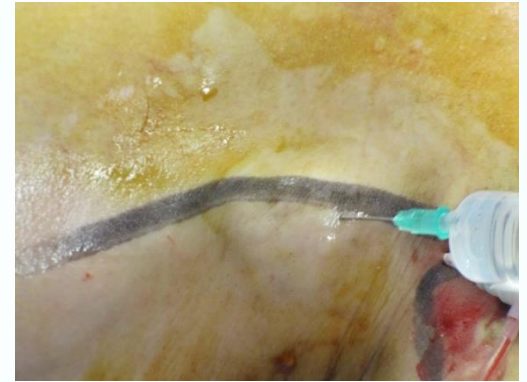


Surgical Technique

- Systematic tumescent anaesthesia,
- $V < 7$ mm: 2 pulses / cm,
- $V > 7$ mm: 3 pulses/ cm,
- $V > 12$ mm: 4 pulses / cm.

Mean procedure time: 35 min (12 – 85),

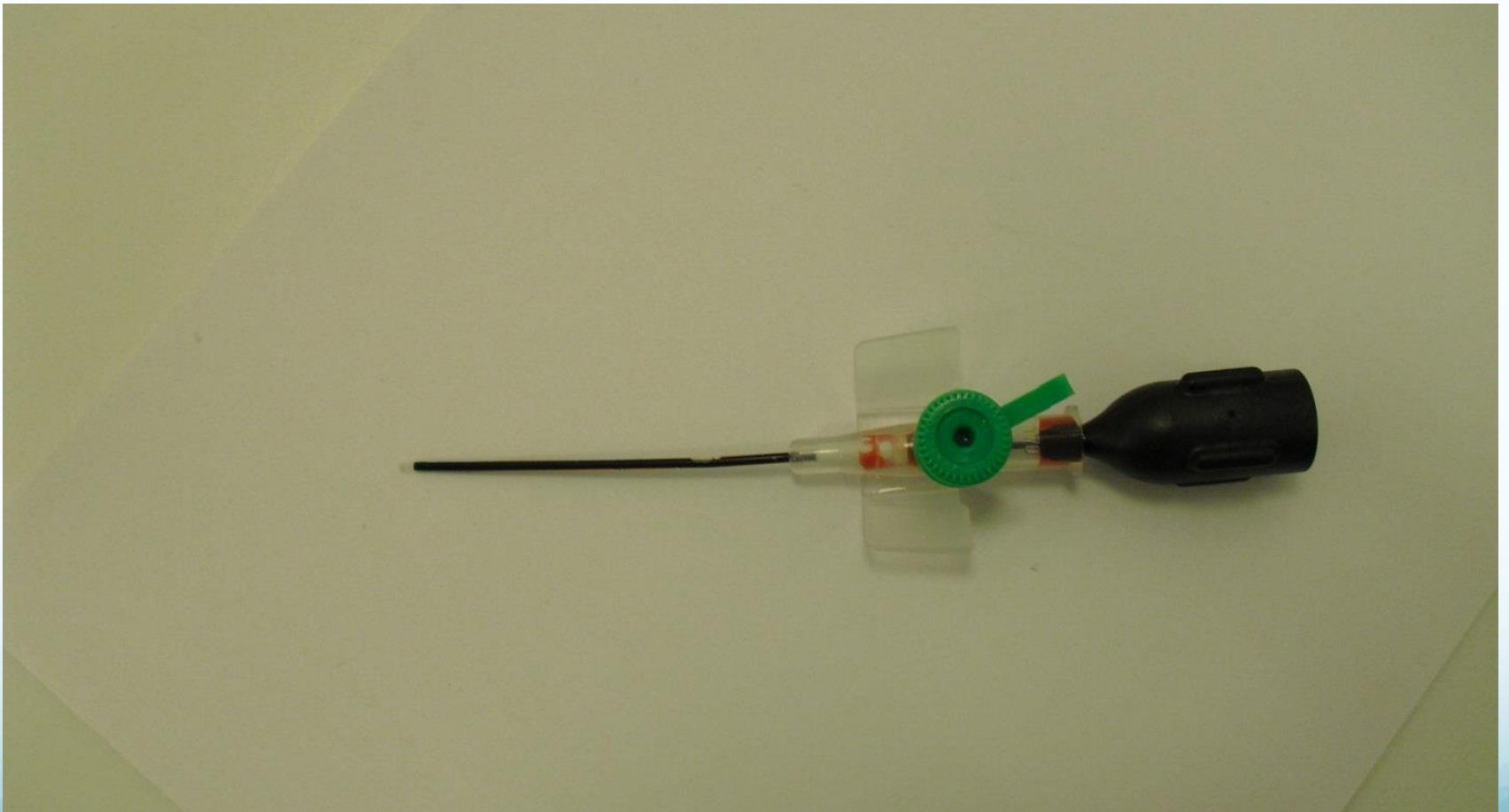
**Mean length of GSV
treated: 42 cm (15 – 57),**



Tumescent anesthesia



The catheter for tributaries



FOAM/STEAM Randomised study

R. Milleret

presented : American College of Phlebology, LA 2011

- **Material**

- 2 groups of 20 patients.
- Localisation of varicose veins: Anterior Accessory Saphenous Vein, Medial and Posterior Calf.

* Varicose veins diameter: 3 to 10 (mean 6 mm).

- **Methods**

- **Foam:**

- 1% Polidocanol ,
- Tessari tourbillon technique
- 6 to 10 cc in one session.

- **Steam:**

- 3 to 6 pulses/injection.

* Eccentric compression.

Evolution

After 8 days

	Foam	Steam
Inflammation	6/20	0/20
Pain (to 10)	2.4	0.5

After 1 month

	Foam	Steam
Thrombus extraction	12/20	6/20
Pigmentation	12/20	4/20

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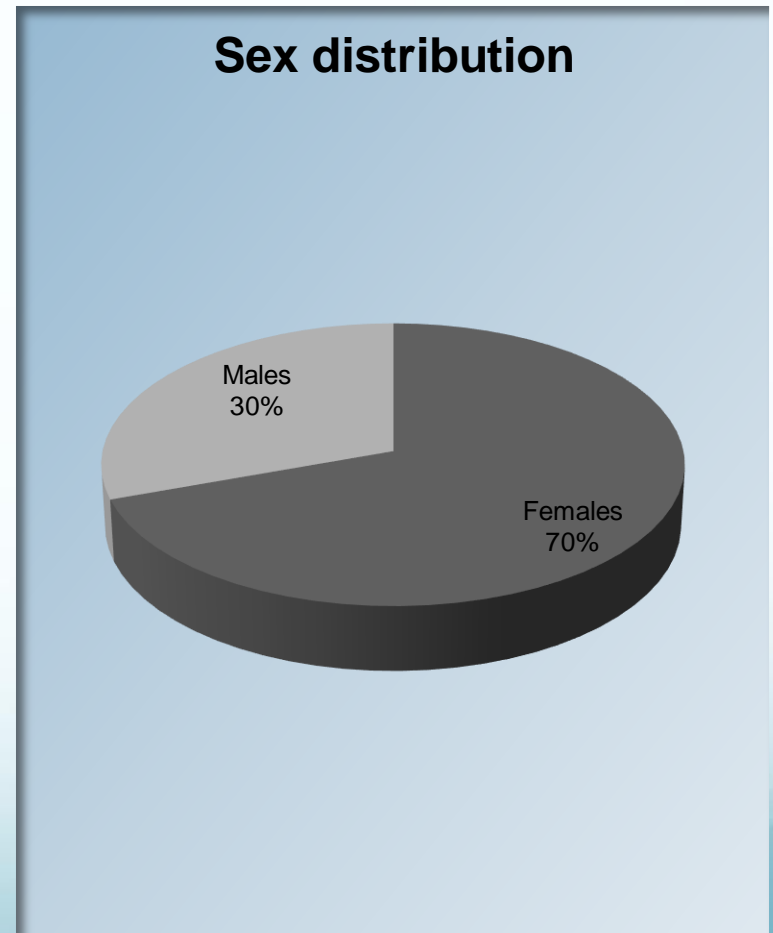
- Objective: safety and efficiency of SVS of GSV
- 75 patients – 4 centers in France
- Follow up 1, 6, 12 months
- Obliteration rate 96% at 6 m and 94% at 12 m

Adverse events

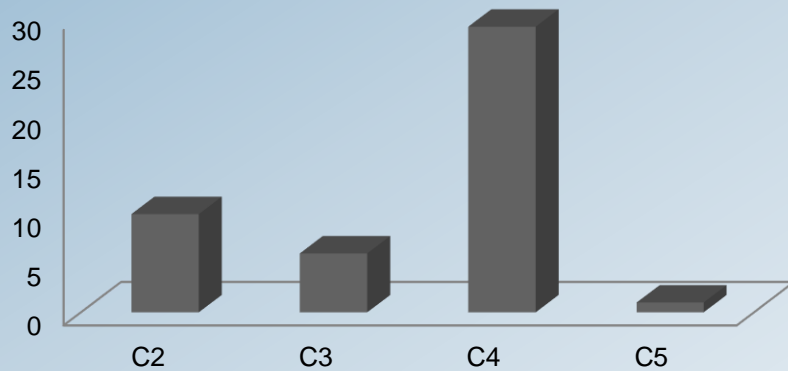
	8d	1m	6m	12m
Pain (>5 VAS)	7	2	4	1
Skin burn at entry point	1	0	0	0
Deep vein path	0	0	0	0
Inflammation	0	2	0	0

Army's Center for Cardiovascular Diseases

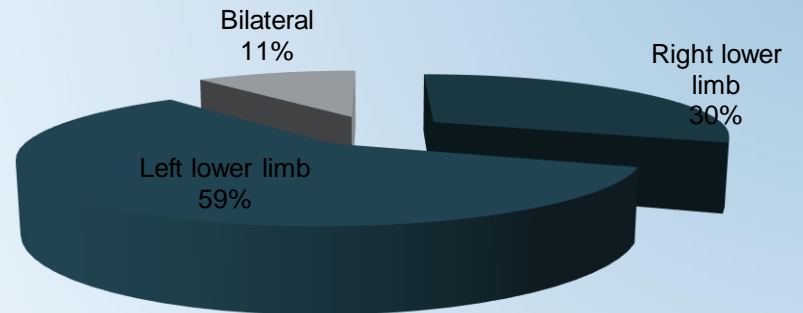
- Jan. 2015 – jan. 2016
- 46 pac.
- Age: 26 – 78 (42.5)
- Veins treated :
 - Internal saph.vein 39 (84.8%)
 - External saph.vein 4 (8.7%)
 - Reinterventions 3 (6.5%)



CEAP classification distribution

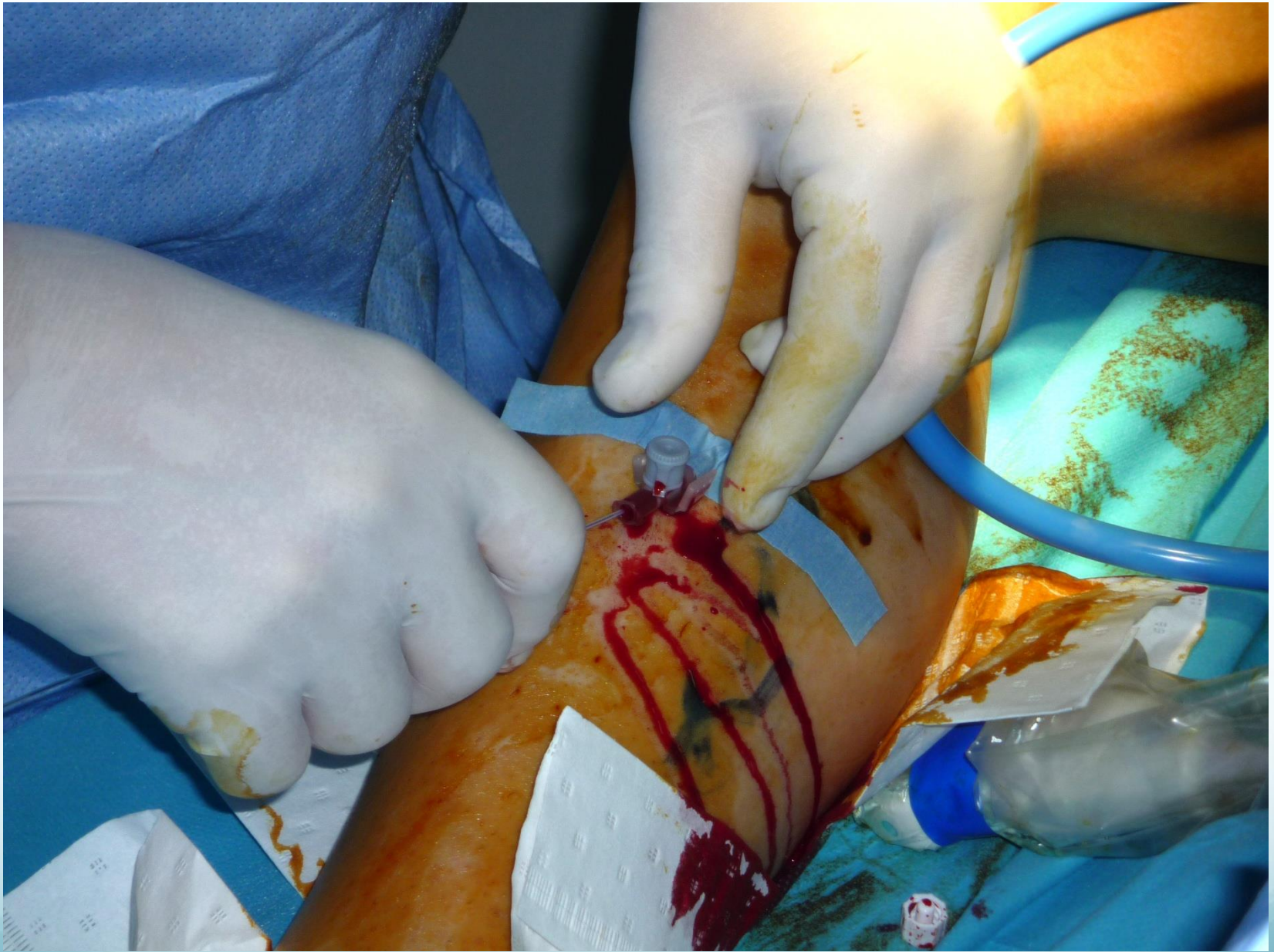


Limb localisation



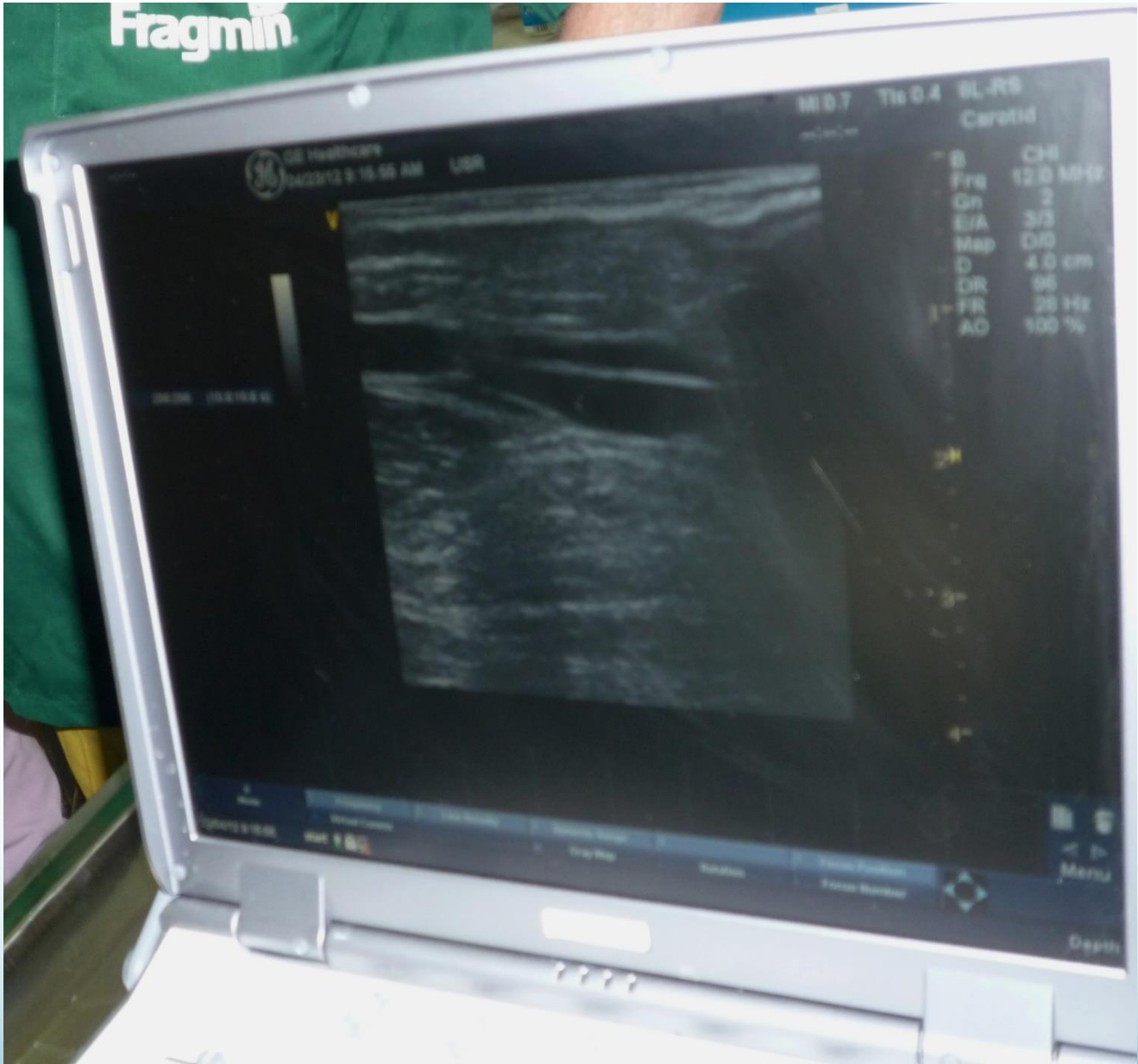








Fragmin.





04/23/12 9:20:11 AM USR

Carotid

B CH1
Frq 12.0 MHz
Gn 2
E/A 3/3
Map D/O
D 4.0 cm
DR 96
FR 28 Hz
AO 100 %



296:296 (10.6:10.6 s)

1-
2-
3-
4-

23/04/12 9:20:11 start Menu

B Mode | 1 Frequency | 2 Line Density | 3 Dynamic Range | 4 Focus Position | Focus Number | Depth

Virtual Curves | Gray Map | Rotation



GE Healthcare
04/23/12 9:21:10 AM USR

Carotid



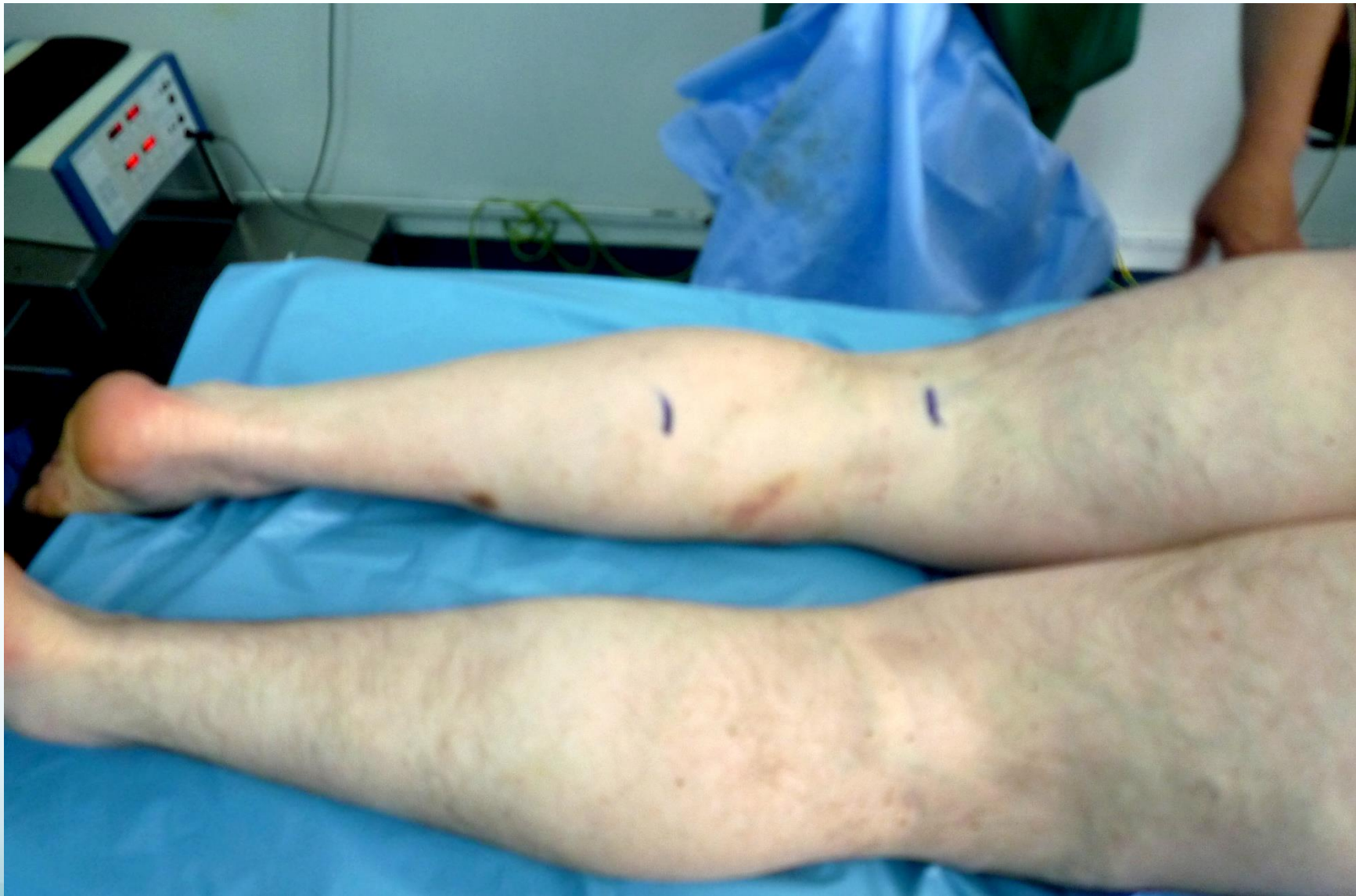
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Gn	2
E/A	3/3
Map	D/D
D	4.0 cm
DR	96
FR	28 Hz
AD	100 %

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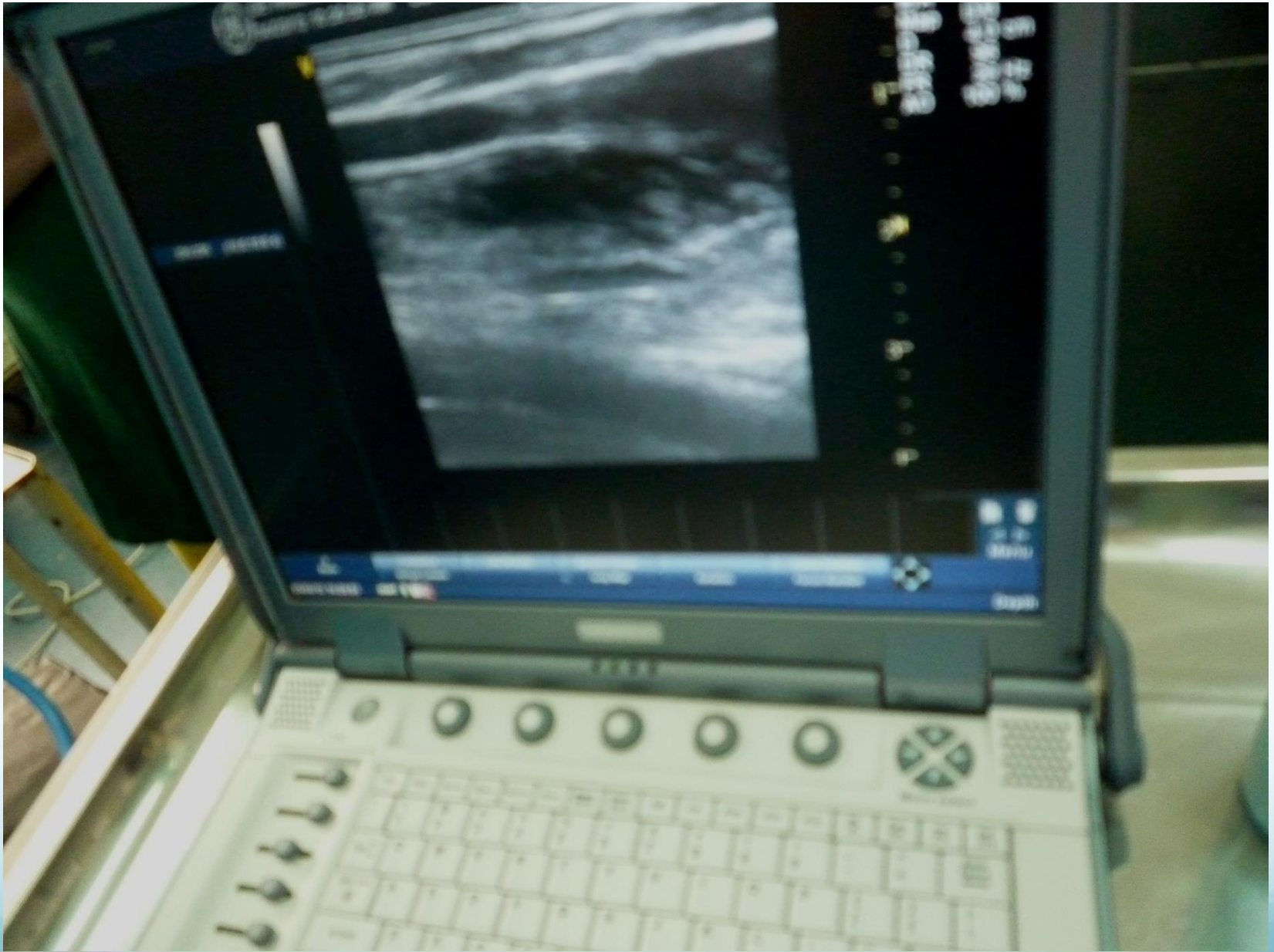
Mode Frequency Line Density Beam Steer Virtual Curves Gray Map Rotation Focus Position Focus Number Menu

23/04/12 9:21:10 start Depth

VIVID i







Results

Follow up: Clinical and Doppler examination at 7d, 1m, 3m, 6m

	No patients	%
Pain	4	8.7
Burns	0	
Pigmentation	2	4.2
Profound vein thrombosis	0	
Infection	0	
Extraction of thrombus	1	2.1

Conclusions

1. Inocuity of water (no perforation).
2. Ability to treat GSV and tributaries.
3. Treatment of recurrence.
4. Low risk of complications.
5. Short procedure time (~35 min/leg).
6. Less expensive (one day surgery).

