

Vascular SONO II

Endovenous Treatment

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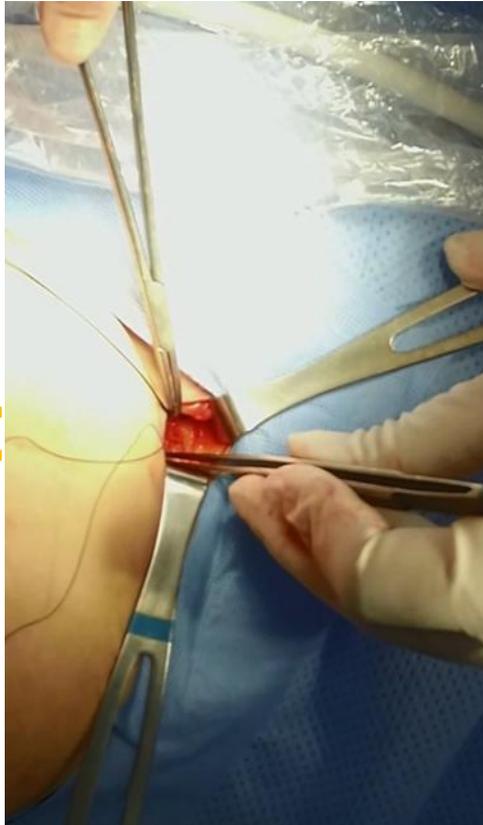
Department of Thoracic & Cardiovascular Surgery
National Medical Center

MMG Modern varicose vein treatments modalities



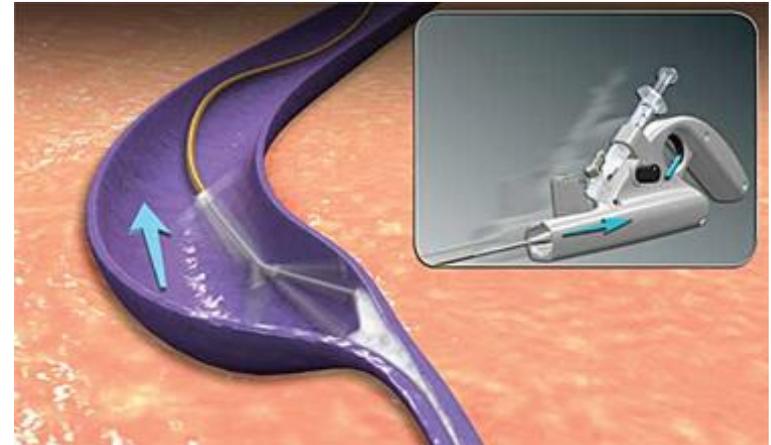
Thermal

Tumescent



Non Thermal

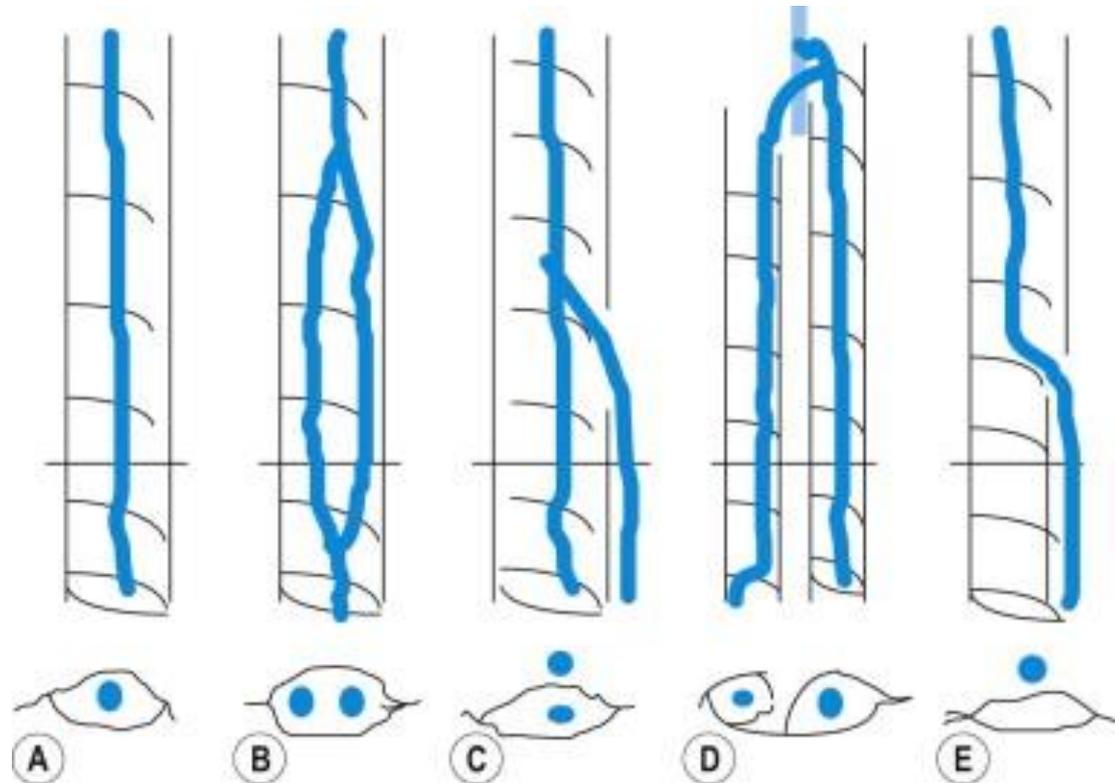
Non Tumescent





Preoperative US guided mapping

- Variations of varicose anatomy should be checked by operator
- Original ultrasound drawing & findings and compare to the mapping





Preoperative US guided mapping





Holding the probe for venous ascees



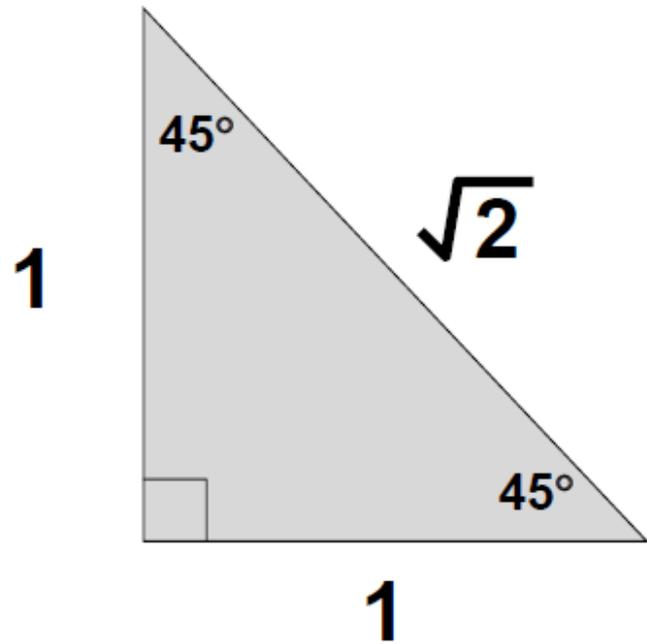
Holding the probe for venous access



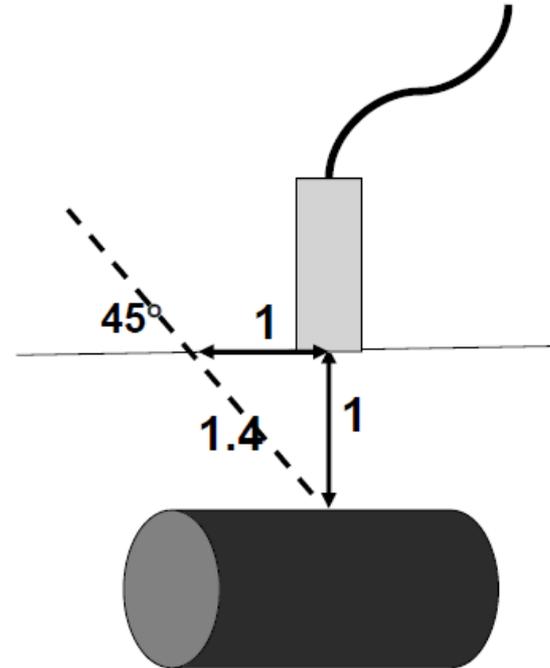
Holding the probe for venous ascees



- Close to the skin surface
- Free from branches or tortuosity
- At least 2 mm in diameter



- Close to the skin surface
- Free from branches or tortuosity
- At least 2 mm in diameter





- Venospasm may occur
- Cause of venospasm
 - cold room
 - cold patient
 - nervous patient
 - multiple needle stick
 - extended access time





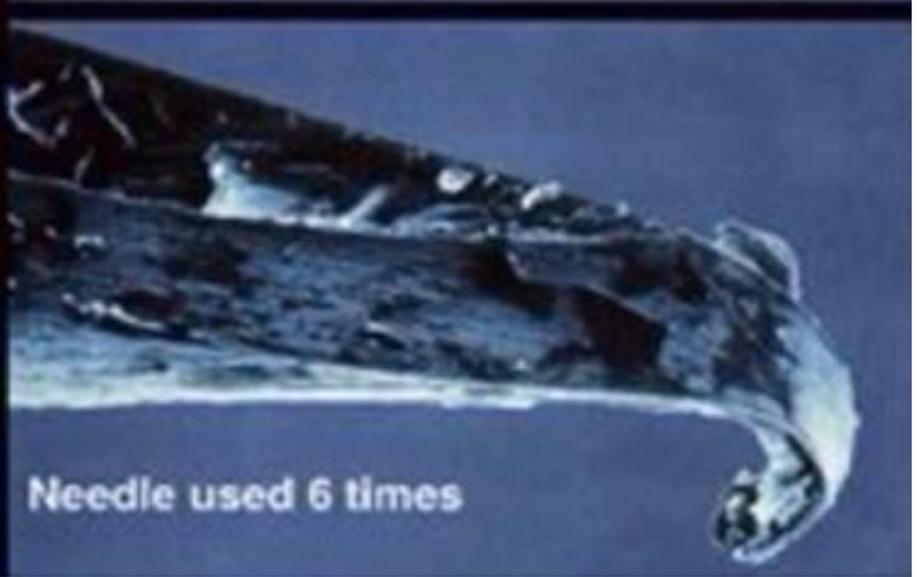
New Needle



Needle used once

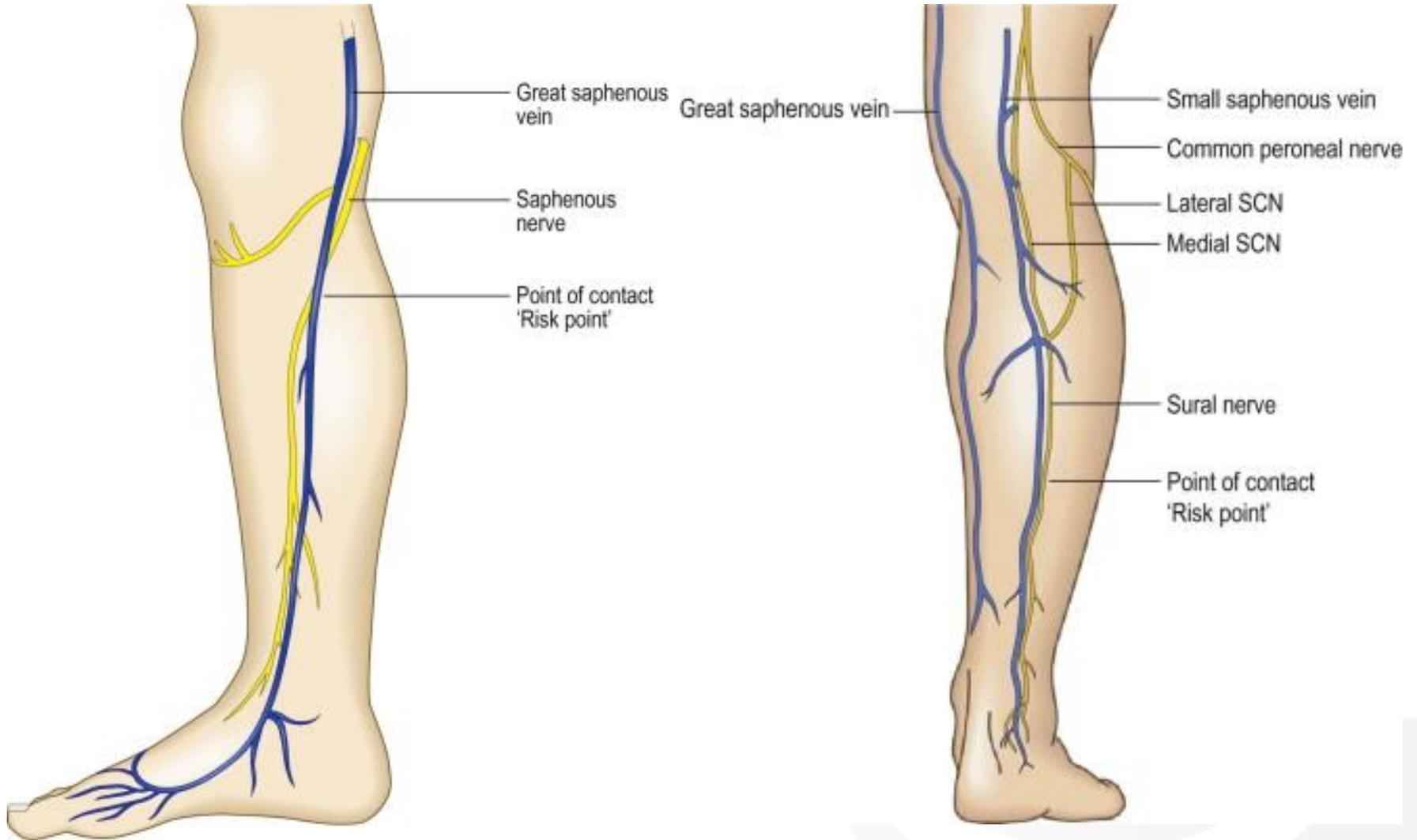


Needle used twice

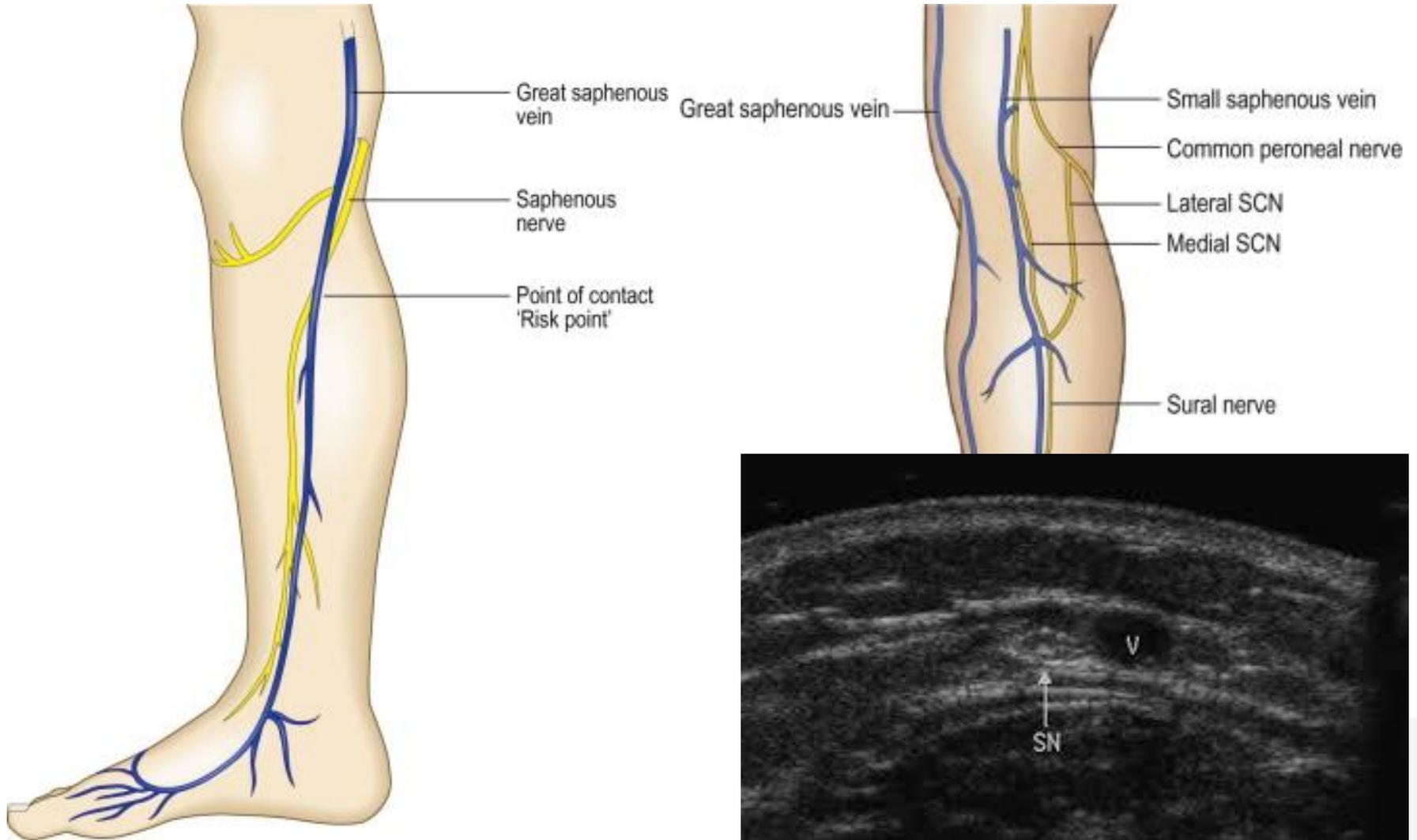


Needle used 6 times

To avoid nerve damage



To avoid nerve damage

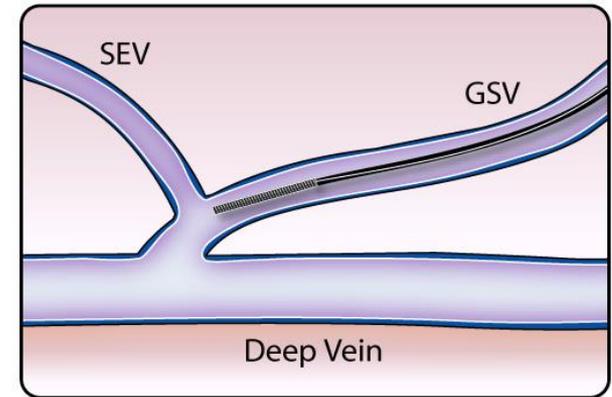


- Avoid long way journey
- Rubber tourniquet can help
- Use reverse trendelenburg position
- Use skin stretch for tortous varicosity
- Avoid resistance of distal tip within vein



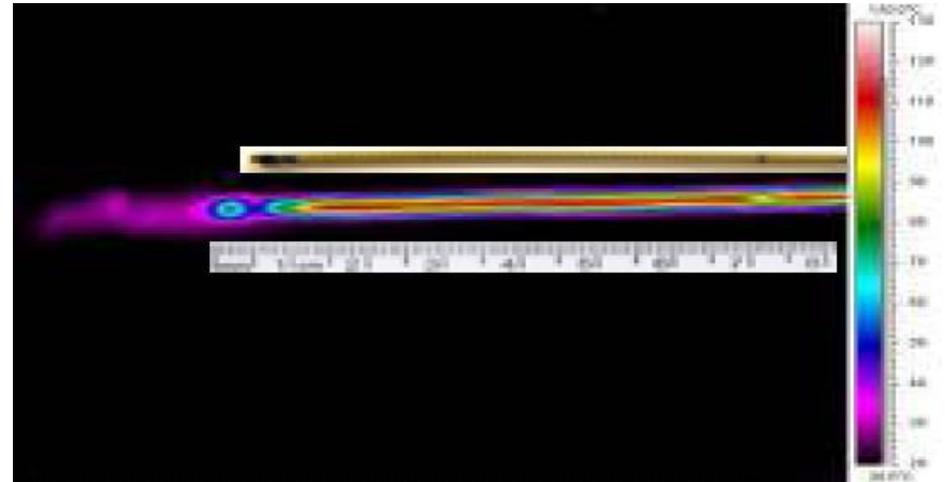
GSV tip position should approximate **2.0cm** from SFJ and spare the SEV

“Minimization of the thermally induced thrombosis of the SFJ.. Safe position for catheter tip placement”



Agis H, Kabnick L, Ombrellino M, Mortiz M. *Int Angiol* 2009;28(4) supp.

- Forward heating
 - beyond catheter tip occurs due to ejection of luminal fluid from catheter lumen upon heating
 - May result in vein occlusion 0.5cm (on average) past original tip position : occlusion up to 1.75cm has been observed



Robert F. Merchant 2007 ACP congress

How can we measure the 2cm from SFJ



How can we measure the 2cm from SFJ



How can we measure the 2cm from SFJ





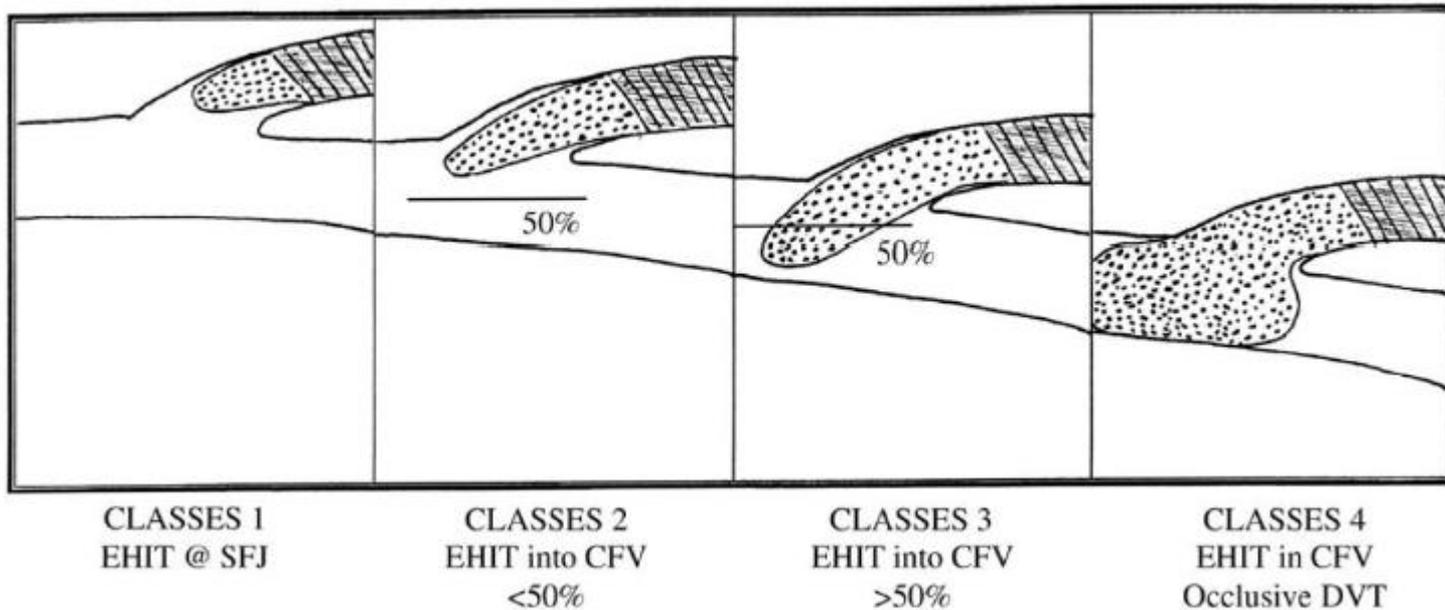
How can we measure the 2cm from SFJ



Endovenous Heat Induced Thrombosis

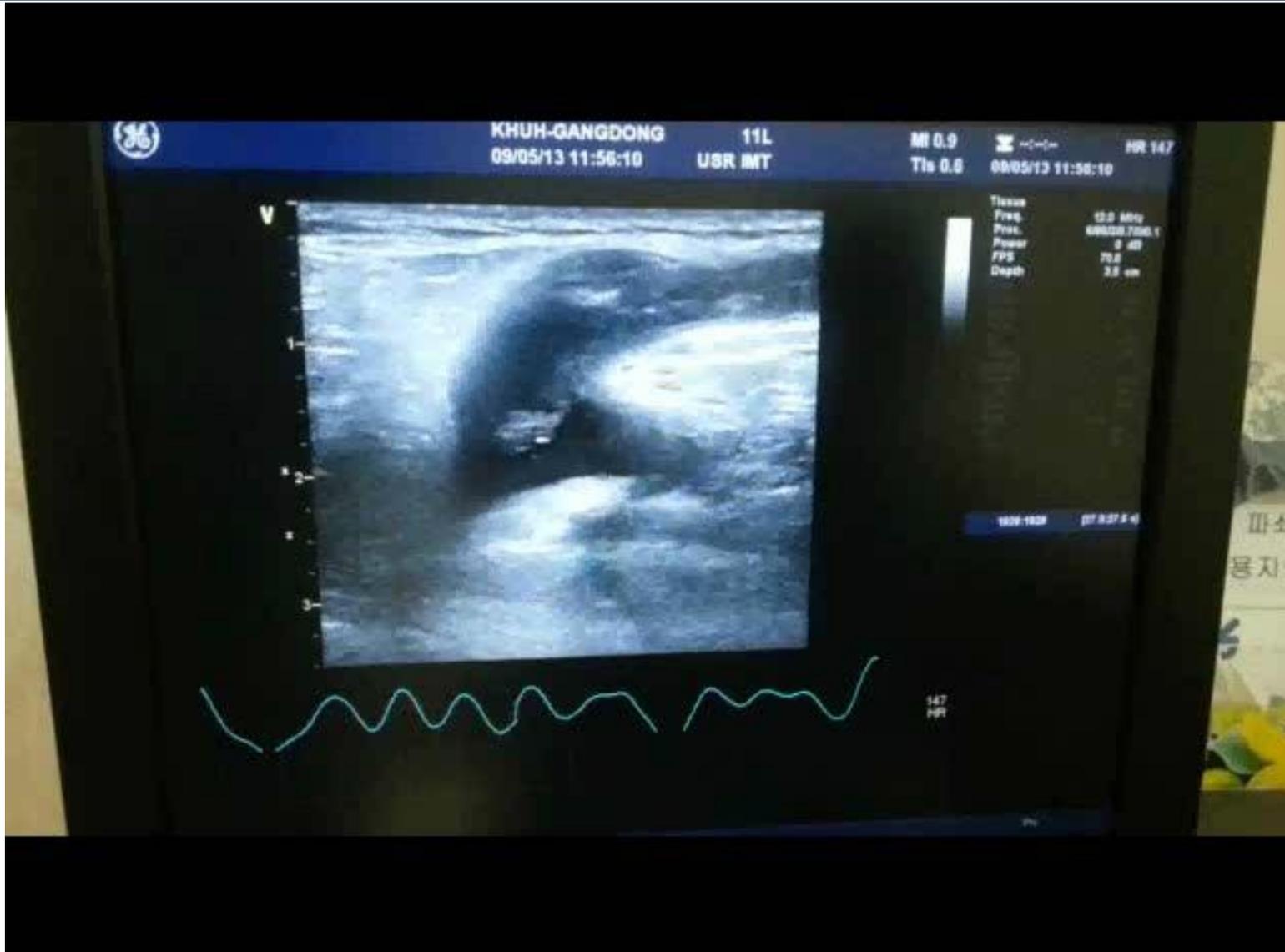
- Thrombus extension from the superficial venous system into the deep venous system
- Occur within 24 to 48 hours after vein ablation

SAPHENOFEMORAL JUNCTION with Endovenous Heat Induced Thrombus (EHIT)



Kabnick LS. Vascular 2006;14:S31-32

Endovenous Heat Induced Thrombosis



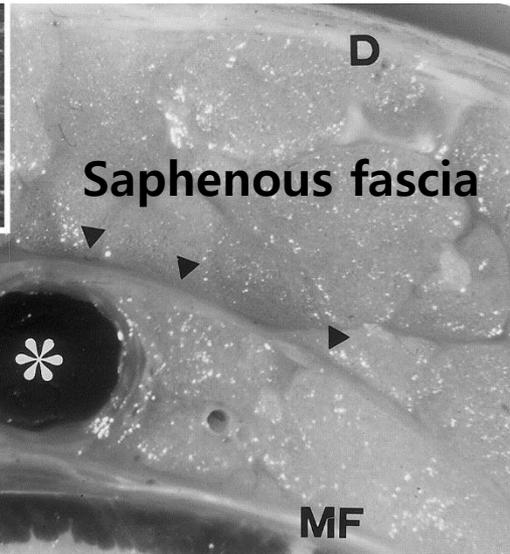
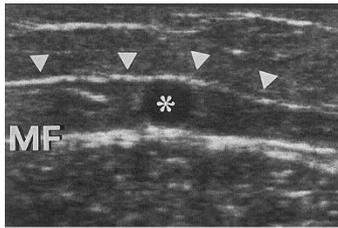
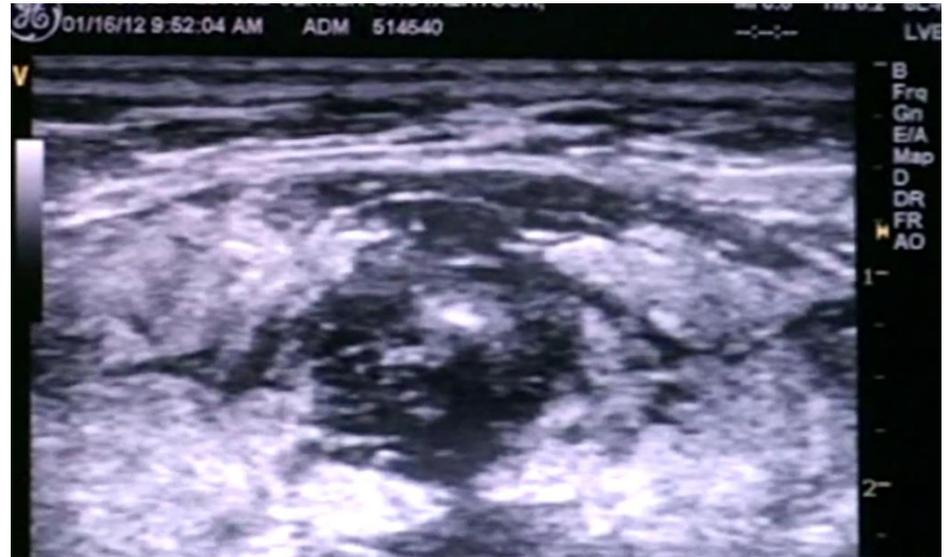
- 2470 RFA and 350 EVLT
- RFA 0.7% DVT (0.2% EHIT)
- EVLT 1% DVT (0.9% EHIT)
- Routine post-operative duplex ultrasound scanning is always recommended

Marsh et al :Eur J Vasc Endovasc Surg 2010;40(4):521-527



- Use of large volume administration of dilute anesthetic
- Invented by Dr. Klein 1986
: Liposuction
- TA apply on Endothermal Ablation by Dr. Ron Bush 1999
 - Regional anesthesia
 - Heat sink properties

Tumescent Anesthesia



Saphenous nerve

- D – Dermis
- MF - muscle (deep) Fascia
- * - Great saphenous vein

Caggiati A Circulation. 1999;100:2547-2549

Tumescent Anesthesia



- Methylparabens (Preservatives)
- Anti-oxidants (Sulfites)
- Latex allergy

Endovenous Ablation



Thermal Ablation Complications

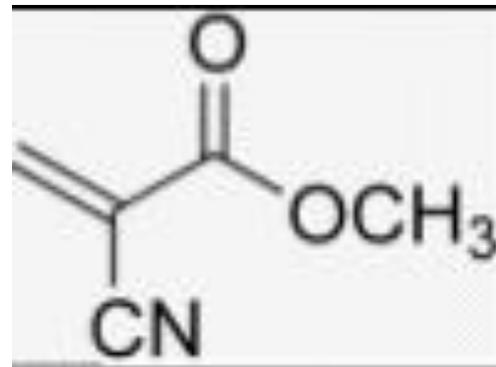


Cyanoacrylate Glue Venaseal™



Cyanoacrylate Glue (Venaseal™)

- A New modality for treating varicose veins with medical adhesive without thermal energy
 - European Conformite Europeenne (CE) Mark approval in september 2011
 - US FDA approved Feb 2015
 - Hong Kong, Australia, Singapore, New Zealand, Canada



Adhesive	Date	Use
Cyanoacrylate Adhesives	1950s	Wound Adhesives
Histoacryl Blue™*	1980s	Skin Incisions
Dermabond™*	1998	Skin Incisions/Lacerations
Ethicon OMNEX™*	1998	Surgical Adhesives
Trufill™*	2000	Liquid Embolic System, AVM Embolization
Indermil™*	2002	Skin Incisions/Lacerations

Pollak J, White R. The use of cyanoacrylate adhesives in peripheral embolization. J Vasc Interv Radiol 2001; 12:907-913 p.908

- **Vascular closing agent for:**
 - Cerebral Arteriovenous Malformations (AVM)
 - Pelvic Congestion Syndrome and Varicoceles
 - Gastric Varices
 - Aortic Aneurysms



Adhesive cast in AVM delivered via micro catheter



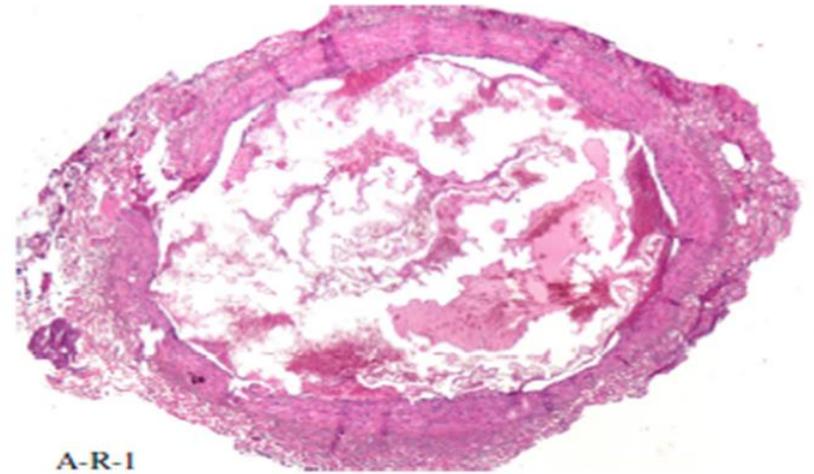
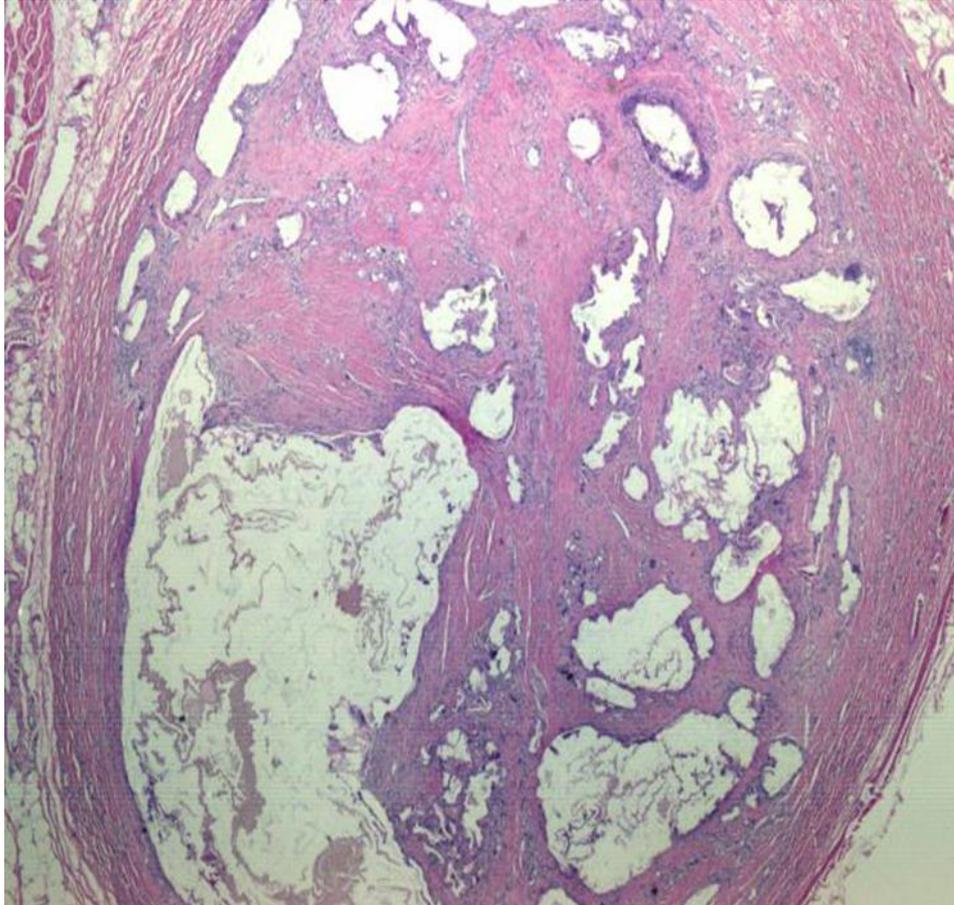
Large amounts of adhesive/thrombus left in AV M, seen on MRI

VenaSeal Polymerization in 1 drop porcine blood

Cyanoacrylate monomers polymerize quickly on contact with anions in blood plasma

Almeida J. et al Cyanoacrylate adhesive for the closure of truncal veins: 60 day swine model results. Vasc and Endovasc Surg 000(00) 1-5. DOI 10.1177/1538574411413938 <http://ves.sagepub.com>

Foreign body reactions

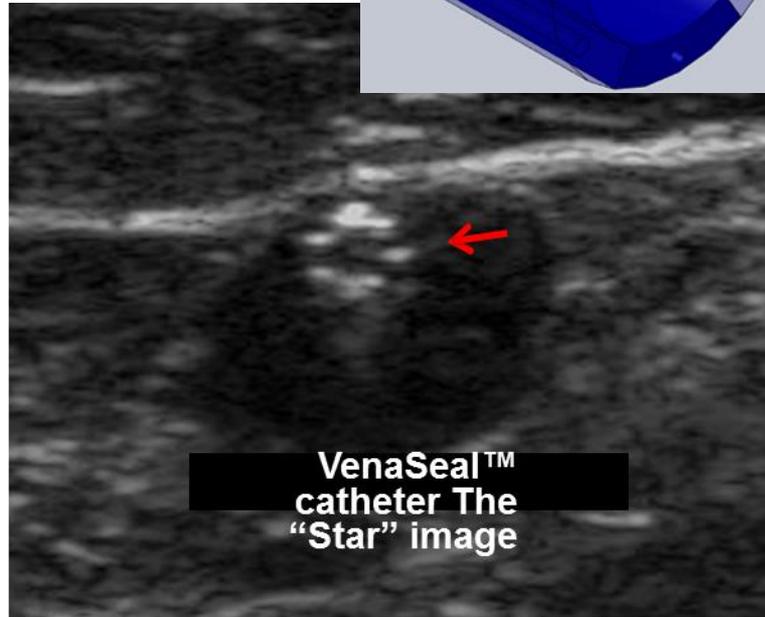
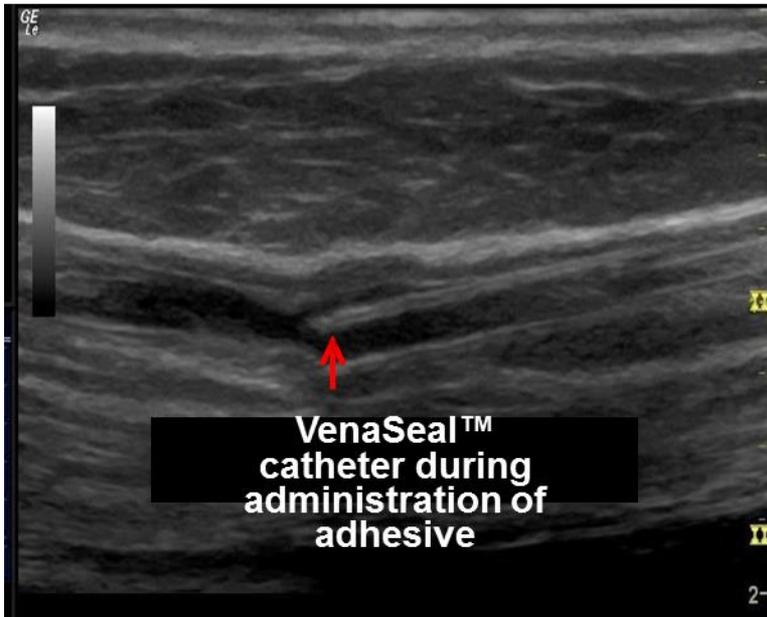
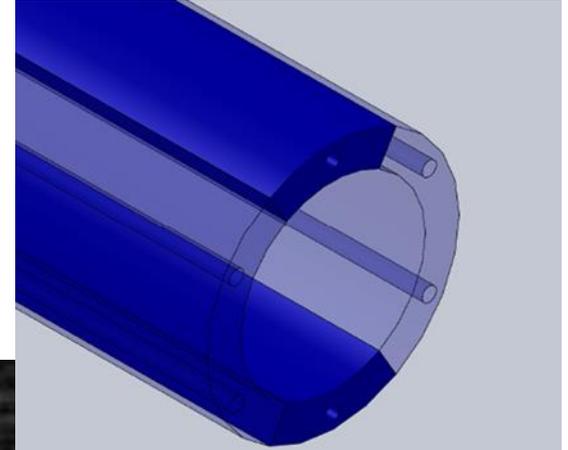




VENASEAL™ closure system

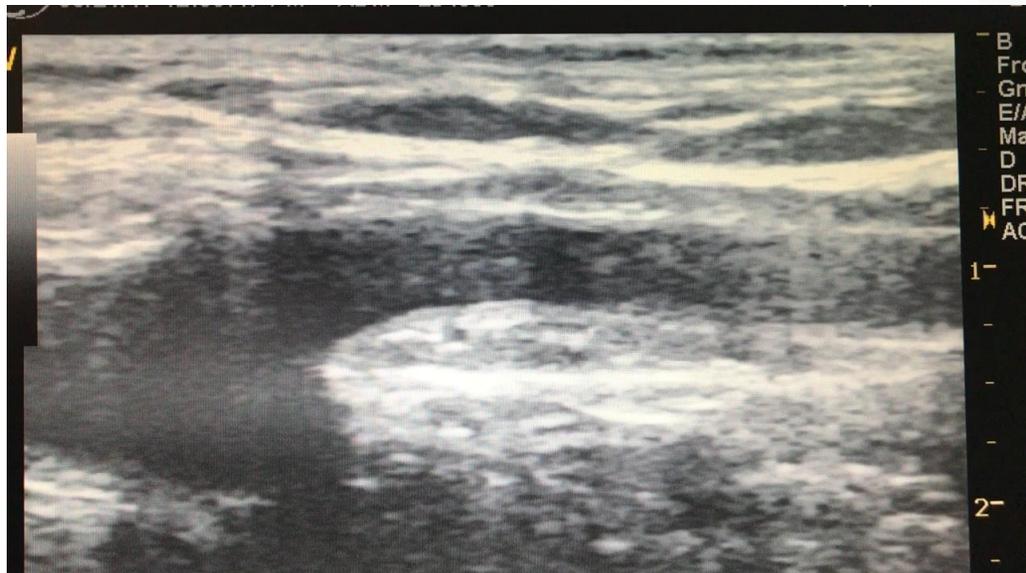
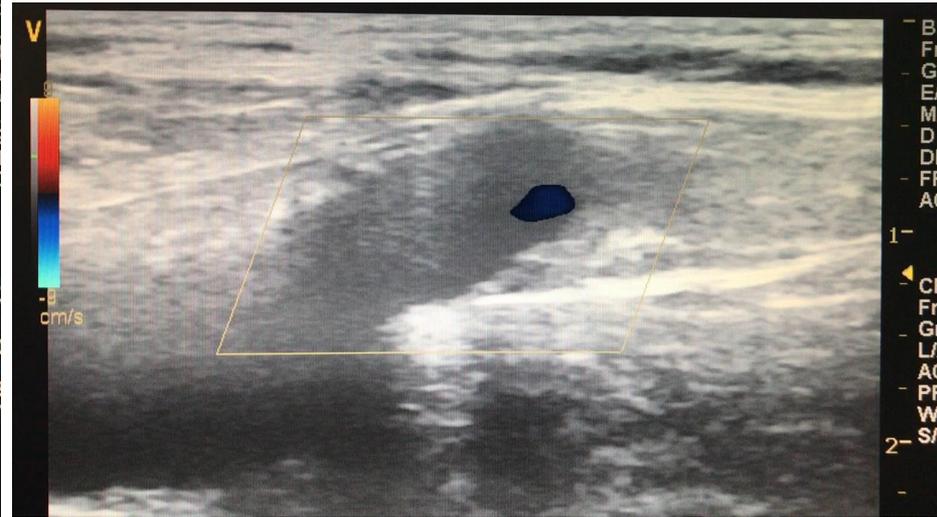
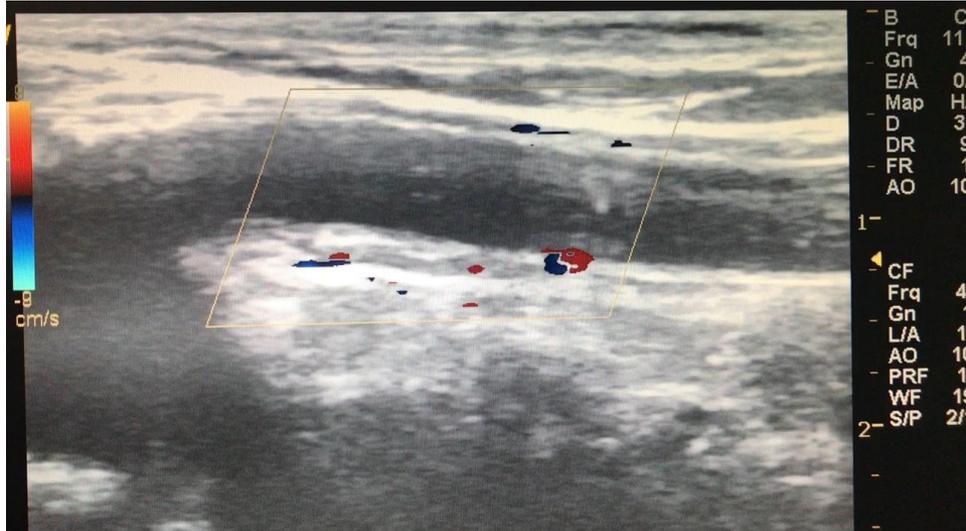


Ultrasound of Venaseal™ catheter





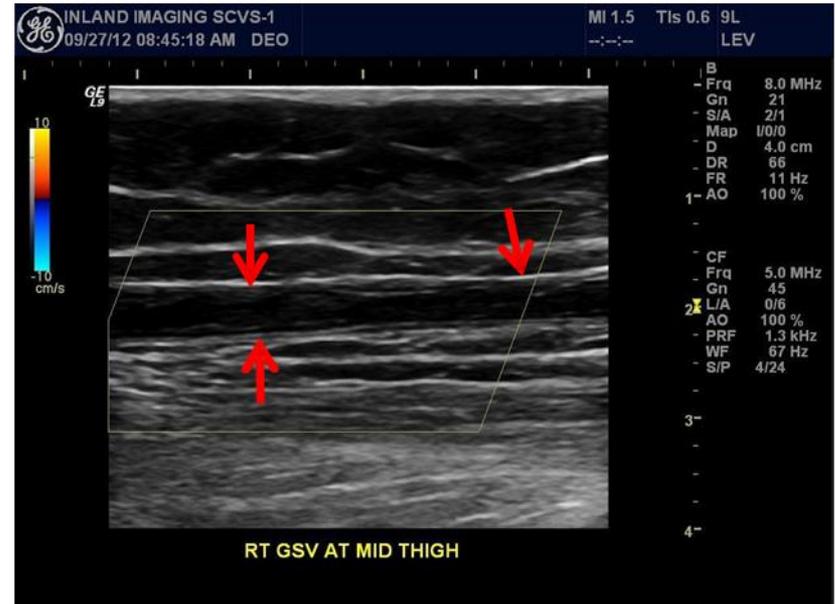
Post Treatment 1 day F/U US



VenaSeal™ Procedure Closure

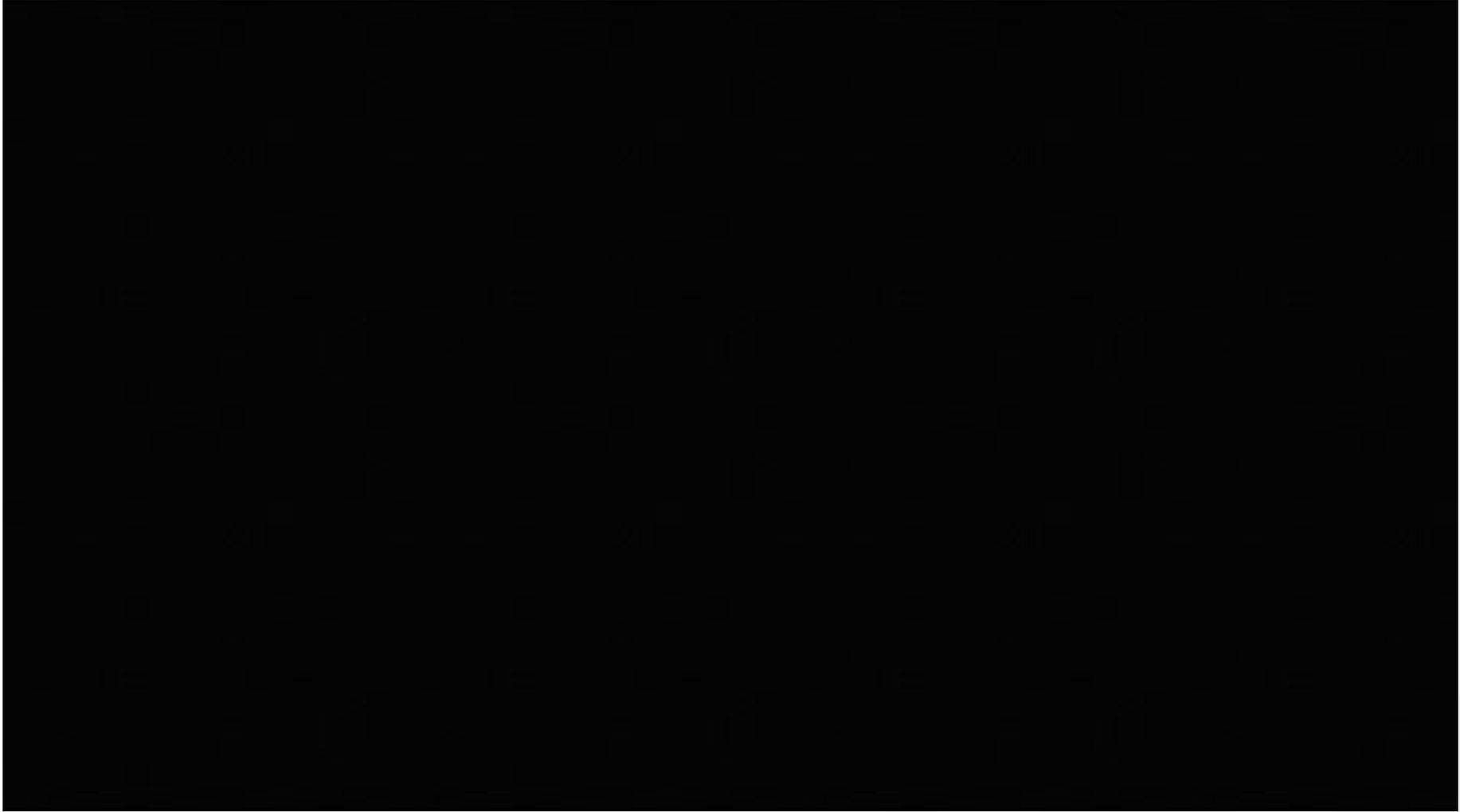


RFA Procedure Closure





Venaseal procedure





VenaSeal Studies

Study	size	F/U	Occusion	Patient pain score (VAS)	Return to normal activities/work	Major complications
Almeida et al. 2015	39	3 years	1year -92.0% 2 year – 92.0 % 3 year – 94.7%	N/A	1 day / 1 day	DVT 6 month 21.1% Phlebitis 21%
Morrison et al. 2015	108	23years	Immediate 99% 6 months – 94.3% 2 years – 94.4%	N/A	N/A	None Phlebitis 20%
Proebstle et al. . 2015	70	1 year	1 years – 92.9%	N/A	N/A	None Phlebitis 11.4%
J. Aim 2014	251	2 years	2 years -100%	1.4	N/A	None Phlebitis 5.3% (inflammation23.8%)
YC Chan et al. 2017	57	1 year	1 year – 78.5 %	N/A	N/A	None
Gibson K et al 2017	70	1 year	1 year – 100 %	N/A	N/A	None Phlebitis 20%
Insoo Park 2017	63	1 year	1 year – 100 %	N/A	N/A	None Phlebitis 17.4%
Langefellner 2015	86Pt. 130 limbs	3 months	3 months – 95.4 %	N/A	N/A	None Phlebitis 8.8%
Zierau 2015	795Pt. 1139 limbs	6 months	6 months – 97.8 %	N/A	N/A	None Phlebitis 11.7%



Cyanoacrylate glue Merits

- Eliminates need for tumescent anesthesia
- No risk of thermal injury
- Rapid return to normal activities
- No capital equipment
- Advanced venous disease status C5,C6 (LDS, Ulcer)
- Thin skinny patient
- Nervous, Anxious patient
- Segmental ablation (No variable pull back rate)
- No post treatment compression

Cyanoacrylate glue Demerits

- Foreign body left (Plastic implant)
- Slow resorption > 5 years
- Long term side-effects of cyanoacrylate are unknown
- Size limitation to <12 mm
- Phlebitic reaction, Hyperpigmentation (vein adherent to dermis)
- Routine NSAID medication after procedure
- Manual compression required
- Tortous vein difficulty
- Too expensive for short length varicose vein

	RFA / EVLT	VenaSeal / Clarivein
Risk of thermal damage to nerves, skin, surrounding tissue- paresthesia	Yes	No
Require tumescent anesthesia	Multiple injections	No
Percutaneous access	6Fr or Larger	4-6Fr.
Generator purchase (capital equipment)	Yes	No
Equipment maintenance costs	Yes	No – totally disposable
Anatomical treatment suitability	GSV & SSV (not ideal for SSV nerve damage)	GSV & SSV and small veins down to ankle
Positioning & pull back speed	2cm from SFJ / 6-8cm per min	5cm VenaSeal / 2cm Clarivein
Patient pain & bruising	More	None / little

Alun Davies . Comparative effectiveness in the treatment of Venous disease : Presented at the 2013 union of international phlebology; September 9, 2013; Boston, US.



ELSEVIER



LEADING ARTICLE

Duplex Ultrasound Investigation of the Veins of the Lower Limbs after Treatment for Varicose Veins – UIP Consensus Document **CME**

M. De Maeseneer ^{a,b,*}, O. Pichot ^{c,d}, A. Cavezzi ^e, J. Earnshaw ^f, A. van Rij ^g, F. Lurie ^h, P.C. Smith ⁱ

- To obtain a consensus of international experts to be used for assessment after treatment
- Ideal non-invasive method for follow-up
: anatomical and haemodynamic information

Immediate : 1-4 weeks after treatment

- Whether the intervention has achieved the intended immediate goal
 - postoperative change of saphenous vein lumen
- Whether the recurrence occur due to inadequate therapy
 - residual incompetent GSV trunk after stripping
- The presence of post-treatment deep vein thrombosis should also be assessed

Late follow-up

- To evaluate recurrence
- Monitor venous recanalization and new site of venous reflux
- Short term – 1 year
Midterm – 2~3 years
Long-term – 5 years or more

MMG Modern varicose vein treatments modalities

