



Laser Ablation for VV: How to Avoid Bad Results; How to Manage Complications

Lowell S. Kabnick, MD, RPhS, FACS, FACPh
Vice President-UIP-North America



Disclosure

Speaker name: Lowell S. Kabnick, MD, FACS, FACPh, RPhS

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I have the following potential conflicts of interest to report:

Consulting: AngioDynamics, Amsel, Bard

Scientific Advisory Board: Venclose

Speakers Bureau: Boston Scientific

Royalties: AngioDynamics



Endovenous Laser

- Complications of EVLT
- **Minor**
- Bruising (51%)
- Haematoma (2.3%)
- temporary numbness (3.8%)
- Phlebitis (7.4%)
- Induration (46.7%)
- sensation of tightness (24.8%)



Endovenous Laser

- **serious complications**
- skin burns (0.5%)
- DVT (0.4%)
- PE (0.1%)
- nerve injury (0.8%)

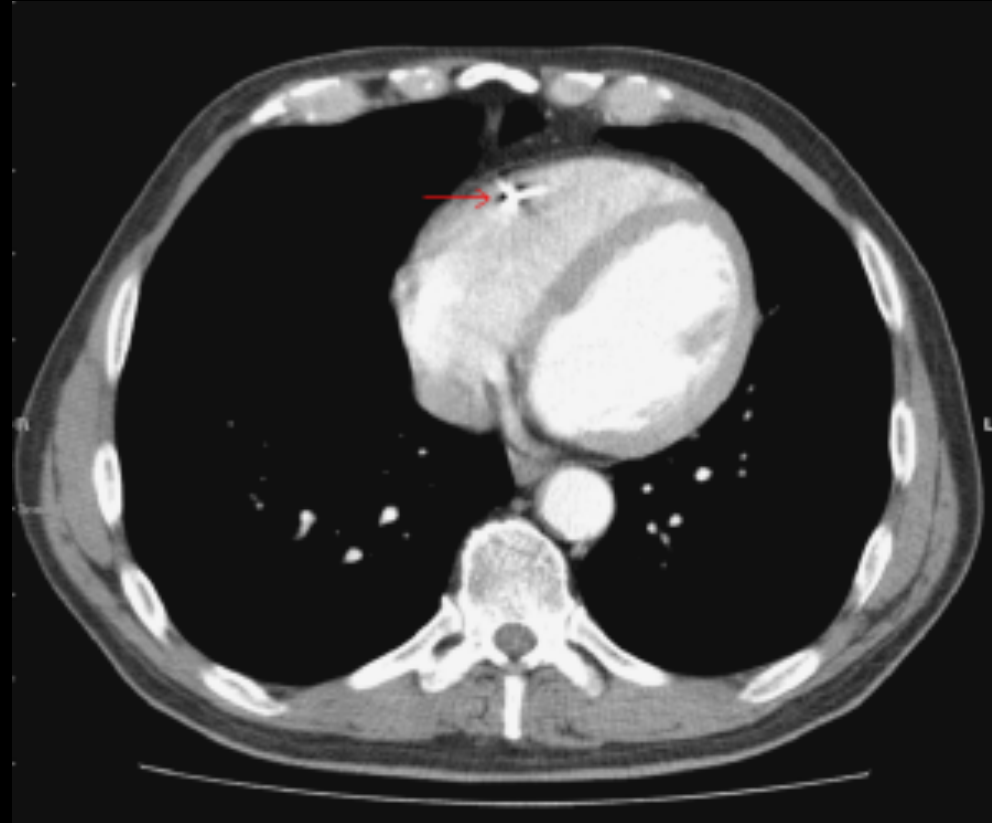
Australian MSAC review of all available literature on the procedure.^[3]

- Retinal damage (<1%)

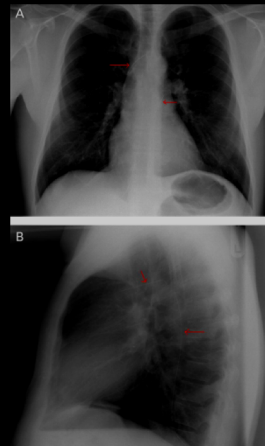
The nominal hazard zone (NHZ) of reflected laser radiation exceeds the maximum permissible exposure (MPE). Use of appropriate protective eyewear specific to the wavelength laser being used may prevent accidental injury.



Wire



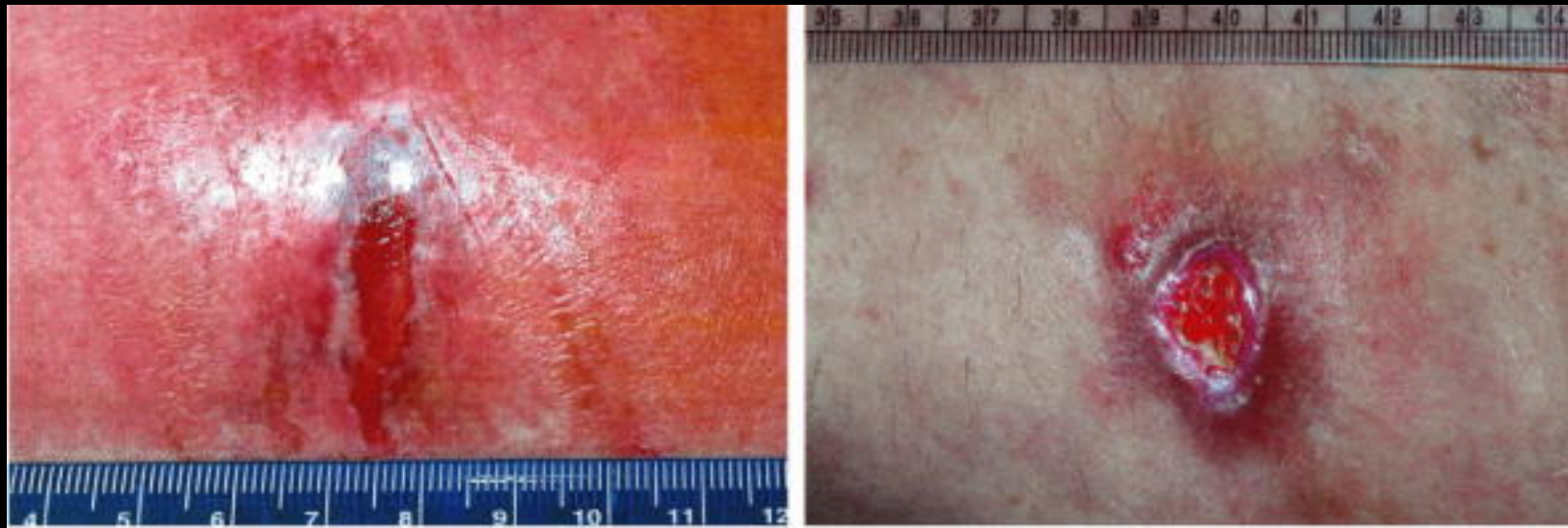
Wire/Fiber



Hyperpigmentation



Post Ablation Burns



Let's look at the Data

International Laser Registry

<u>ADVERSE EFX</u>						
COUNTRY	Ecchymosis	Parasthesia	Phlebitis	Burns	DVT	PE
Argentina	n/d	n/d	n/d	n/d	n/d	n/d
Brazil	n/d	n/d	n/d	n/d	n/d	n/d
Belgium	79/152 (51.97%)	63/152 (41.45%)	2/152 (1.32%)	2/152 (1.32%)	0	0
Chile	n/d	n/d	n/d	n/d	n/d	n/d
England	94/ 94 (100%)	3/ 94 (3.19%)	5/ 94(5.3%)	0%	0%	0%
Equador	n/d	n/d	n/d	n/d	n/d	n/d
France	156/156 (100%)	(2/156) 1.28%	2/156 (1.28%)	0	0	0
Germany	72/160 (45%)	8/160 (.50%)	0/160 (0%)	0	0	0
Italy	503/1087 (46.25%)	18/1087 (1.61%)	49/1087 (4.48)	15/1087 (0.14)	0	0
Peru	n/d	n/d	n/d	n/d	n/d	n/d
Switzerland	2/114 (2.75%)	9/114 (7.89%)	2/114(2.75%)	0	0	0
United States	1875/1933 (97%)	11/1933 (0.569%)	10/1933 (0.517%)	0	10/1933 (.517%)	1/1933 (0.052%)
REPORTED TOTALS	2781/3696 (75.24%)	114/3696 (3.08%)	69/3696 (1.87%)	17/ 3696 (.460%)	10/3696 (.271%)	1/3696 (.023%)

Endovenous Laser Ablation–Induced Complications: Review of the Literature and New Cases

RENATE R. VAN DEN BOS MD¹, MARTINO NEUMANN MD, PHD¹, KEES-PETER DE ROOS MD, PHD², TAMAR NIJSTEN MD, PHD¹

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Issue



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Author	Year	Limbs, <i>n</i>	Wave Length, nm	%					
				Skin Burns	Ecchymoses or Bruising	Dysesthesia	Phlebitis	Deep-vein Thrombosis	Other
Agus ¹	2006	1076	810, 980	0.2	39	0.8	1	0	0%
De Medeiros	2005	20	810	0	100	0	0	0	0%
Darwood	2008	71	810	0	±	1.4	12.7	0	Pruritus 1.4%, transient discoloration 1.4%
Disselhoff	2005	93	810	0	31	0	2	0	Tightness 17%, induration 2%, pain 14%
Elmore	2008	516	810	0.4	±	2.1	±	0	0%
Gibson ¹	2007	210	980	0	0	1.6	0	5.7	0%
Goldman	2004	24	1320	±	0	±	±	±	±
Gonzales-Zeh	2008	45	980	±	64.4	4.4	22.2	0	Induration 68.9%
Huang	2005	230	810	1	0	7.2	0	0	Pain+, induration+
Kabnick	2006	60	810, 980	0	+	0	22	0	Pain+, itching+
Kim 1	2006	34	980	0	24	2.9	2.9	0	Hematoma
Kim 2	2006	60	980	0	27	0	3.3	0	Hematoma, tenderness 28%
Marston	2006	31	810	±	±	±	±	3.2	±

				%					
				Skin Burns	Ecchymoses or Bruising	Dysesthesia	Phlebitis	Deep-vein Thrombosis	
Min 1	2001	90	810	0	+	1.1	0	0	0%
Min 2	2003	499	810	0	24	0	5	0	Pulling cord sensation 90%
Myers ¹	2006	404	810	0	+	0	0	1.9	Pulmonary embolism 0.25%, sural nerve palsy 0.25%
Navarro	2001	40	810	0	+	0	0	0	0%
Oh	2003	15	980	0	100	±	6.7	0	Induration 60%
Park ⁵	2007	21	980	9	60	9	±	0	Tightness 33.3%
Park	2008	390 [±]	980	0	83	2	2.3	0	Pain 87%
Perkowski ¹	2004	165	940	0	+	0	±	0	0%
Pleister	2008	50	980	±	±	±	±	0	±
Proebstle	2003	41	940	0	49	11	8	2.8 [±]	0%
Proebstle	2005	264	940, 1320	0	61-81	5-14	10	0	Pain 50-80%, induration 45-64%
Proebstle	2006	252	940	0	80	9	12	0	Pain 80%, Induration 63%, Hyperpigmentation 2%
Puggioni	2005	77	810	0	±	±	5.2	0	Cellulites 2.6%, urine retention 1.3%, excessive pain 3.9%, hematoma 1.3%, edema 2.6%

				%					
				Skin Burns	Ecchymoses or Bruising	Dysesthesia	Phlebitis	Deep-vein Thrombosis	
Ravi ¹	2006	1091	940	0	+	0	0	0	0%
Sharif	2006	145	810	0.8	83.1	0	0	0	Saphenal nerve injury 0.8%
Theivacumar ¹	2007	68	810	0	+	4.4	4.4	0	0%
Theivacumar	2008	644	810	±	±	1.1	10.2	0.2	±
Timperman ¹	2004	111	810	0.9	±	±	±	0.9	±
Timperman	2005	100	810	0	0	1	0	0	Spider veins 1%
Viarengo ¹	2007	27	980	3.7	62.9	22.2	0	0	Pain 33.3%, induration 18.5%, thrombus extending to femoral vein 7.4%, lipid necrosis 3.7%
Yang	2006	71	1320	0	±	2.8	±	0	Thrombus extending to common femoral vein 1.4%

DVT and Nerve Injuries occur about 1%

CASE PICTURES

- 56 yo female with symptomatic VV
- Previous history of swelling “now and again”
- VV of the medial thigh, no swelling
- Rt GSV reflux from SFJ to proximal calf
- Office EVLT of GSV performed without incident
- One week postop duplex exam
 - GSV closed
 - No EHIT 2



Post Therapy 3yrs later



Original article

Is there a risk for lymphatic complications after endovenous laser treatment versus cryostripping of the great saphenous vein? A prospective study

B C V M Disselhoff*, D J der Kinderen[†] and F L Moll[‡]

*Department of Surgery; [†]Department of Dermatology, Mesos Medical Centre, Utrecht; [‡]Division of Vascular Surgery, University Medical Centre Utrecht, Utrecht, The Netherlands



Phlebology 2008;23:10–14.

Abstract

Objective: To investigate whether lymphatic complications occur after endovenous laser treatment (EVLT) versus cryostripping.

Methods: A prospective analysis of patients who underwent lymphoscintigraphy before and six months after treatment of primary varicose veins.

Results: Of 120 patients randomized in a clinical trial comparing EVLT and cryostripping, 33 agreed to participate in this study. Six months after treatment, none of the 17 patients treated with EVLT and one (6.3%) of the 16 patients treated with cryostripping had clinical grade 1 lymphoedema, with marked disruption of the lymphatics around the knee. This patient also showed an abnormal uptake of radioactive tracer at the groin, 120 min after injection.

Conclusion: This study demonstrated that no lymphatic complications occurred six months after EVLT, whereas one lymphatic complication occurred after cryostripping, however not in the groin but at the knee.

Postoperative Complication

- 68 year old female with symptomatic VV of the left thigh.
- GSV reflux within the fascial compartment to mid thigh and then epifascial to below the knee
- RF performed, entry site below the knee
 - Extra tumescent anesthesia placed around the vein in the epifascial area (originally under the skin and post T 1cm below the skin)

- 1 wk postoperatively
 - Closed GSV
 - NO EHIT 2
 - Complaining of pain in around the epifascial GSV
 - Palpate a cord
 - No erythema

- 3 months postoperative U/S closed GSV
- Picture

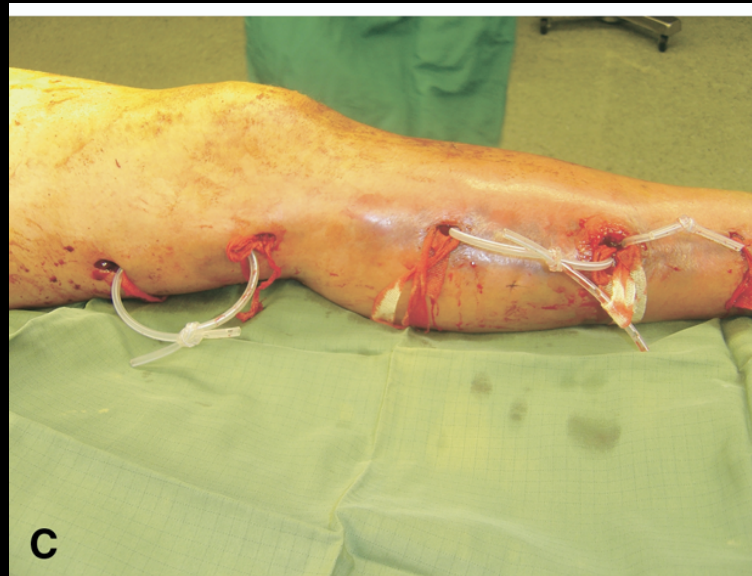


Diffuse phlegmonous phlebitis after endovenous laser treatment of the greater saphenous vein

Karin M. Dunst, MD,^{ab} Georg M. Huemer, MD,^c Wolfgang Wayand, MD,^{ab} and Andreas Shamiyeh, MD,^{ab} *Linz, Austria*

Endovenous laser treatment (EVLT) has become a valuable and safe option in the treatment of varicose veins. Although long-term results are lacking, most patients seem to benefit in the short-term from EVLT. Reported postoperative complications are limited, consisting usually of pain, ecchymosis, induration, phlebitis, or spot skin burn injuries. The most feared complication is an extension of the saphenous thrombus into the femoral vein, with possible pulmonary embolism. Here we report a septic thrombophlebitis after EVLT resulting in a phlegmonous infection of the whole leg that was treated by surgical drainage. Aggressive local therapy and antibiotic treatment resulted in complete resolution of symptoms and eventual satisfactory healing. (*J Vasc Surg* 2006;43:1056-8.)





Stroke following endovenous laser treatment of varicose veins

Alberto Caggiati and Marco Franceschini, *Rome, Italy*



This report describes an ischemic stroke following endovenous laser treatment of the great saphenous vein in a patient with a patent foramen ovale. No thrombophilic conditions or other possible sources of emboli could be demonstrated. (J Vasc Surg 2010;51:218-20.)

Endovenous laser treatment (EVLT) is currently used in selected patients for the ablation of lower extremity varicose veins. First attempts of EVLT date back to 1989 by Puglisi,¹ but it was in 1999 that Boné² reported on the successful use of diode laser in the treatment of great saphenous vein (GSV) reflux. Moreover, many reports about the efficacy and safety of EVLT have been published.³ Contin-



ture, the patient was able to walk. No signs or symptoms of deep vein thrombosis (DVT) were noted at discharge.

On the evening of April 15, the patient reported unspecific visual disturbances and on the next morning she suddenly developed right side hemiparesis with global aphasia. A brain computed tomography (CT) was negative for hemorrhage. Trans cranial Doppler (TCD) demonstrated complete occlusion of the left mid-



Case report

Arteriovenous fistula after endovenous ablation for varicose veins

Nung Rudarakanchana, PhD, MRCS  , Todd L. Berland, MD, FACS, Cara Chasin, MD, Mikel Sadek, MD, Lowell S. Kabnick, MD, FACS, FACPh

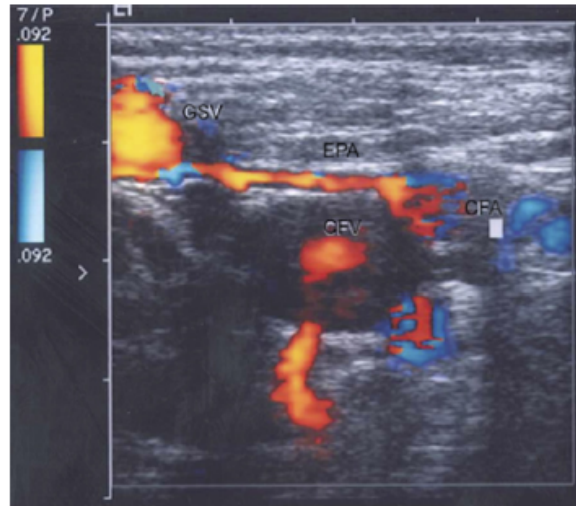
NYU Vein Center, New York University, New York, NY

Endovenous ablation, using radio frequency or laser, is becoming the mainstay of treatment for symptomatic varicose veins in the setting of saphenous vein incompetence. Both procedures have been shown to produce high rates of truncal vein occlusion with few complications. This article presents three patients who developed arteriovenous fistula (AVF) following great saphenous vein treatment: two following radiofrequency ablation (RFA) and one following laser ablation. This is the first published report of AVF following RFA for which operative details are known. We review the literature and discuss possible causes and management of this rare complication. (J Vasc Surg 2011;■■■■.)

Endovenous ablation techniques for treatment of truncal vein incompetence are effective, with short and medium-term outcomes at least equivalent to those for traditional surgical procedures of high junction ligation and vein stripping.^{1,2} Although rates of complications appear to be lower than those for conventional surgery,^{3,4} ablative techniques can result in complications not previously seen with open procedures, such as skin burns, and rarely, endothermal heat induced thrombosis (EHIT) and arteriovenous fistula (AVF). From our center's experience of over 2500 procedures, we describe three patients (<0.15%) who developed AVF following endovenous ablation.

CASE REPORT

Three patients with primary varicose veins who underwent endovenous ablation for saphenofemoral (SFJ) and great saphenous vein (GSV) incompetence are presented. All procedures were carried out under local tumescent anesthesia with duplex ultra-



Review of literature

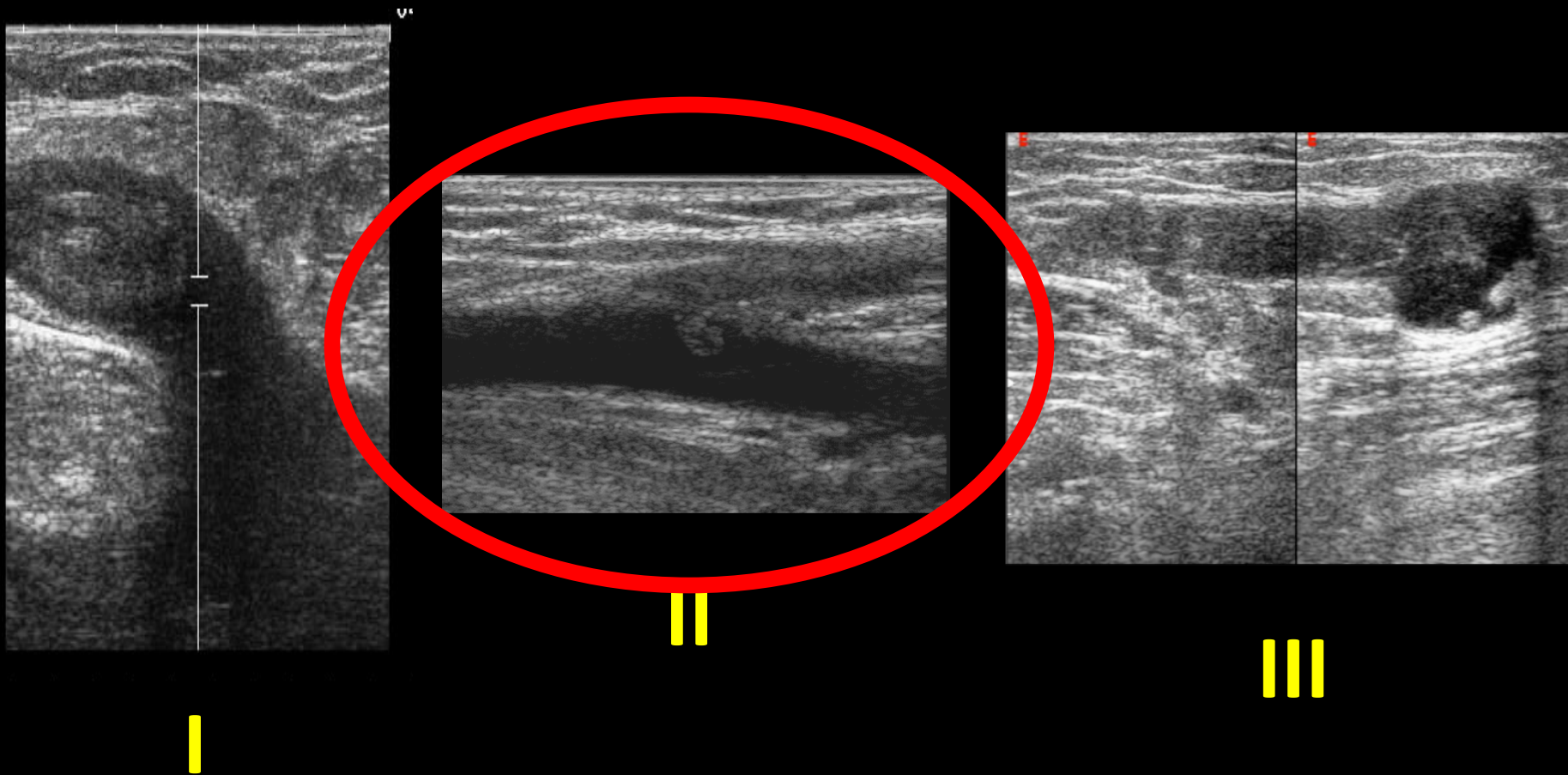
- Rare complication (<0.15%)
- **Total of 11 patients**
- 8 cases after EVLA (73%)
 - 810nm diode, 1320nm Nd:YAG
- 4 cases after ablation of SSV (36%)
- 4 patients symptomatic (36%)
 - 3 patients oedema
 - 1 patient high output cardiac failure

Thrombus Extension



JUN 14 2003

EHIT Classification

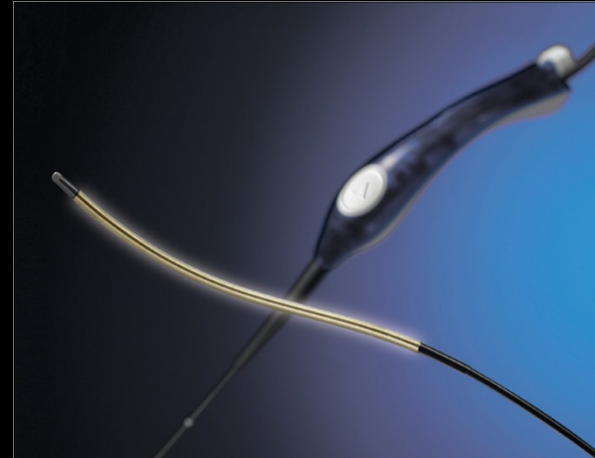


Objective

- Evaluation of EHIT II



VS



Methods

- Retrospective review (4/07 – 4/10)
- Vein Center at NYU
- **2,276 procedures (EVLA 507, RFA 1769)**
- **29 EHIT II**
- Inclusion
 - Treatment of GSV and SSV
- Primary Outcome
 - Rate of EHIT II
- Secondary Outcomes
 - Anticoagulation, hematoma, thrombophlebitis

Results

- **EHIT II**
 - EVLA vs RFA (2.2% vs 1.0%, P=0.07)
- **EHIT III, IV**
 - No reported cases
- **Diminishing trend of EHIT II**
 - 1st year 5.2% *
 - 2nd year 1.8%
 - 3rd year 0.4%

 - ***2.5 cms**

Conclusions

- **EHIT II does not differ significantly in patients treated using EVLA as compared to RFA.**
- **Frequency of EHIT II diminishes with increasing experience**
- **Majority of patients with EHIT II are treated using anticoagulation 2010**



I'M Star d'Argent

Thank you
lsk@lowellkabnick.com