Endovascular and Minimally Invasive Treatment of Varicose Veins

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The Vein Center at Atlantic Medical Imaging

Common Myths Surrounding Venous Disease

Patients...

- “Something I will have to learn to live with...”
- “They are only of cosmetic concern...”
- “There is nothing I can do about them...”
- “I don’t want to undergo surgery...”

Common Myths Surrounding Venous Disease

- Physicians…
  - “I don’t treat them…”
  - “Just elevate your legs…”
  - “Don’t treat these veins…you will need them later for bypass grafting…”

Reality…

Significance

- Improved awareness in both the medical community and the lay population
- There is now a better understanding of the implications and impact of venous reflux disease
- Significant health impacts
- Patients seek out “minimally invasive” procedures and “non-surgical therapies”

Significance

Your patients will be asking you!

Spectrum of Disease

- Spider veins and telangiectasias

Small reddish and purple veins near the skin surface (treatment usually considered cosmetic and not reimbursed by insurance)

Spectrum of Disease

- Reticular veins

Blue or green deeper veins under the skin surface (treatment usually considered cosmetic and not reimbursed by insurance)

Spectrum of Disease

- Varicose veins

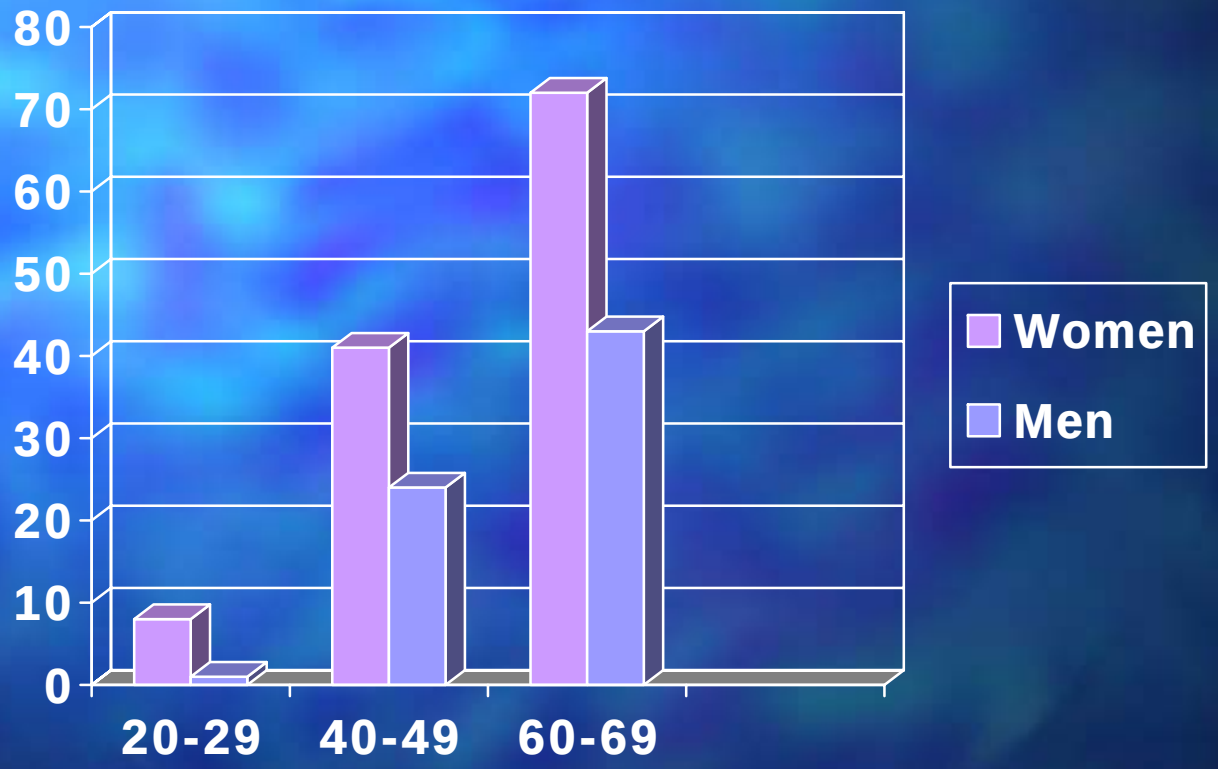
Large bulging veins that are easily palpable (usually symptomatic and treatment most often covered by insurance)

Spectrum of Disease

- Venous ulcers

Breakdown of the skin related to Failure of the venous system and Venous insufficiency (usually symptomatic and treatment most often covered by insurance)

Prevalence



- Coon WW et al. Venous Thromboembolism and Other Venous Disease in the Tecumseh Community Health Study. Circulation 1973; 48:839-846.

Etiology of Varicose Veins

- Heredity
  - No known specific genetic factors
  - Reflux at saphenofemoral junction is 2X as likely in those with a parent with the condition
- Occupational
  - Those with jobs requiring long periods of standing

Etiology of Varicose Veins

- Sex and hormones
  - During menstrual cycle veins become more distensible due to hormonal influence
  - Pregnancy
- Age
  - Elastic lamina degenerates and smooth muscle layer atrophies

Clinical Presentation

- Leg heaviness and aching
- Exercise intolerance
- “Restless” legs
- Night cramps
- Edema
- Paresthesias
- Pain or tenderness along the course of a vein
- Skin changes
  - Edema and hyperpigmentation
  - Stasis dermatitis
  - ulceration

Clinical Presentation

- Symptoms generally are least in the morning and worsen throughout the day
- Exacerbated by long periods of standing
- Often history of self medication with OTC analgesics and support stockings
- Veins often worsen during pregnancy
- Progressive worsening

Clinical Presentation – Clinical CEAP Classification

- Class
  - 0 – no signs or symptoms
  - 1 – spider or reticular veins
  - 2 – varicose veins
  - 3 – edema
  - 4 – skin changes
  - 5 – healed ulcer
  - 6 – active ulcer

Normal Anatomy and Physiology

- Unlike upper extremity veins, the veins of the lower extremities are subjected to significant hydrostatic pressure
- Normal valves help “segment” this column of blood to reduce the pressure felt by any segment of the vein
- Venous system is a **low** pressure system

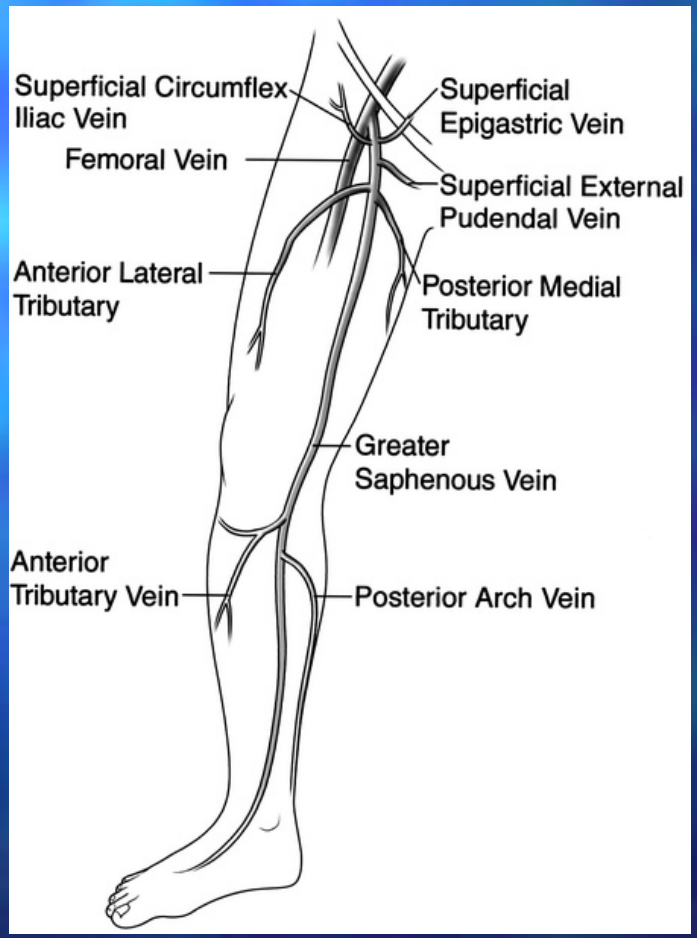
Normal Anatomy and Physiology

- Deep and a superficial system separated by the deep muscular fascia
- Deep system is relatively high pressure due to the “calf pump” mechanism to facilitate venous return to the heart
- The superficial system is a lower pressure, capacitance system

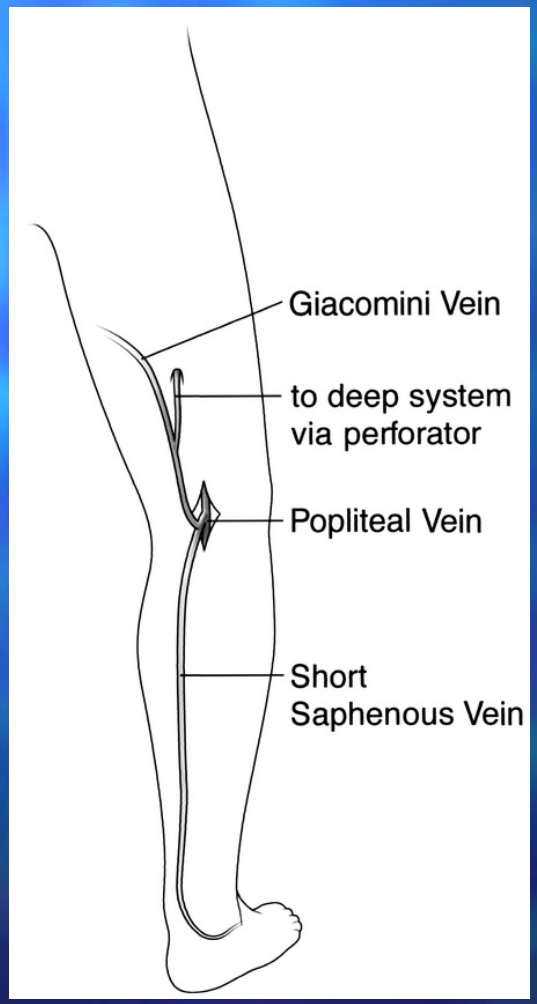
Normal Anatomy and Physiology

- Deep System
  - CFV
  - Femoral vein
  - Popliteal vein
  - Calf veins – tibial and gastrocnemius
- Superficial System
  - GSV
  - LSV
  - Tributaries
- Perforators

Normal Anatomy and Physiology



Normal Anatomy and Physiology



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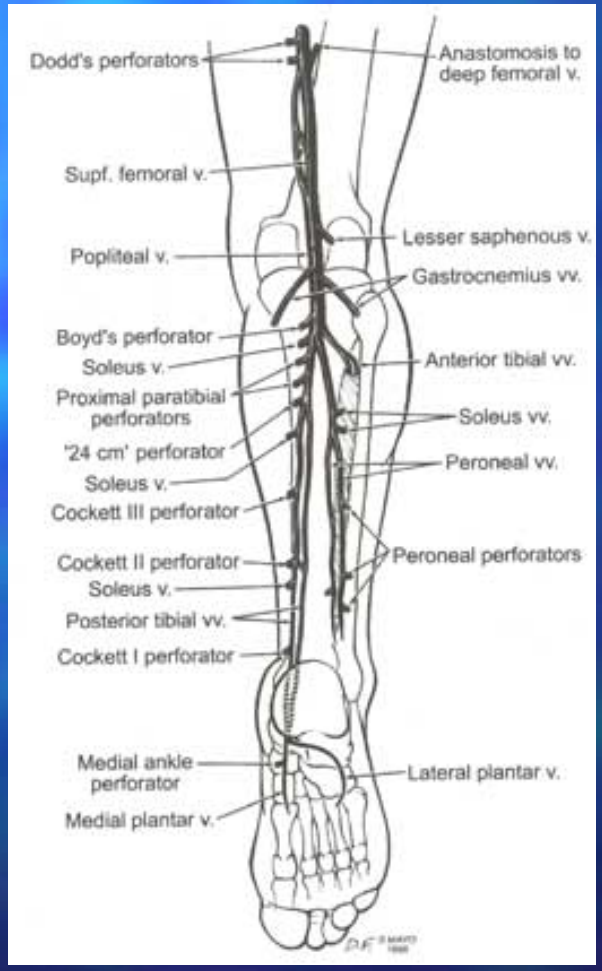

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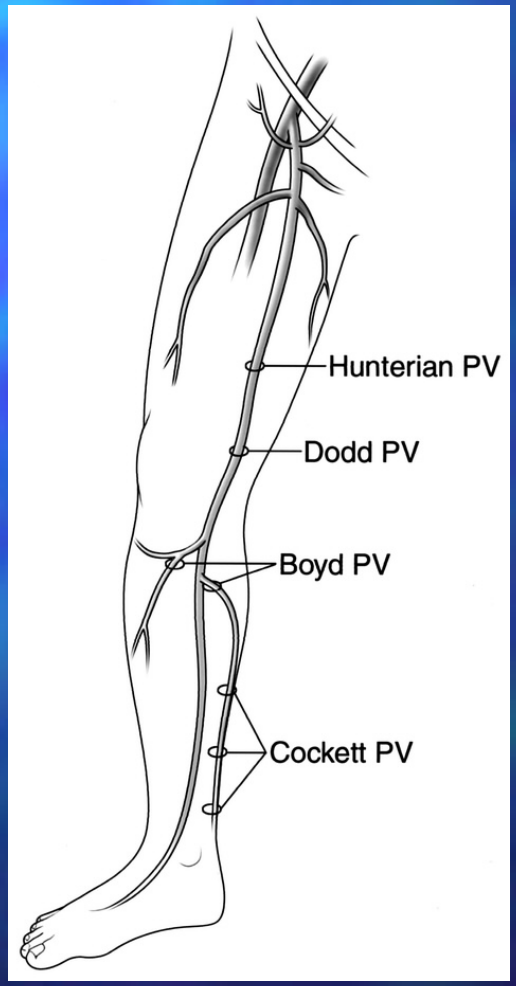
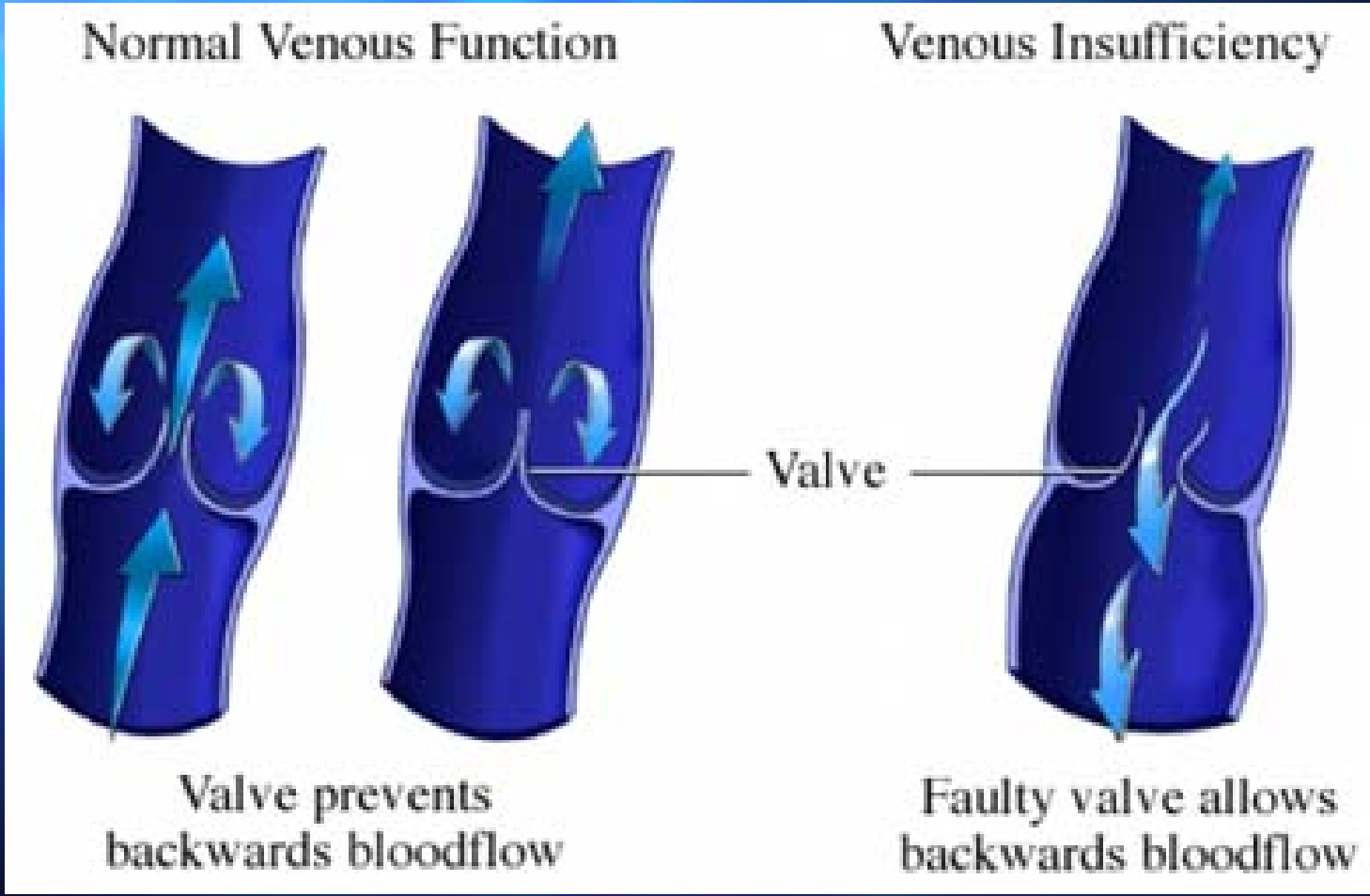


Normal Anatomy and Physiology

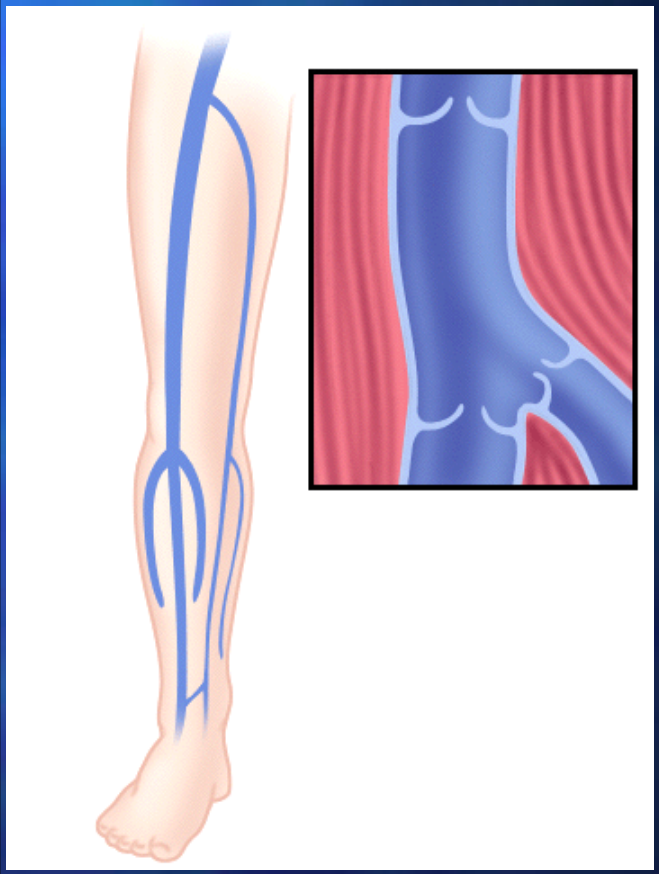
- Calf Pump
  - Calf muscles contract and due to the tight, rigid muscular fascia results in elevated pressure to “pump” the blood against gravity and towards the heart
  - When the muscles relax, pressure decreases and allows flow from the superficial to deep system via perforators
  - Competent valves in the perforators and superficial system prevent exposure of the superficial system to the higher pressures of the deep system

Etiology of Venous Insufficiency



Superficial Venous Insufficiency

Etiology of Primary Disease



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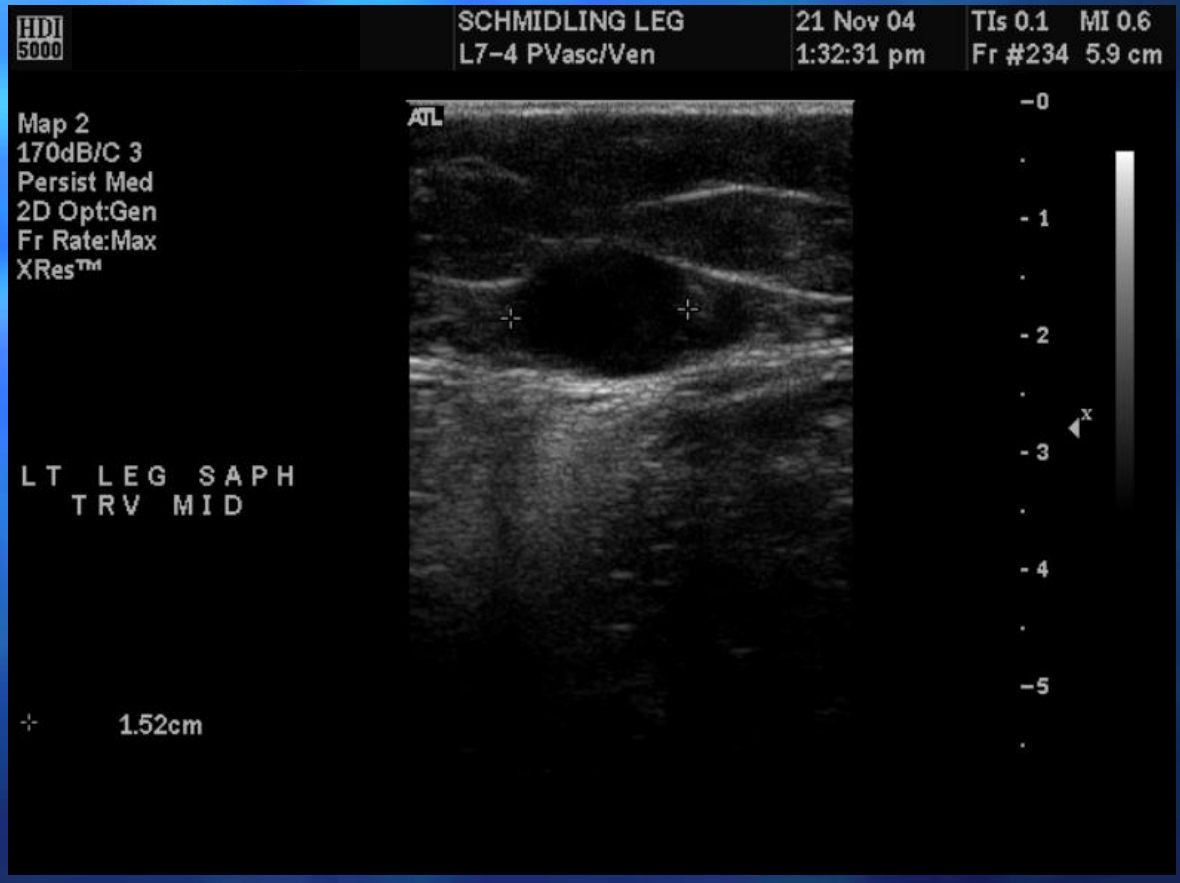

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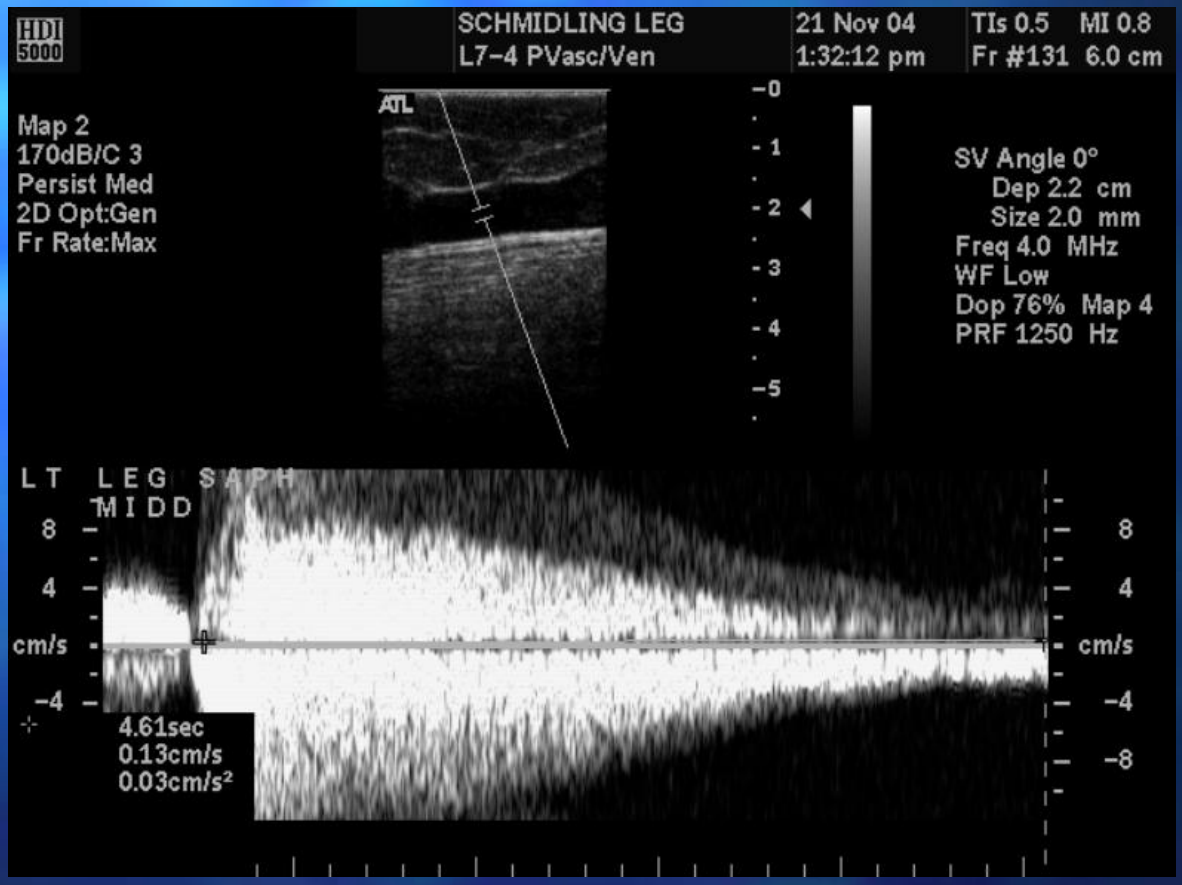

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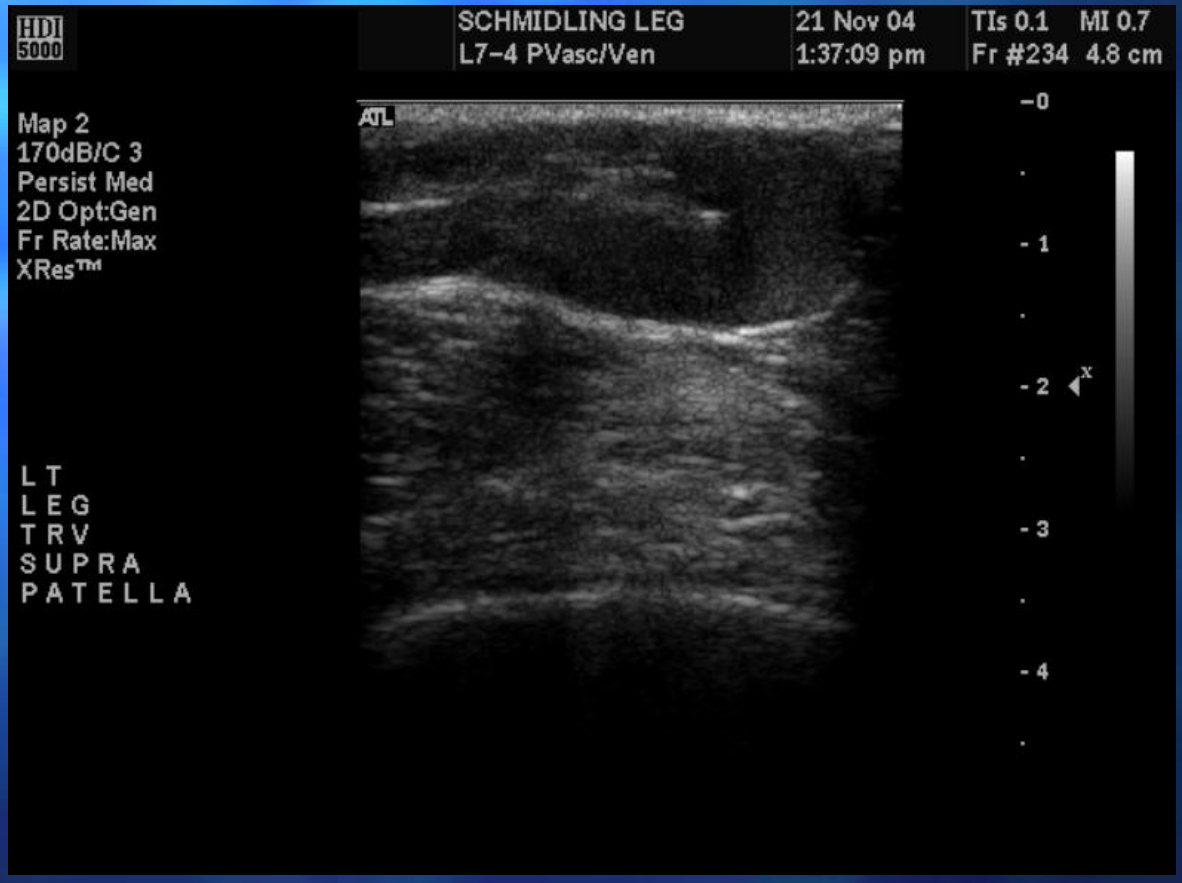

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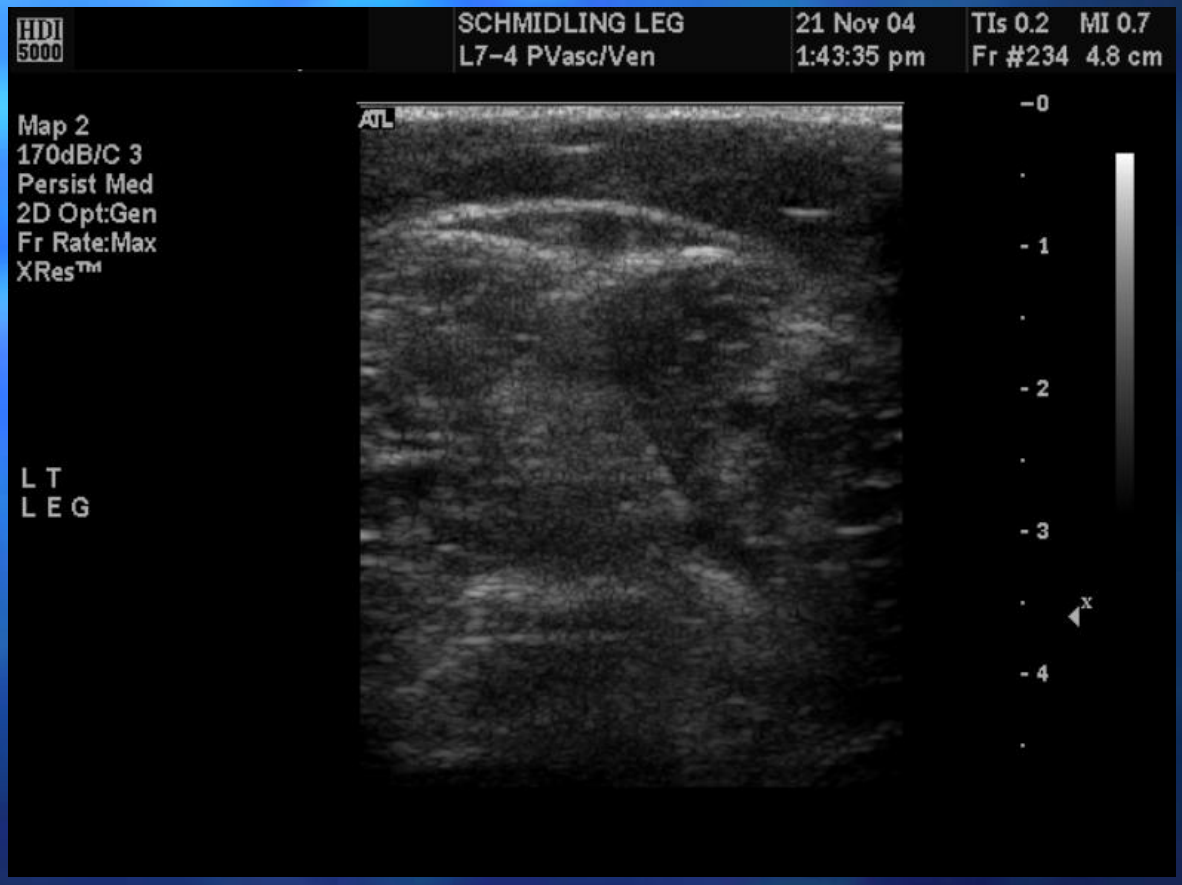

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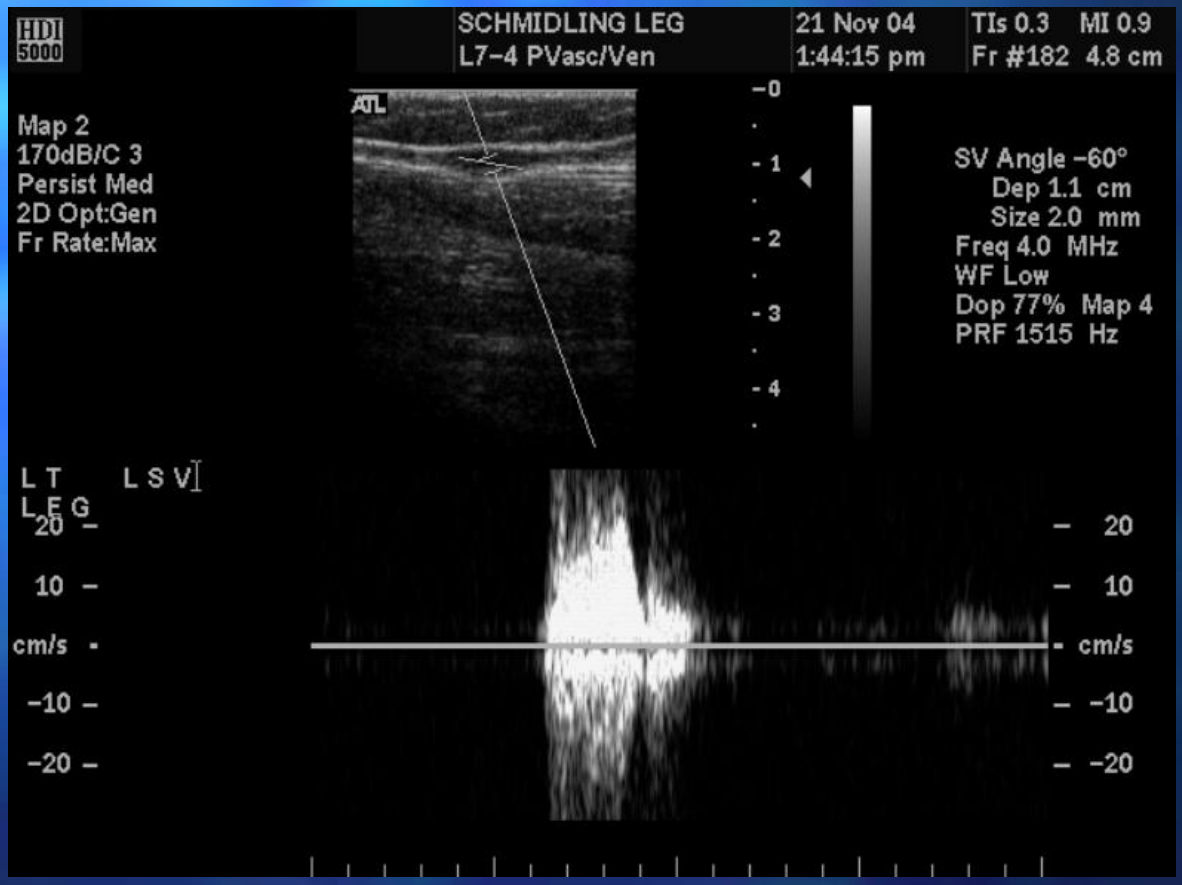
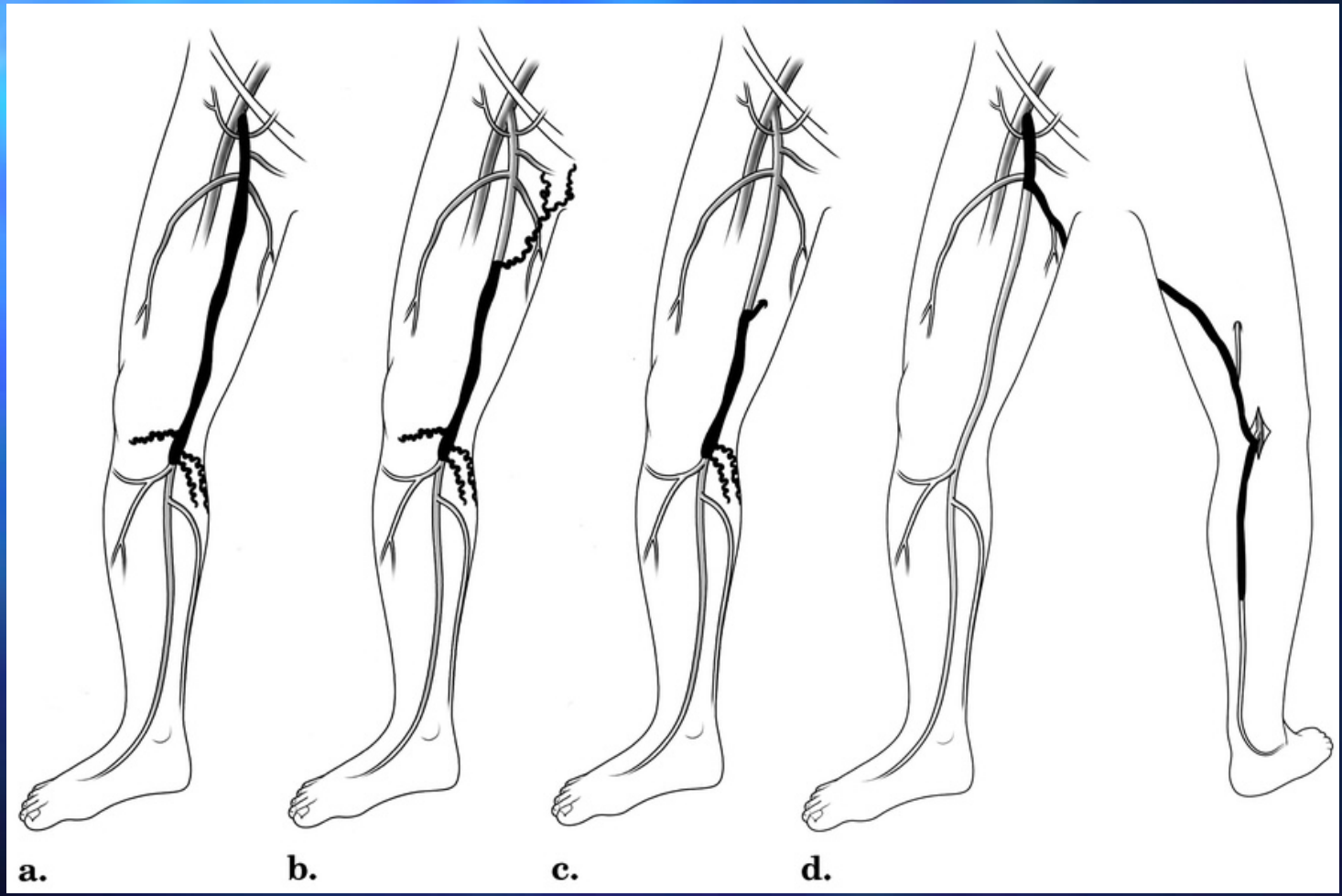


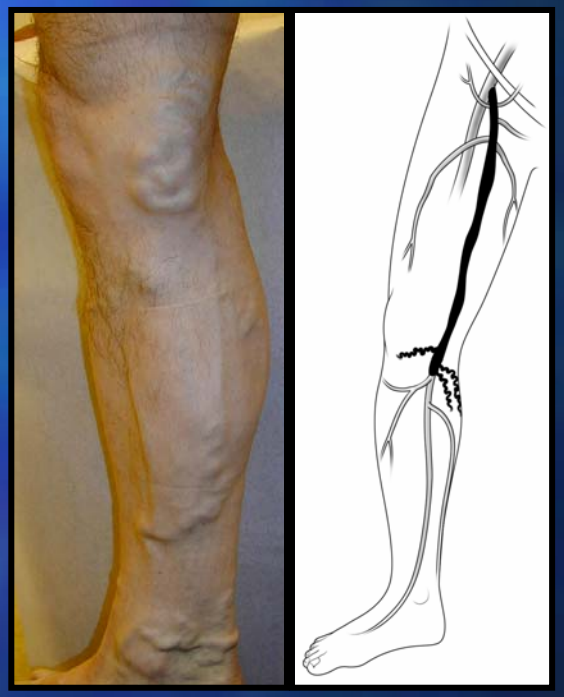
Common Patterns of Reflux



Great Saphenous Vein Reflux

Treatment Goals

- Eliminate reflux
  - SFJ and SPJ
  - Perforator(s)
- Ablate incompetent venous segments
- Eliminate recirculation
- Clinical improvement



Surgical Ligation and Stripping

- Traditional therapy
- Possible complications of surgery
  - Paresthesia, infection, bleeding, scars
- Prolonged recovery period
- Increased costs of in-hospital procedure
- Greater risks and costs associated with general anesthesia

Endovascular Varicose Vein Rx

Therapy of varicose veins has been revolutionized by endovascular techniques such as endovenous laser therapy.

Endovascular Varicose Vein Rx

- Endovascular ablation of Greater Saphenous Vein using laser or radiofrequency energy transmitted through a catheter based system
- Ancillary procedures: sclerotherapy and ambulatory phlebectomy
- Results comparable to (and often better than) ligation and stripping with decreased morbidity and shorter post procedure recovery time

Endovascular Varicose Vein Rx

- Basic tenent: Underlying venous insufficiency and valvular incompetence must be treated first.
- “Ancillary” procedures such as phlebectomy and sclerotherapy are doomed to failure if there is persistent underlying reflux.

Endovascular Varicose Vein Rx

The search for less invasive techniques to treat varicose veins has led to the development of

- Ultrasound Guided Sclerotherapy

  (liquid and foam)
- Endovenous Laser Treatment

Diomed 810 nm Diode Laser

Endovenous Laser Treatment

Materials and Methods

- Venous mapping with duplex-ultrasound
- 5 Fr introducer sheath placed into GSV
- 600 micron laser fiber (Diomed, Inc., Andover, MA) introduced into sheath
- Laser fiber positioned at SFJ using US and direct visualization of red aiming beam
- 0.2% lidocaine delivered perivenously under sonographic guidance (distal to proximal)

Endovenous Laser Treatment

Materials and Methods

- 810 nm wavelength laser energy provided by Diomed Laser (Diomed, Inc., Andover, MA)
- Laser energy delivered endovenously 10 mm below SFJ and along GSV
- Fiber withdrawn at rate of 1-3 mm per second
- 14 watts continuous mode
- Class I (20-30 mm Hg) stockings for 4 wks

Procedure

Procedure

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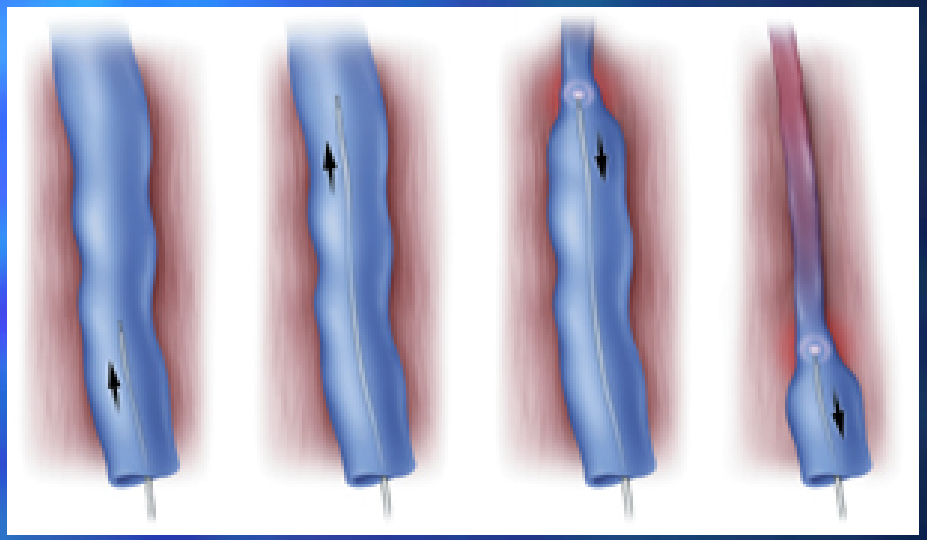
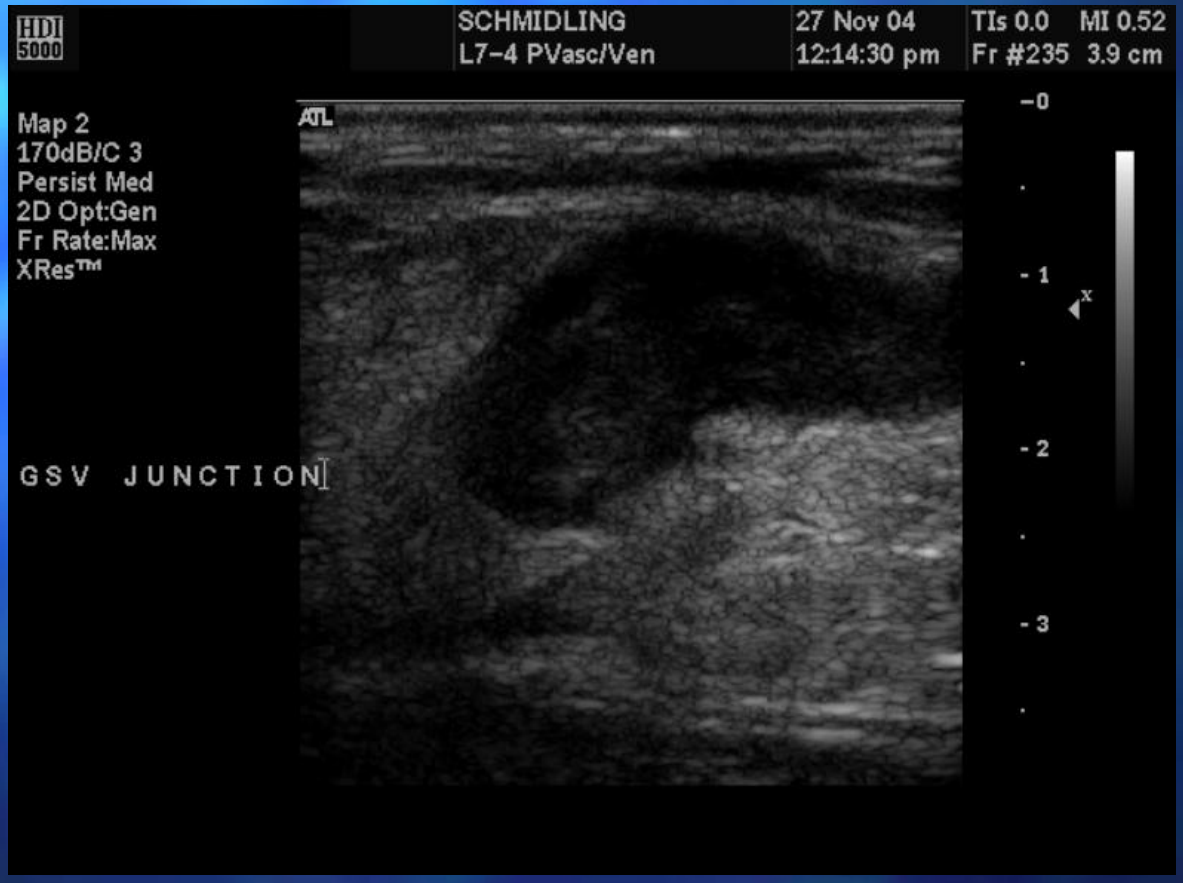
The Procedure

The Procedure



Post-procedure



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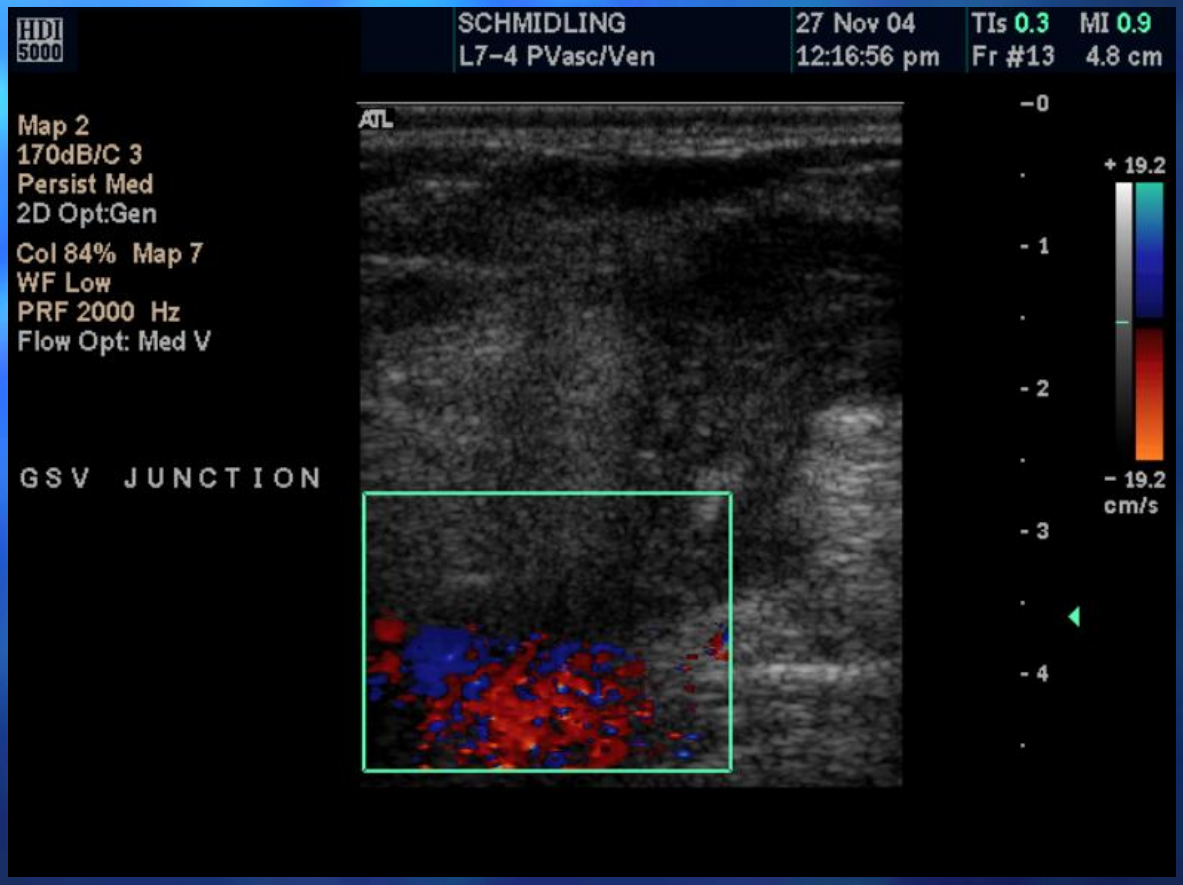

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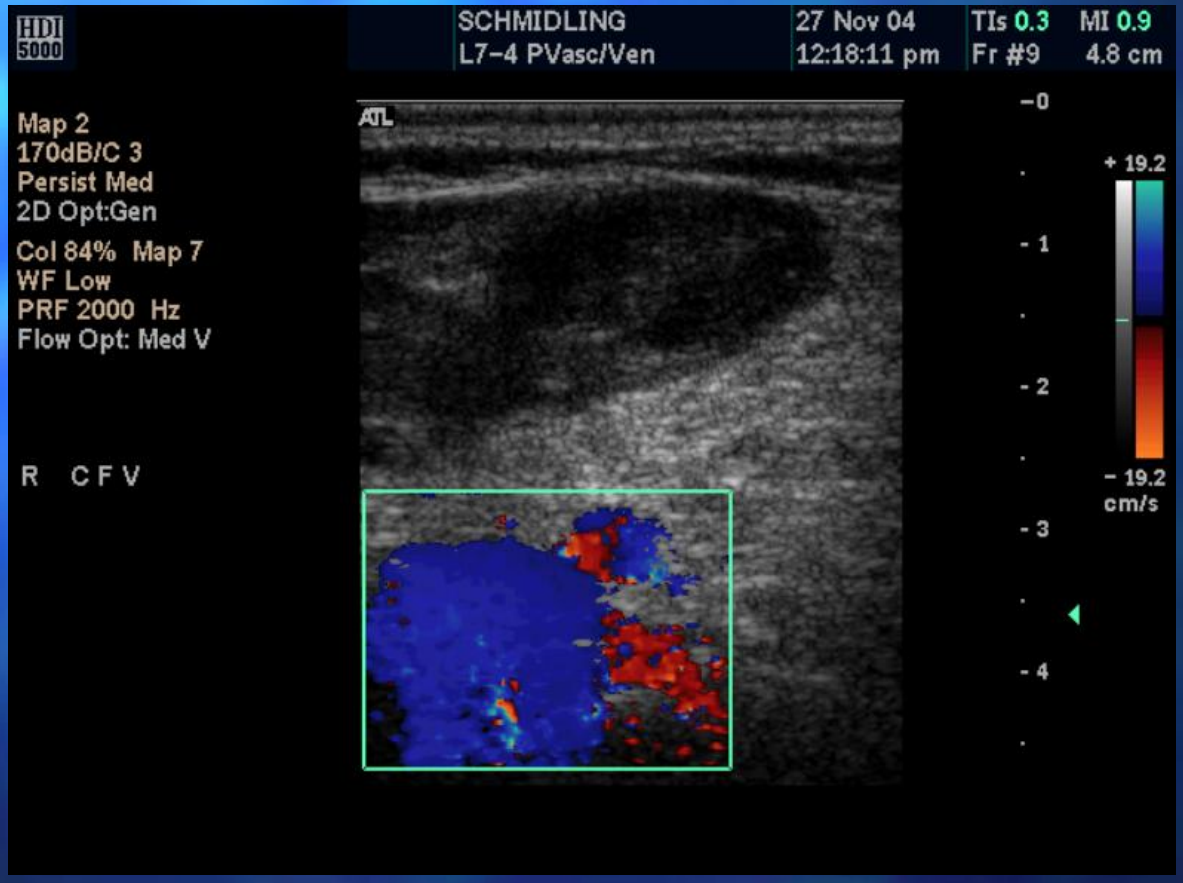

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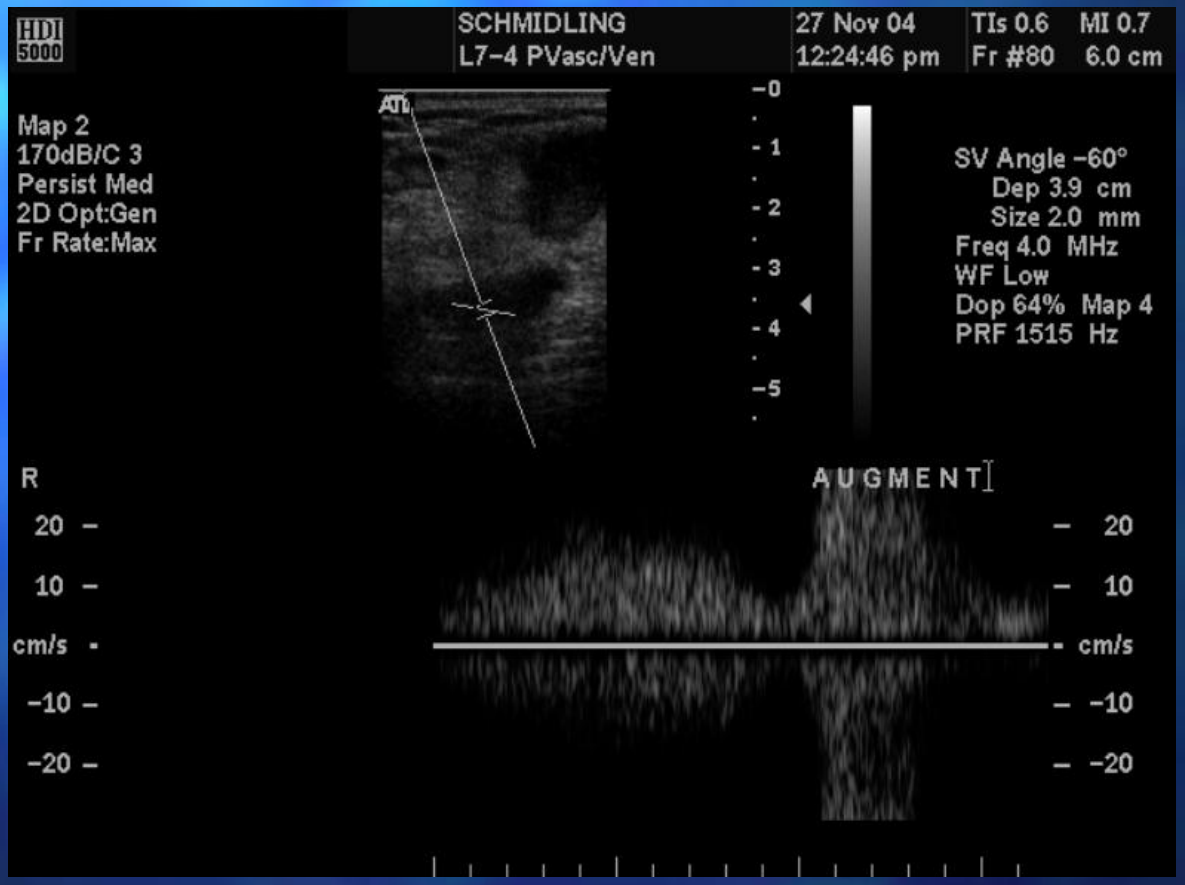

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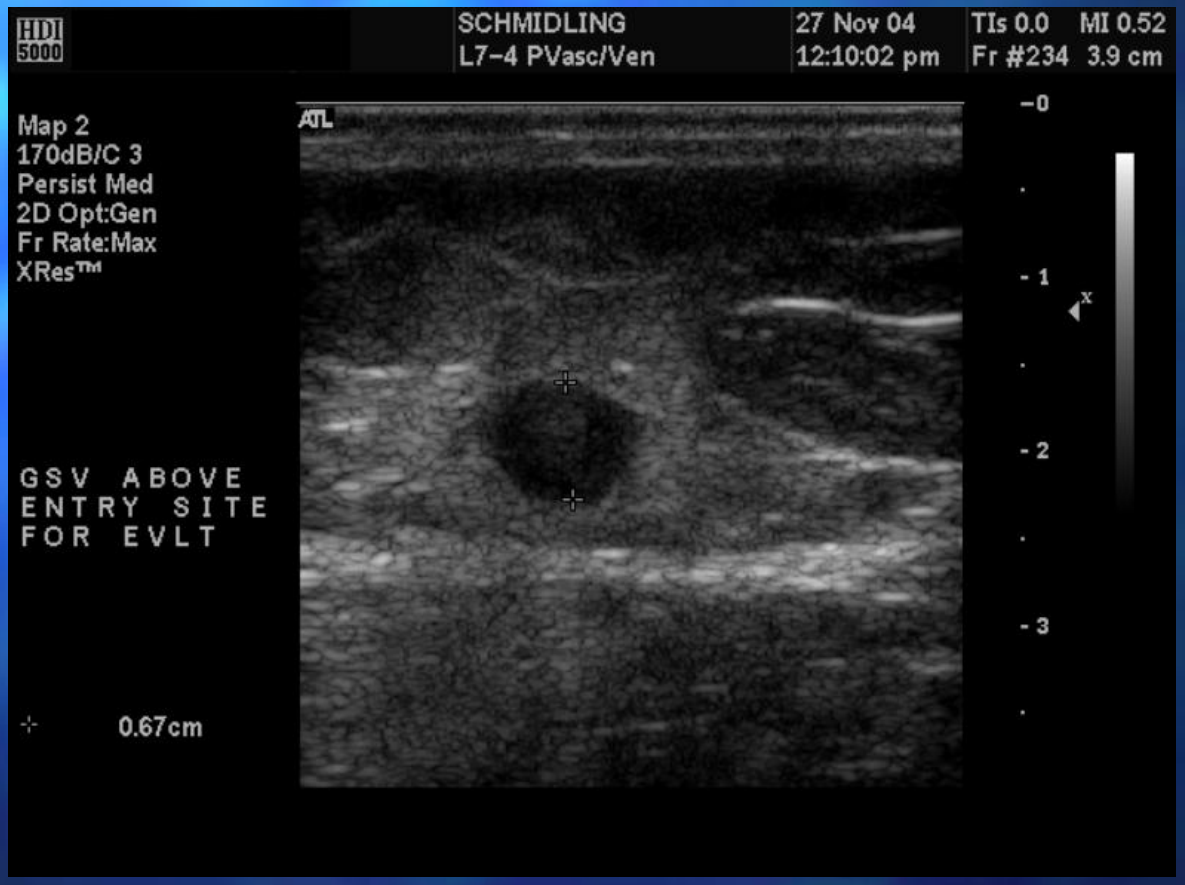

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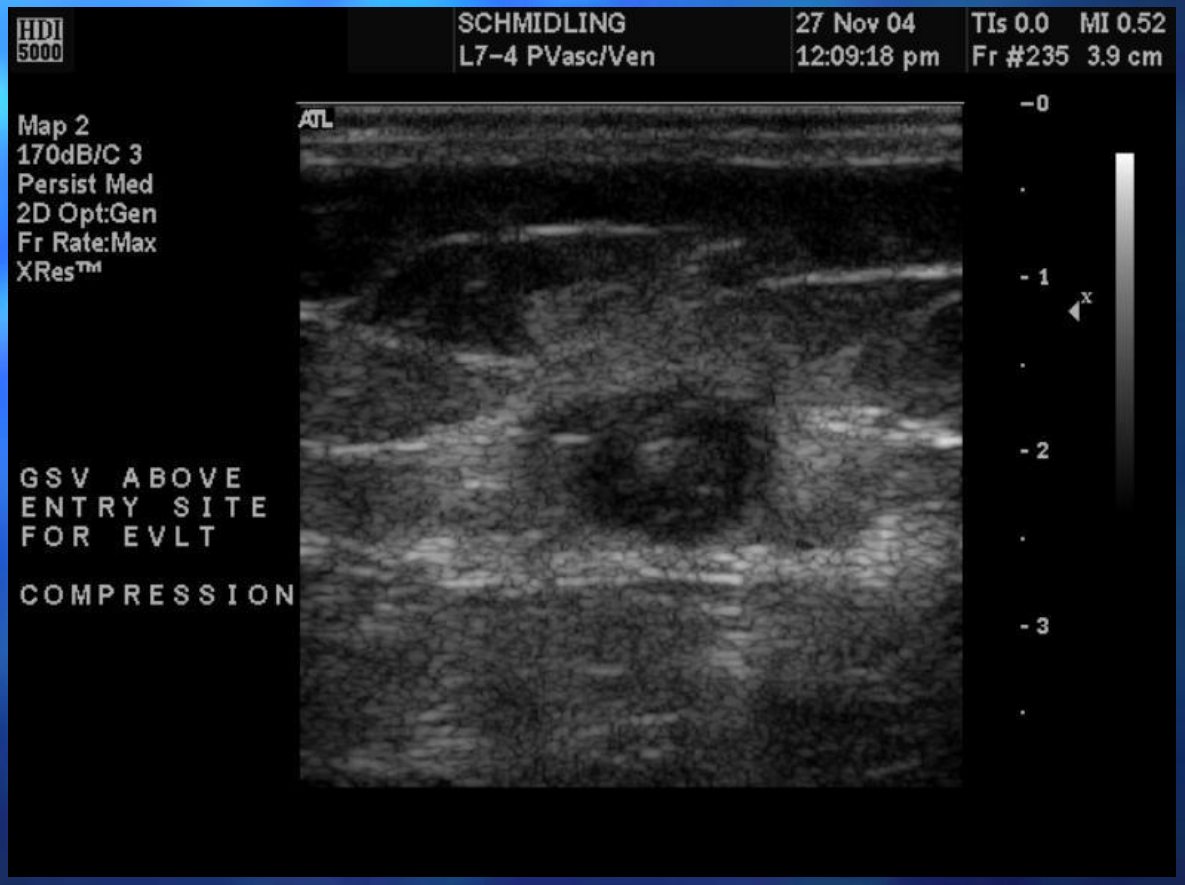

Post-procedure

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Post-procedure

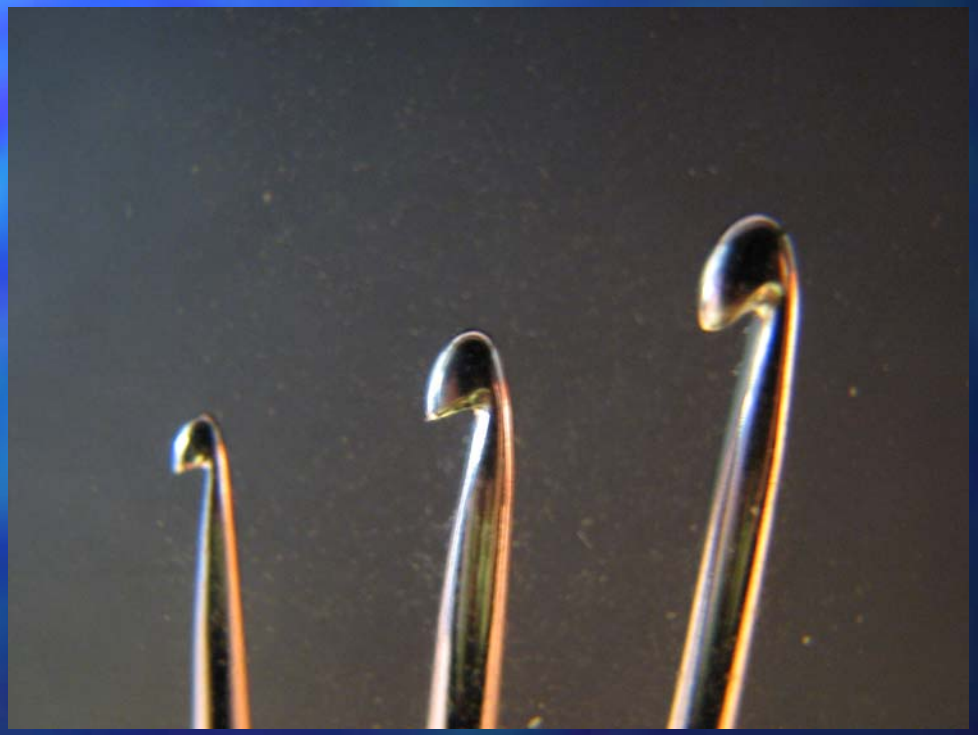
Post-procedure

Ancillary Procedures

- Phlebectomy
  - After surgical prep, skin is anesthetized with dilute lidocaine solution
  - Small “stab” incisions are made with 16g admixture needle
  - Varicosities are hooked with a phlebectomy hook
  - Hemostats used to pull and “tease” the vein out
  - Repeated over course of varicosity

Ancillary Procedures

Phlebectomy hooks



Procedure

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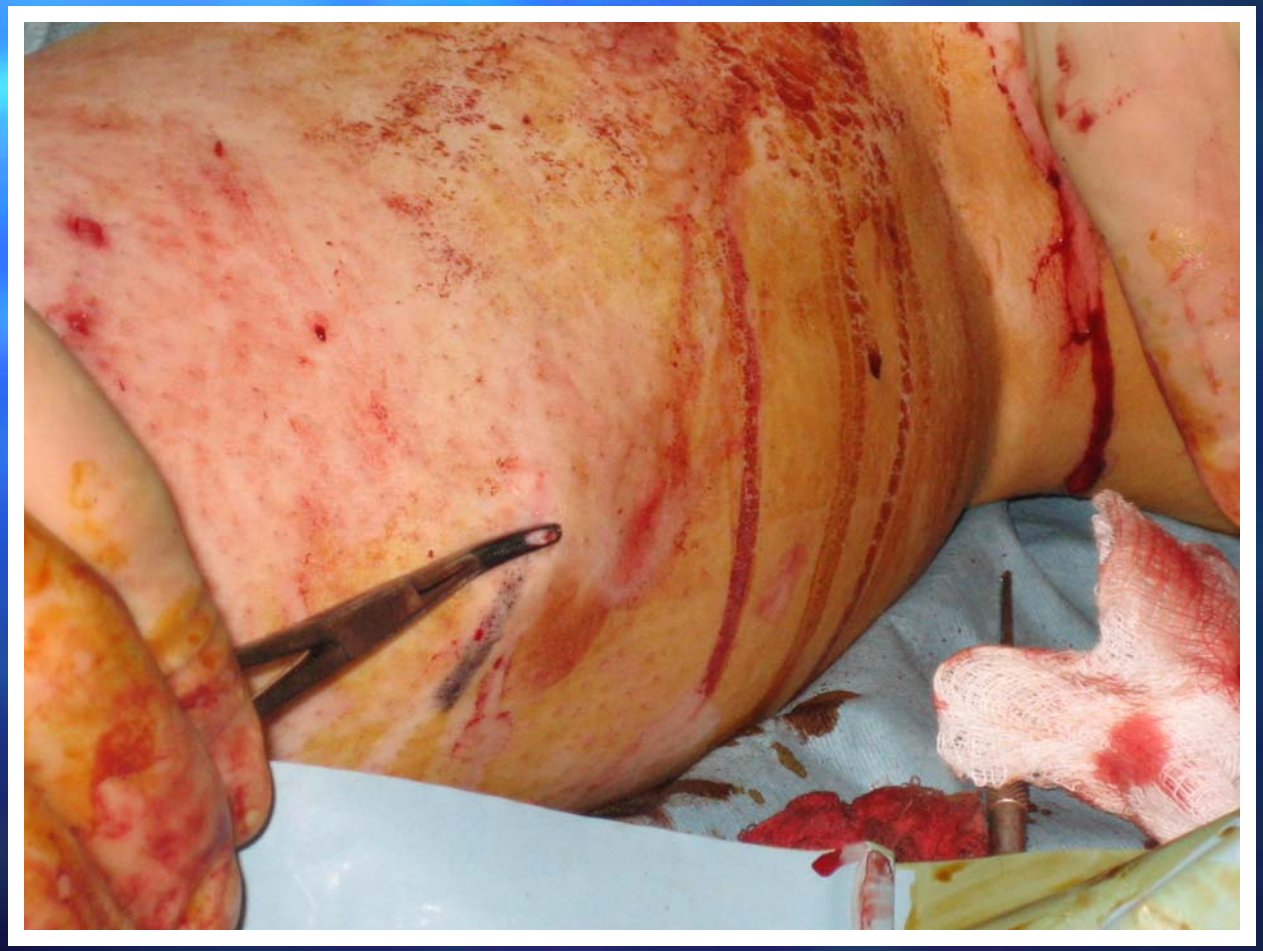

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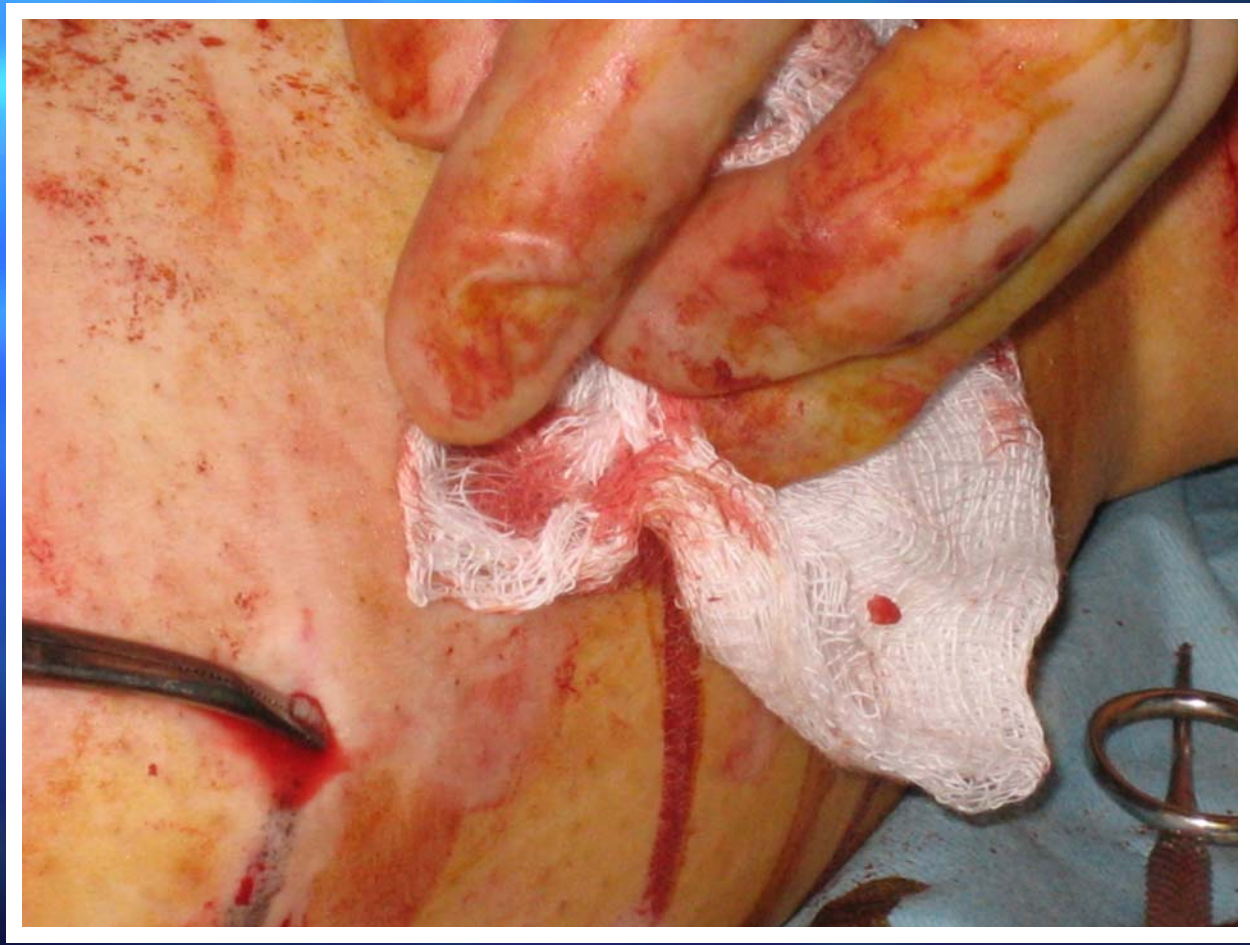

Procedure

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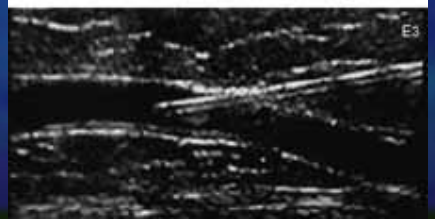
Procedure

Ancillary Procedures

- Sclerotherapy
  - Injection of a sclerosant agent that chemically “burns” the endothelium of vein causing occlusion
  - Polidocanol, STS, hypertonic saline, etc.
  - Variations
    - US guided
    - “foam”

Ancillary Procedures

- Sclerotherapy

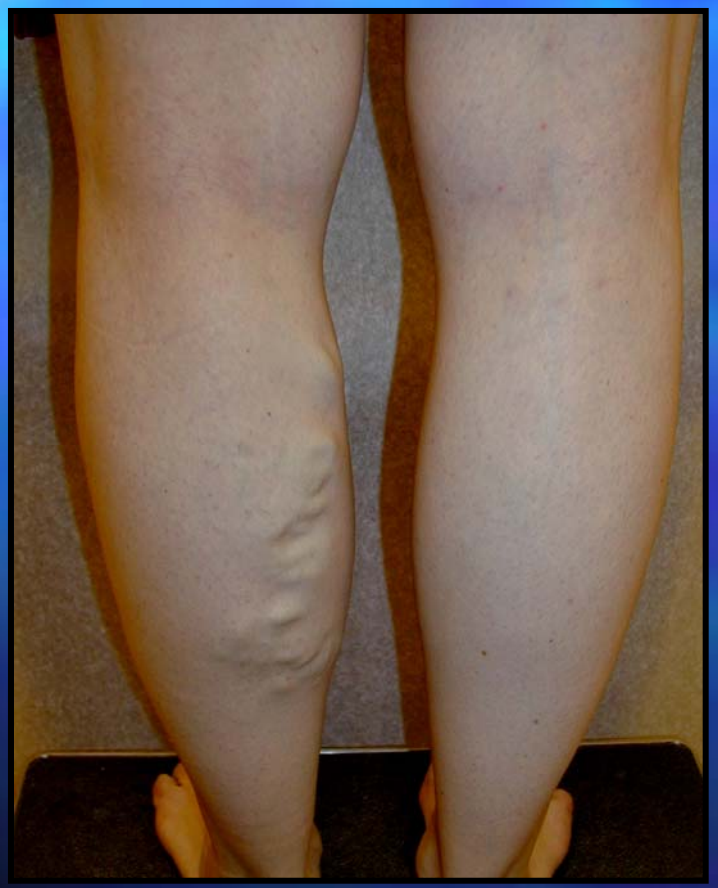


Greater Saphenous Vein

Pre-Treatment 1 Wk Post-EVLT

Greater Saphenous Vein

Pre-Treatment



1 Wk Post-EVLT

Greater Saphenous Vein

Pre-Treatment

2 Wks Post-EVLT

Greater Saphenous Vein

Pre-Treatment

Post-Treatment

Greater Saphenous Vein

Pre-Treatment

Post-Treatment

Posterior Medial Tributary

Pre-Treatment

4 Wks Post-EVLT

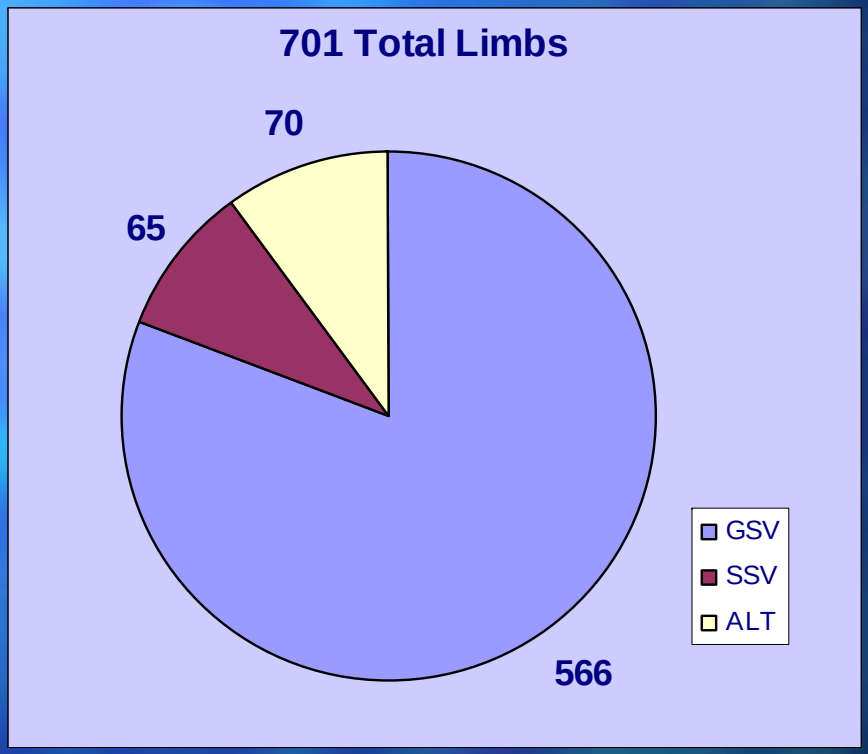
Lesser Saphenous Vein

Pre-Treatment

Post-Treatment

Endovenous Laser Treatment

— *Results: Cornell Vascular*



- 701 limbs treated in 610 subjects
- 595 (85%) presented with aching pain

Endovenous Laser Treatment

— *Results: Cornell Vascular*

Gender	512 (84%) women	98 (16%) men
Age	range: 22 - 76 yrs	mean: 43 yrs

Side	371 (53%) left	330 (47%) right
Diameter	range: 4.1 - 35 mm	mean: 10 mm
Length	range: 9 - 70 cm	mean: 38 cm

Endovenous Laser Treatment - *Results*

Follow-Up (Yrs)	Closed / No. Treated	Continued Occlusion
< 1 Year	218 / 231	94 %
1 – 2 Years	245 / 247	99 %
2 – 3 Years	151 / 151	100 %
> 3 Years	72 / 72	100 %

- Followed 3 – 42 months (mean of 20 months)

Endovenous Laser Treatment - *Results*

- 98% (686/701) closed at 3 - 42 months
- 223 limbs followed at least 2 years demonstrate continued occlusion

Min R, Khilnani N, Zimmet. Endovenous laser treatment of saphenous vein reflux: long-term results. JVIR 2003; 14: 991-996.

Endovenous Laser Treatment - *Results*

- > 99% with resolution of symptoms
- > 99 % would recommend EVLT
- Bruising & mild / moderate tenderness (resolving in < 2 wks)
- ***NO*** skin burns, DVTs, or paresthesias

Endovenous Laser Treatment - *Conclusions*

- Successful ablation of > 97% of limbs treated with endovenous laser
- Continued closure of more than 220 vein segments followed for > 2 years
- Results comparable or superior to other options available for treatment of GSV reflux
- EVLT offers these benefits with lower rates of complication and avoidance of general anesthesia

The Vein Center at Atlantic Medical Imaging

Michael Schmidling, MD

Rajesh Patel, MD

- Board certified radiologist with fellowship training in Interventional Radiology
- Certificate of Added Qualification in Vascular and Interventional Radilogy
- Co-Directors of Vein Center

The Vein Center at Atlantic Medical Imaging

- All patients are evaluated at our Vein Center in Galloway.
- Complete consultation including H&P and duplex US performed.
- Entire spectrum of venous disease from spider veins to venous ulceration is treated.
- All procedures and follow up appointments at the Vein Center in Galloway.
- Procedures are done as an outpatient with light oral sedation and local anesthetic.
- Minimal recovery time is needed.

Bottom line

Thanks

- Robert J. Min, M.D., Cornell Vascular-Weill Medical College of Cornell University