Endovenous Thermal Ablation
Treatment/Therapy

Marcus Stanbro, DO, FSVM, RPVI
Assistant Professor of Clinical Surgery
USC School of Medicine-Greenville
GHS-Center for Venous and Lymphatic Medicine
Greenville, SC
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Disclosures

No pertinent disclosures
Vein Stripping largely replaced by catheter-based ablations
Endovenous Thermal Ablation (ETA)

- Radiofrequency ablation (RFA)
- Endovenous laser ablation (EVLA)
- Steam ablation
ETA
Mechanism

- Thermal injury w/ vein wall collagen denaturation
- Vein wall inflammation
- Fibrosis
- Occlusion
ETA
Treatment Plan

- H & P
- Duplex documenting patent deep veins and enlarged/incompetent saphenous vein
- Careful explanation to patient
- Use physician and patient recorded outcome measures
  - VCSS, photos, QoL scores
ETA
Indications

- Symptomatic varicose veins
- Asymptomatic varicose veins
- Chronic venous insufficiency w/ or w/o complications

- ALL secondary or associated with REFLUX of the appropriate saphenous veins or other “appropriate” veins
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Amenable Veins

- GSV (1A)
- SSV (1A)
- Accessory saphenous veins (1B)
- Giacomini & cranial extension of SSV (1B)
- Perforating veins (1C)
- Other superficial veins (1C)
- Malformations (1C)
- Residual veins after previous treatment (1C)
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Contraindications

- Absolute:
  - Acute DVT or STP
  - Acute infections at puncture sites
  - Deep vein obstruction where the target vein functions as a collateral.
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Contraindications

- Relative:
  - Pregnancy
  - Immobility
  - PAD w/ ABI <0.5 or ankle pressure <60
  - Thrombophilia or Hx of previous DVT
  - Unable to undergo local anesthesia
  - Decompensated leg swelling
  - Terminal diseases or uncontrolled severe diseases (uncontrolled DM)
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Contraindications

- Technical issues:
  - Tortuous vein
  - Too small
  - Previous STP with intraluminal webs, etc.
  - Vein segment too short
  - Orifice of SFJ to be excessively large*
Intraluminal webs - STP
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Vein Access
ETA
Proper placement
ETA
Anesthesia

- Can be done under local, regional, general
- Even if done under regional/general:
  - Treated vein should still have tumescent fluid infiltrated around it to create “heat sink” and facilitate vein compression
  - Should be infiltrated under duplex guidance
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How much energy?

- Radiofrequency:
  - **Segmental RFA:** Energy automatically adjusted by generator to maintain heat at 120°C for a 20 second cycle. Additional cycles can be applied (top of junction or areas of saccular enlargement)
  - **Bipolar RFA:** Setting at 20W to deliver 40-45J/cm. Pull back speed can be adjusted
Radiofrequency “Closure” Technique

- Outpatient procedure approximately 60 min. long
- Local tumescent + heparin drip
- Temperature at vein wall controlled
- 90% closure at 2 yrs
- FDA-approved for RX of Great Saphenous Vein

Photos courtesy of VNUS Medical, Inc.
RF Catheter
ETA
How much energy?

- **EVLA:**
  - Energy density delivery is dependent upon:
    - Diameter of vein
    - Wavelength of the laser
    - Laser power setting (W)
    - Fiber type
  - Calculated as:
    - Linear Endovenous Energy Density (LEED) in J/cm
    - Endovenous Fluence Equivalent (EFE) in J/cm²
Endovenous Laser Ablation

- Outpatient procedure approximately 60 min long
- Only local tumescent anesthesia required
- Usually continuous pullback
- FDA-approved for RX of GSV, SSV, & accessory saphenous v
- Multiple wavelengths available:
  - 810nm
  - 940nm
  - 1320nm
  - 1470nm
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How much energy?

- Laser target (chromophore)
  - Hemoglobin: 810, 940, 980, and 1064 nm
  - Water: 1320 and 1470 nm
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How much energy?

- **EVLA:**
  - 810-980 nm lasers:
    - Bare fiber: LEED ≥ 60-80 J/cm
    - EFE > 20 J/cm²
  - Protected fibers: allow for lower LEED and EFE
  - 1320-1470 nm lasers:
    - Initially follow manufacturers recommended settings:
    - LEED 40-50 J/cm
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How much energy?

■ **EVLA:**

■ **Sliding Scale based upon diameter:**
  - 5cm use ~ 50 J/cm
  - 10cm ~120 J/cm

  Almeida JI, Raines JK. Radiofrequency ablation and laser ablation in the treatment of varicose veins.
  Ann Vasc Surg 2006;20:547-552

■ **Typically, 50-80 J/cm**

  Chapter 12 , Fundamentals of Phlebology. Based on two studies of 810 and 980 nm lasers
810 vs. 980

- 30 legs each wavelength
- 50 joules/cm
- 1 yr. follow up
- Recanalization 1 yr. – 810 (2)  980 (2)
- “Both laser wavelengths were effective in treating GSV insufficiency, with no major complication and a paucity of adverse outcomes”

Kabnick LS. Outcome of different endovenous wavelengths for Great saphenous vein ablation. J Vasc Surg 2006;43:88-93
ETA

Comments about SSV

- Can be treated with same high success rate
- Some authors report higher complication rate
  - DVT & Sural nerve injury
- Keep cath tip well below SPJ and avoid the lower 1/3rd of SSV
ETA-Perforators
Techniques for Dealing with Perforating Veins

- Linton – Variants of open
- SEPS – Subfascial Endoscopic Perforator Surgery
- PAPs – Percutaneous Ablation of Perforators
  - RF
  - Laser
- Injection sclerotherapy (Foam)
IPV Ablation Indications

- **CEAP 4, 5, 6**
  - Especially if perforator is underneath or close proximity to ulcer site

- **CEAP 2 or 3? - if source of VV or pain**
  - Not recommended by SVS/AVF guidelines

- **All other sources treated first**

- **Large perforators (≥ 3.5mm)**

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Post-Treatment

- Pads over insertion site
- +/- wraps
- Most use 30-40mmHg compression hose
- Many advocate the use of eccentric compression
  - Gauze or foam padding over the course of the treated vein to create localized compression
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Post-Treatment

- Routine DVT prophylaxis not necessary
- Most recommend a F/U visit and duplex scan by POD 10-14
- 3-6 month F/U w/ duplex also recommended
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Post-Treatment

- **Recommended terminology**
  - Recanalization (w/ or w/o reflux)
  - Neovascularization
  - Primary ablation
  - Primary assisted ablation (before clinical failure)
  - Secondary ablation
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Minor Complications

- Pain
- Ecchymosis
- Erythema
- Hematoma
- Hyperpigmentation
- Paresthesias
- Phlebitis
- Infection
- Telangiectatic Matting
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Major Complications

- VTE (PE and/or DVT)
- Arterial damage (AVF)
- Severe nerve damage
- Skin burns (typically early experience or patients w/o tumescent)
- Fiber fracture/breakage during the procedure
- Stroke (one case report)

- Overall, quite RARE
Endovenous Heat Induced Thrombosis (EHIT)
ETA Complications
EHIT

- **Endovenous Heat Induced Thrombosis—WHY?**
- **Identified Risk Factors**
  - Male gender
  - Large GSV diameter
  - Multiple phlebectomies
  - Higher Caprini scores
  - Previous STP
  - ?Catheter tip placement?

1st International Guidelines for ETA - 2012
ETA Complications

EHIT

- Endovenous Heat Induced Thrombosis
- Or, Post Ablation Superficial Thrombus Extension (PASTE)
- Classification:
  - Class 0 – distal to SFJ
  - Class 1 – flush to the SFJ
  - Class 2 – thrombus extending into lumen of the CFV (<50%)
  - Class 3 – thrombus >50% involvement of the CFV
  - Class 4 – occlusive thrombosis of the CFV
ETA Complications
EHIT Treatment

Classification:
- Class 0 – (distal to SFJ)  NO TREATMENT
- Class 1 – flush to the SFJ  NO TREATMENT
- Class 2 – (<50%)  Short term LMWH w/ serial scans
  - Antiplatelet agents
  - Serial duplexes
- Class 3 – (>50%)  Treat as DVT, mc LMWH
- Class 4 – occlusive clot  Treat as DVT, mc LMWH
Example of Class 2
Length of vein to be treated
Hach’s Perforator
Profunda Femoral Vein
These perforators are usually longer and tortuous, so foam sclero may be better.
Pre-op finding-
Asymmetric flow at the CFV
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Conclusions

- Recommended Reading:

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Conclusions

- If attention is paid to LEED and proper technique, differences in wavelengths or technology probably not significant.

- Both RFA and EVLA are effective and safe

- Be aware of EHIT
Endovenous Thermal Ablation
Treatment/Therapy

Thank you.

G H S C l i n i c a l U n i v e r s i t y P a r t n e r s