

Current Management of Lower Extremity Venous Disease and DVT

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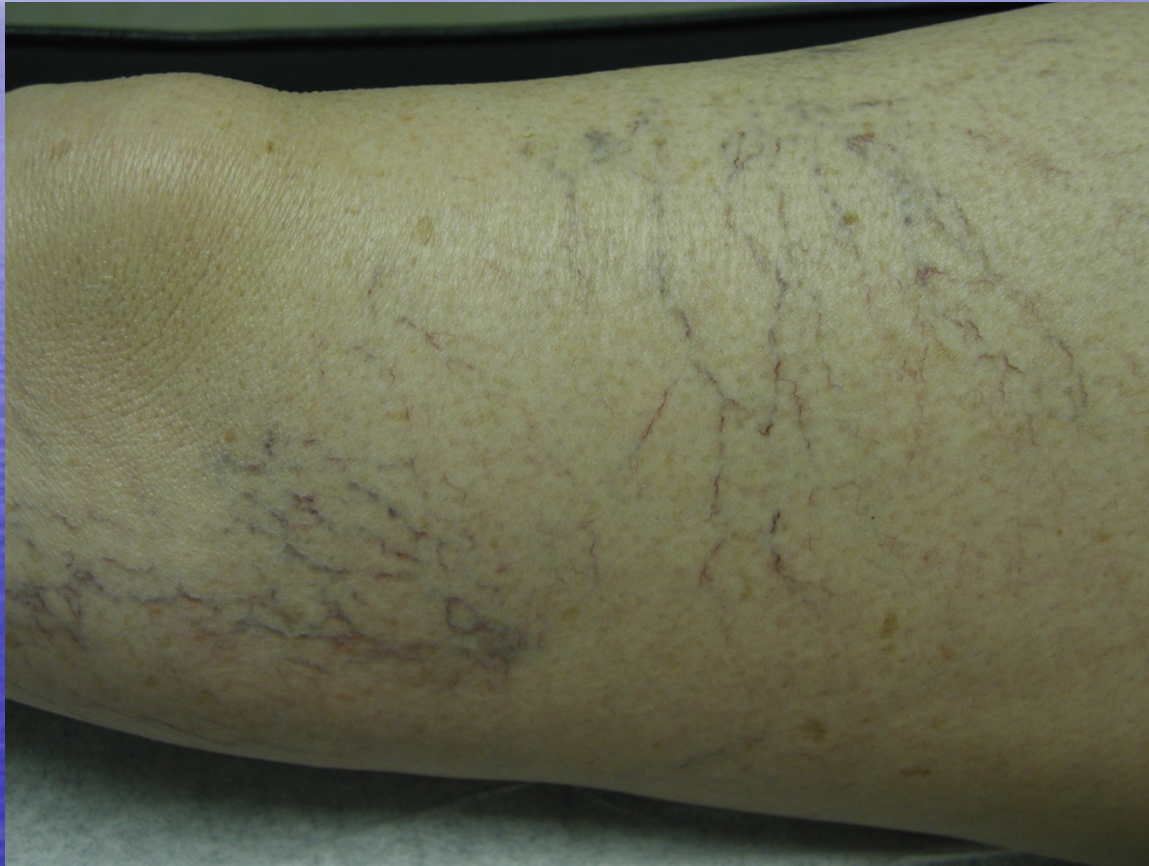
Salem Skin and Vein Specialists

A Novant Medical Group Practice

Why do we care about vein disease?

- 25 million people have varicose veins
- 7 million are symptomatic
- 6 million work-days lost per year
- DVT/PE affects up to 600,000 people/yr
- Fatal PE affects up to 200,000 people per year (more than AIDS/Breast Cancer/MVA combined)

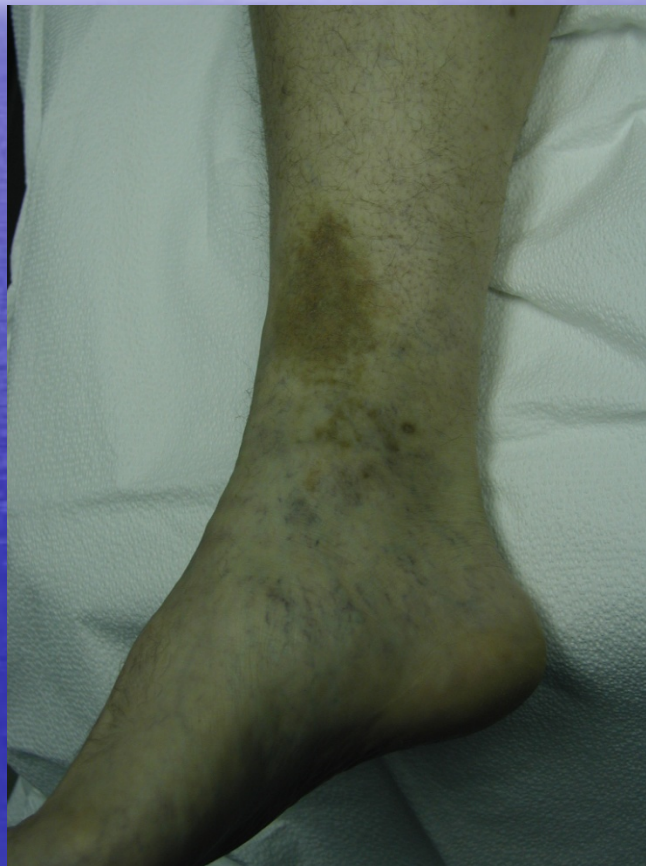
Spider Veins



Varicose Veins



Lipodermatosclerosis



Venous Ulceration



DVT



Phlegmasia Cerulea Dolens



Background

- Sir Benjamin Collins Brodie
- 1782-1862
- First to demonstrate reflux in the saphenous vein

Background

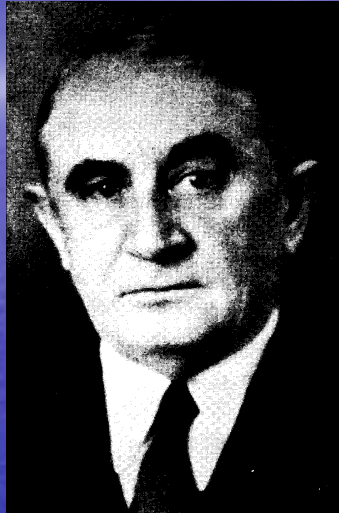


- Friedrich Von Trendelenburg
- Ligation/Division of Saphenous vein in upper thigh
- 1st performed 1860/Published 1890

Brodie/Trendelenburg Test

- Clinical examination
- Used occlusive cuffs to determine source of reflux (superficial/perforators)
- Largely of historical interest since development of quality ultrasound

Background



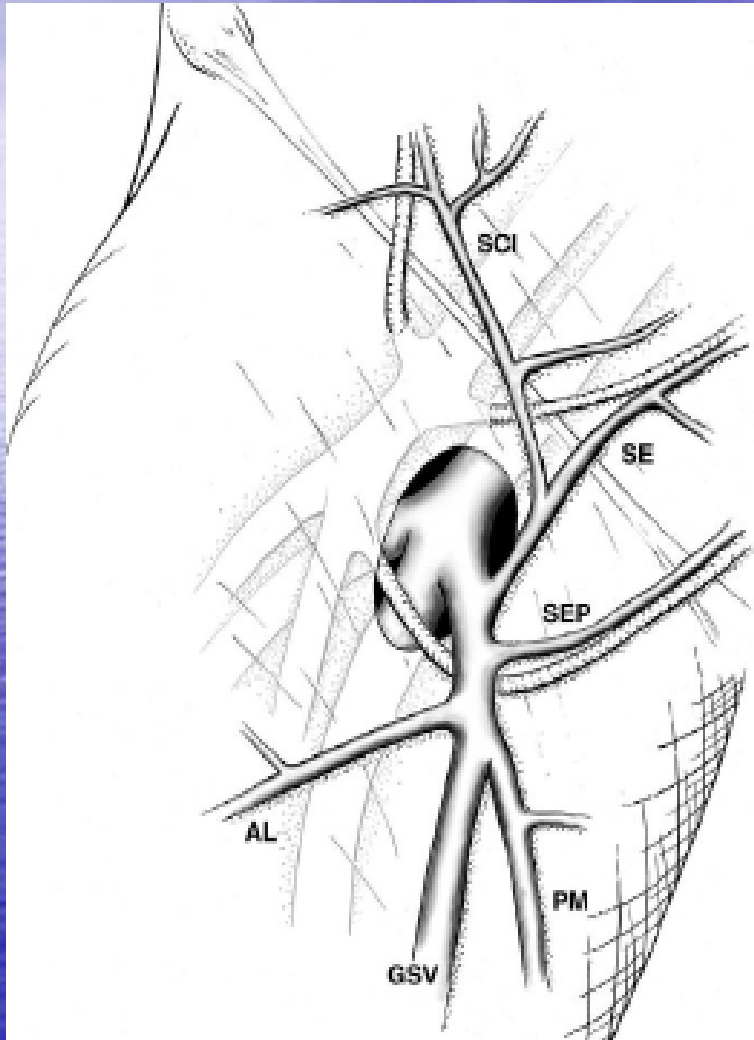
- Charles Mayo
- Excision of the saphenous vein, 1888
- Long incision
- Later developed “ring-vein enucleator”

Anatomy

Superficial System

- Great saphenous vein
- Small saphenous vein
- Vein of Giacomini (connects GSV and SSV)
- Anterior Accessory saphenous
- Posterior Accessory saphenous

Sapheno-femoral Junction



- AL-Ant. Accessory Saph.
- PM-Post. Accessory Saph
- SEP- Sup. Ext. Pudendal
- SE-Sup. Epigastric
- SCI-Sup. Circumflex Iliac

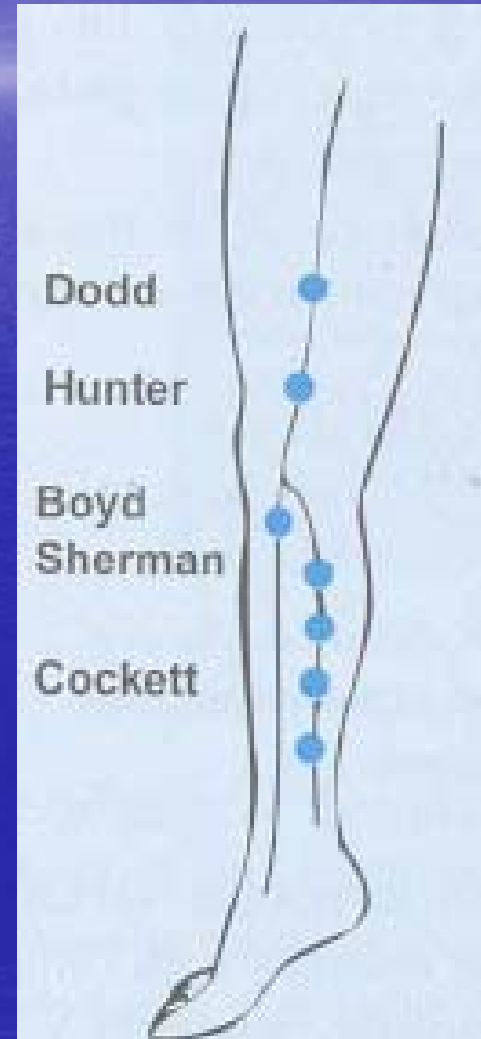
Anatomy

Deep System

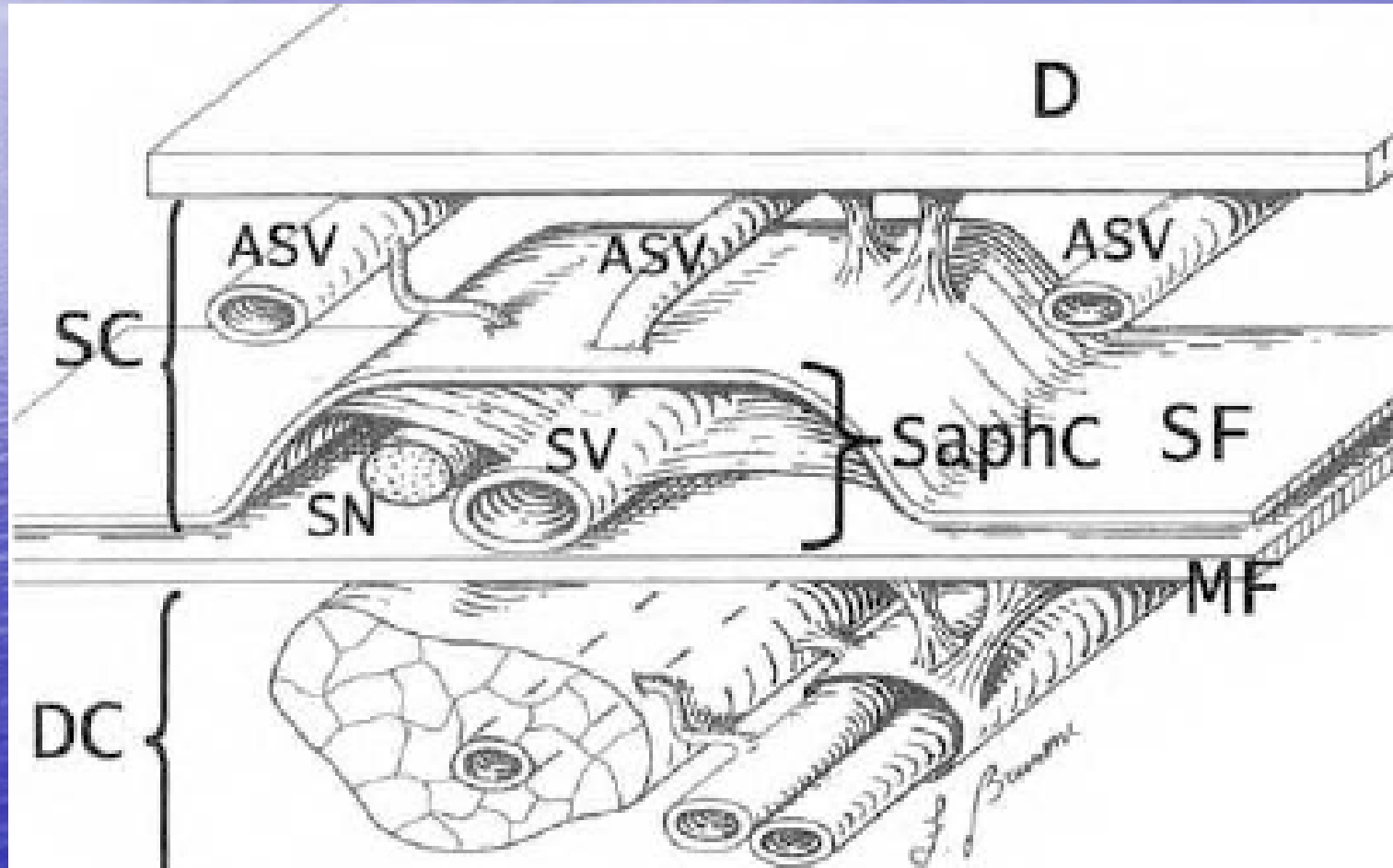
- Popliteal vein
- Femoral vein (superficial femoral vein)
- Common femoral vein
- Iliac vein

Anatomy Perforators

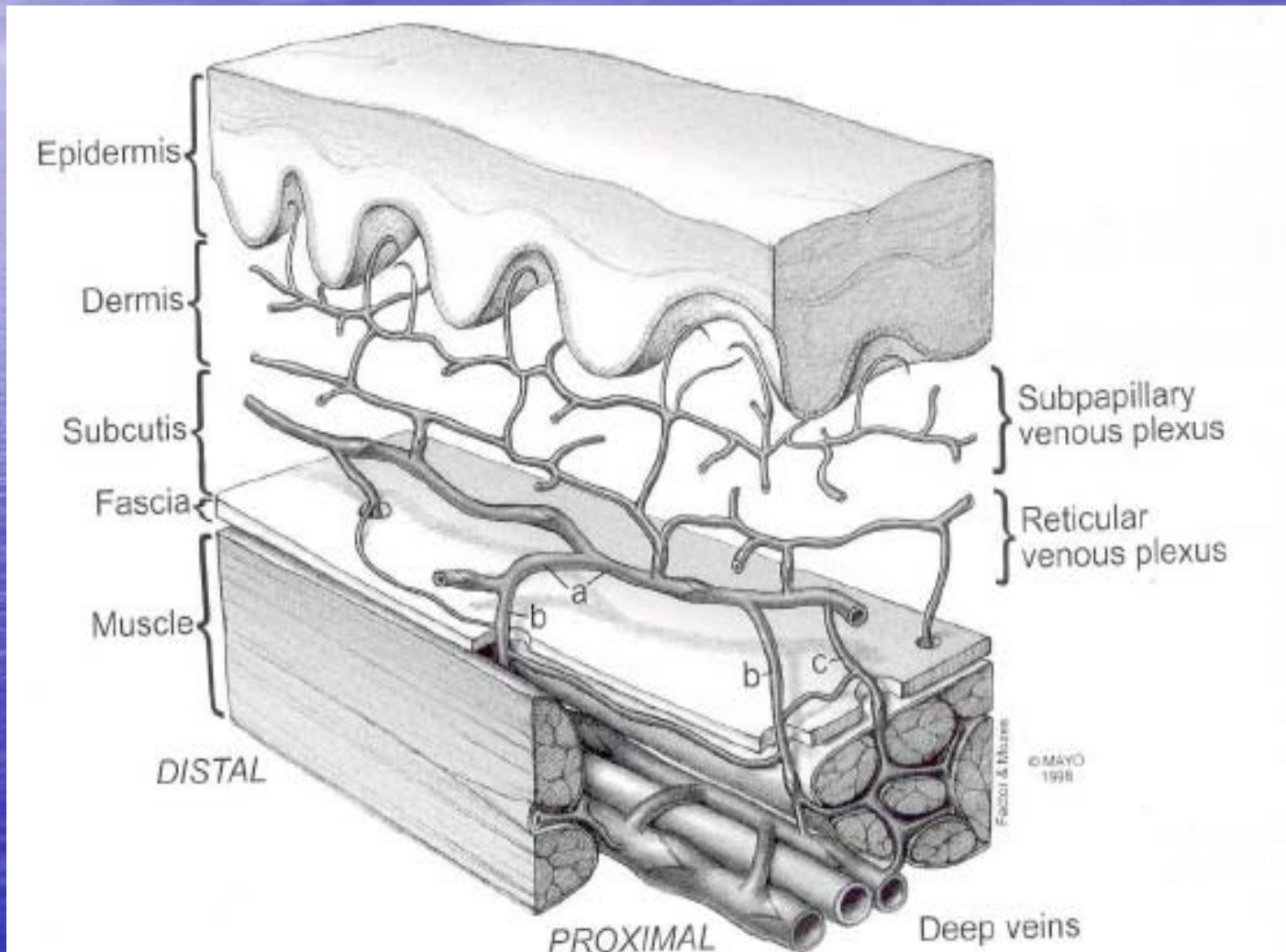
- Connect superficial and deep systems
- Flow normally goes from superficial to deep
- There are 4-20 perforators in each leg



Anatomy



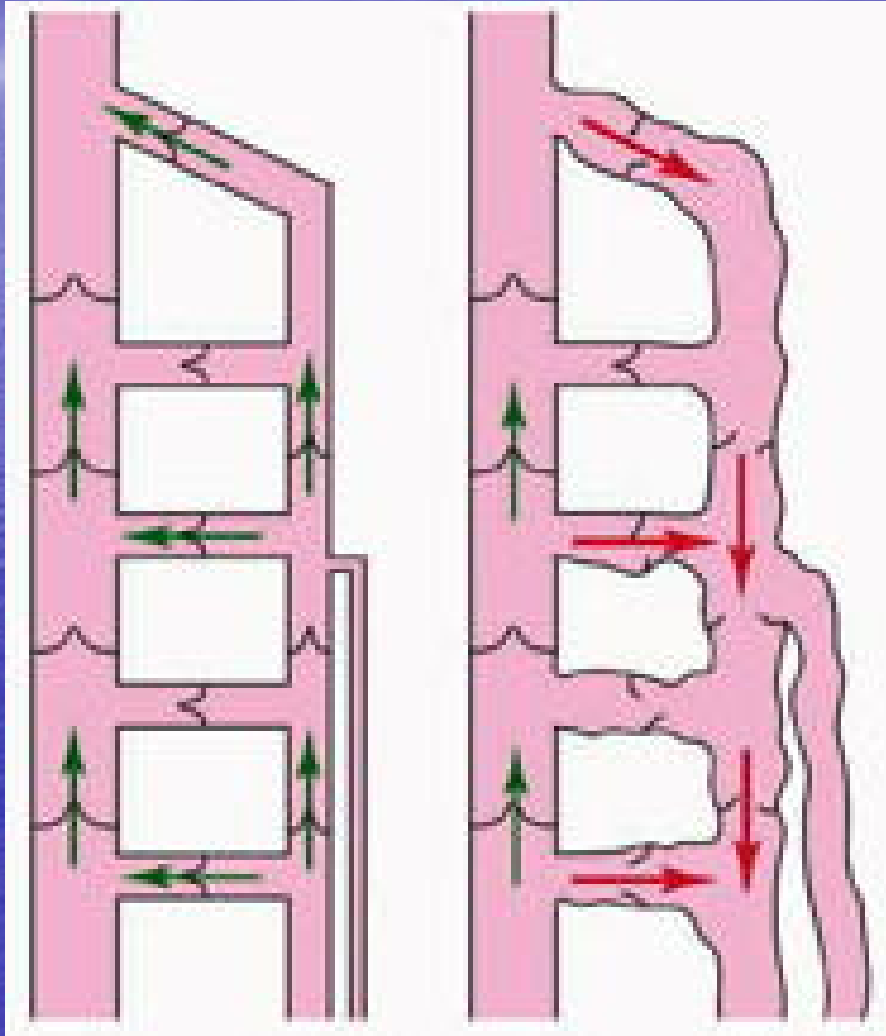
Anatomy



Etiology of Venous Disease

- Reflux through incompetent valves
 - Superficial system (varicose veins)
 - Deep system (post-phlebitic syndrome and ulceration)
 - Perforator veins (deep \Rightarrow superficial \Rightarrow varicose veins)
- Obstruction of deep system

Reflux

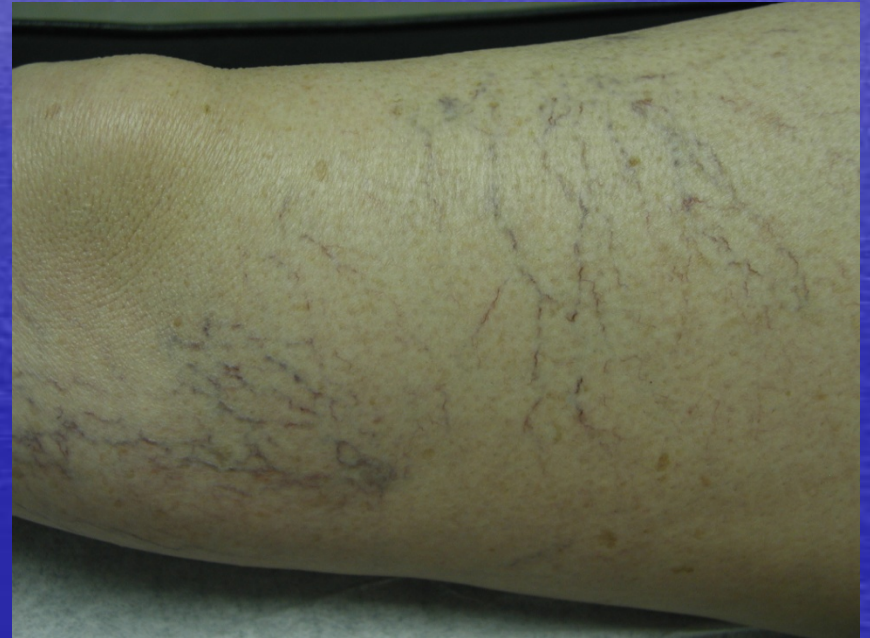


Symptoms

- Localized vs. generalized
- Skin changes
- Edema
- Ulceration

Spider Vein Symptoms

- Burning
- Itching
- Pain?
- "I just don't like the way these look"



Varicose Vein Symptoms

- Heavy, aching legs
- Bulging sensation
- Stinging
- Pain
- Swelling
- Phlebitis
- Bleeding/Phleborrhagia



Venous Ulcer Symptoms

- Pain
- Drainage
- Secondary infection
- Edema
- May be painless



C.E.A.P. Classification

- Clinical
- Etiology
- Anatomy
- Pathophysiology

Clinical

- C0 = no visible venous disease
- C1 = telangiectatic or reticular veins
- C2 = varicose veins
- C3 = edema
- C4 = skin changes without ulceration
- C5 = skin changes with healed ulceration
- C6 = skin changes with active ulceration

Etiology

- C- for congenital disease,
- P- for primary disease (not due to another cause)
- S- for secondary venous disease, usually due to prior deep venous thrombosis.

Anatomy

- **Superficial veins (As)**
- Telangiectasias or reticular veins
- Greater saphenous vein - above the knee
- Greater saphenous vein - below the knee
- Lesser (short) saphenous vein
- Nonsaphenous
- **Perforating Veins**
- Thigh
- Calf
- **Deep veins (Ad)**
- Inferior vena cava
- Common iliac
- Internal iliac
- External iliac
- Pelvic: gonadal, broad ligament, etc.
- Common femoral
- Deep femoral
- Superficial femoral
- Popliteal
- Crural: anterior tibial, posterior tibial, peroneal
- Muscular: gastrocnemius, soleus, etc.

Pathophysiology

- R- for reflux
- O- for obstruction
- R,O- for both reflux and obstruction

Evaluation

- History
- Physical Exam
- Complete Duplex Exam

History

- Family history
- Symptoms-duration, relieving/aggravating factors
- Trauma
- DVT
- Prior treatments
- Cosmesis?

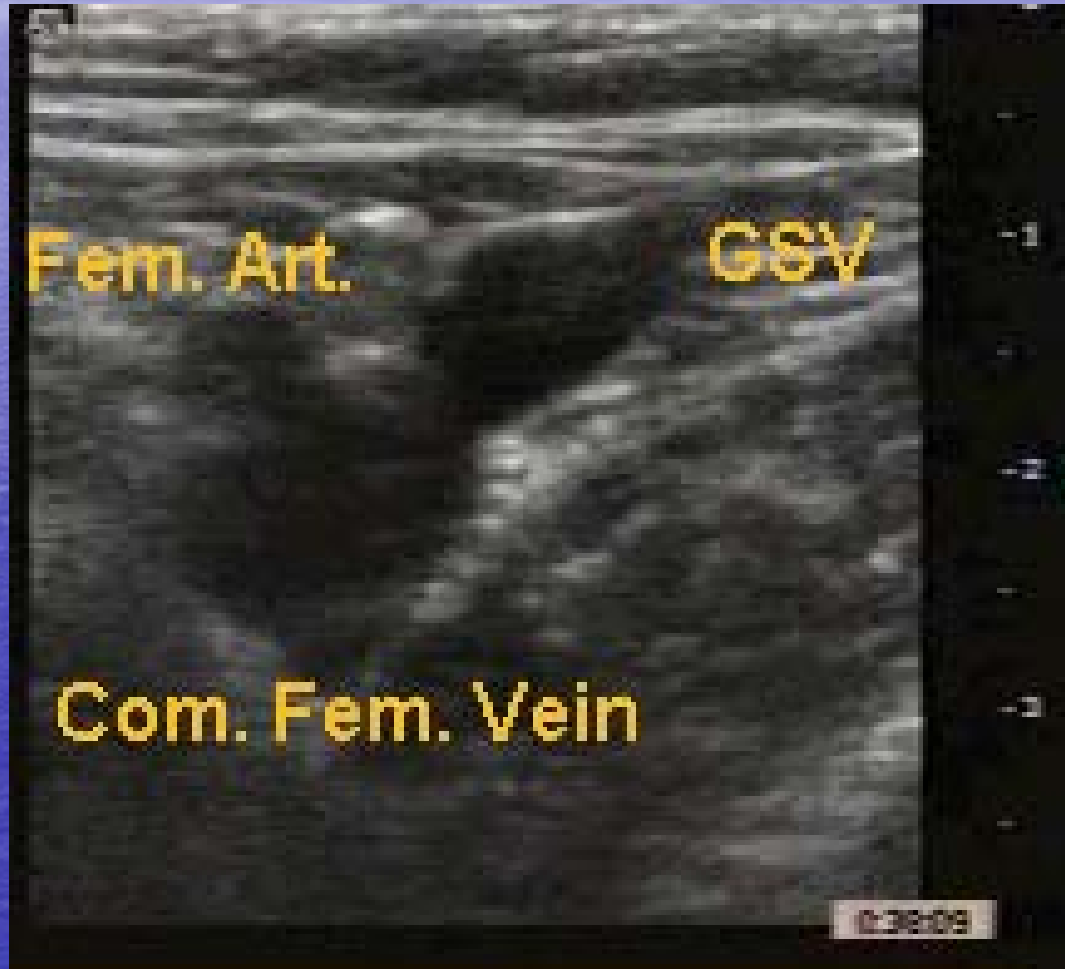
Physical Examination

- Location of complaints
- Mapping of veins
- Identification of skin changes
- 360° standing evaluation
- +/- photos

Duplex Examination

- Most important technical component to evaluation of venous insufficiency
- "Complete Exam" includes:
 - CFV, SFV, Popliteal Vein
 - GSV, SSV
 - Perforators

Sapheno-femoral Junction



Ultrasound Image of GSV



Treatment

- Spider Veins
- Saphenous Reflux
- Branch Varicosities
- DVT

Spider Veins

- Laser Sclerotherapy
- Injection Sclerotherapy
- Foam Sclerotherapy
- Electrical thermolysis

Laser Sclerotherapy

- Best for fine “red” spider veins
- Various wavelengths available
- Skin pigment may preclude its use
- Few side effects:
 - Pain
 - Hypo/Hyperpigmentation
 - Scarring (rare)
- Results are variable

Injection Sclerotherapy

- Commonly used worldwide
- Multiple agents used
- Few are FDA approved

Sclectotherapy Agents

- Sodium Morhuate
- Hypertonic Saline (23.4%)
- Dextrose/Saline (25%/10%)
- Sodium Tetradecylsulphate (Sotrodecot)
- Polidocinol

Sodium Morhuate

- Manufactured from fish oil
- FDA approved
- Effective sclerosant
- Few side effects from subcutaneous injection
- *Incidence of anaphylaxis*

Hypertonic Saline

- Most effective at high concentration (23.4%)
- May be diluted to 11.7%
- Painful during injection
- Unapproved
- *High incidence of skin necrosis if injected subcutaneously*

Dextrose/Saline

- Not approved
- Less painful than hypertonic saline
- Lower incidence of burns

Sotrodecol

- FDA Approved
- Has not been commercially available for several years
- Detergent agent
- Painless on injection
- Low incidence of skin necrosis
- Only isolated reports of allergic reaction
- *Will be released by Bioriche this fall*

Polidocanol

- Most commonly used sclerosant worldwide
- FDA approved March 2010!
- Painless injection
- Extremely safe and effective
- Asclera™ distributed by BioForm Medical, Inc.

Foam Sclerotherapy

- Detergent agents (Sotrodecol and Polidocanol) mixed with air/gas to create "foam"
- Foaming increases the effective concentration of agent 3X
- Bubbles increase contact time with intima
- Bubbles create vapor-lock that delays washout
- Foam causes venospasm

Foam Sclerotherapy

- Effective on larger veins
- Limited volumes can be used
- PFO can lead to bubbles in arterial circulation
- Slight increased risk of DVT

Foam Sclerotherapy



Sclerotherapy Technique

- Loupe magnification
- Surgical lighting
- 3cc syringes/31g ½ inch needle
- Post procedure compression
- +/- Microthrombectomy (2-3 weeks)

Treatment of Varicose Veins

- Compression
- Vein Stripping
- Endovenous thermal ablation
- Ambulatory Phlebectomy
- SEPS (Subfascial endoscopic perforator surgery)
- Valve replacement

Compression Therapy

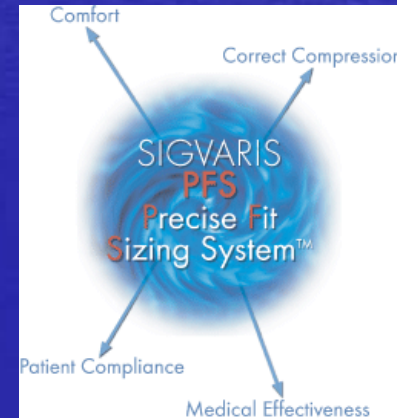
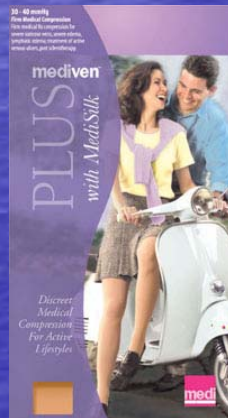
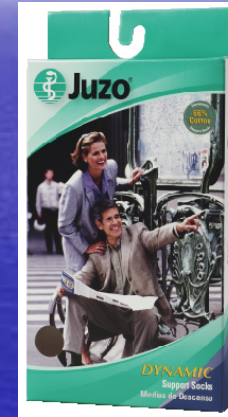


- Conrad Jobst
- German Mechanical Engineer
- Multiple patents
- Suffered from venous insufficiency
- Found relief walking in his swimming pool

Conrad Jobst

- Developed weaving machine that produced gradient pressure stocking
- High pressure at foot/low pressure at top
- Now multi-million dollar industry world-wide

Compression Therapy



Compression Therapy



Compression Therapy

- "Compression therapy is the mainstay of treatment for venous disease"
- Needed before, during, and after other treatments
- People who wear their stockings rarely require additional therapy
- These are not your grandmother's thick beige stockings

Compression Therapy

The Downside

- Compression stockings can be uncomfortable
- They must be replaced every 3-6 months
- They are hot in warm/humid climates
- Shorts and compression stockings just don't look good on anyone

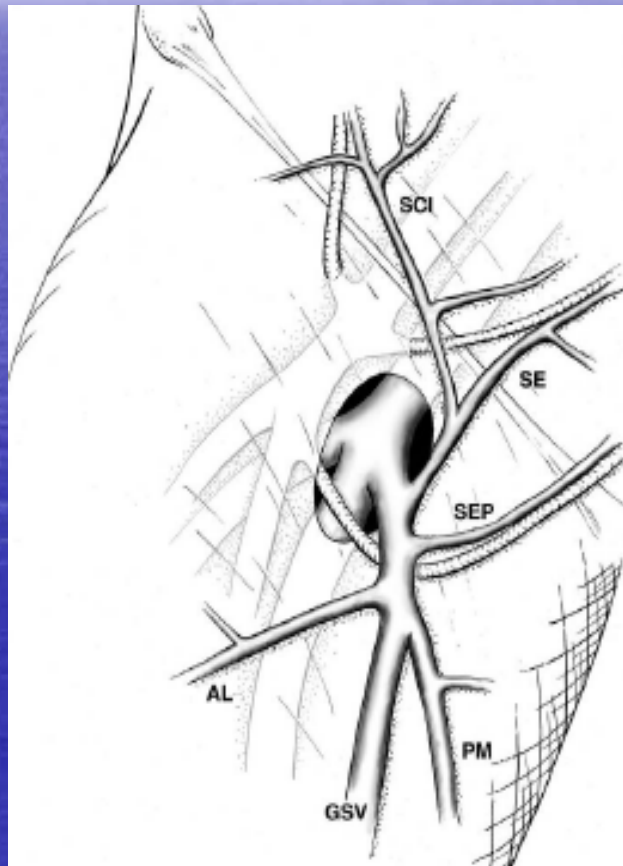
Traditional Vein Stripping

- Spinal or general anesthesia
- Incisions at groin and ankle/knee
- Great saphenous vein stripped
- Compression applied

Vein Stripping Advantages

- Vein is removed
- Branch varicosities are avulsed
- Saphenofemoral junction is obliterated
- Recurrence rates are low

Sapheno-femoral Junction

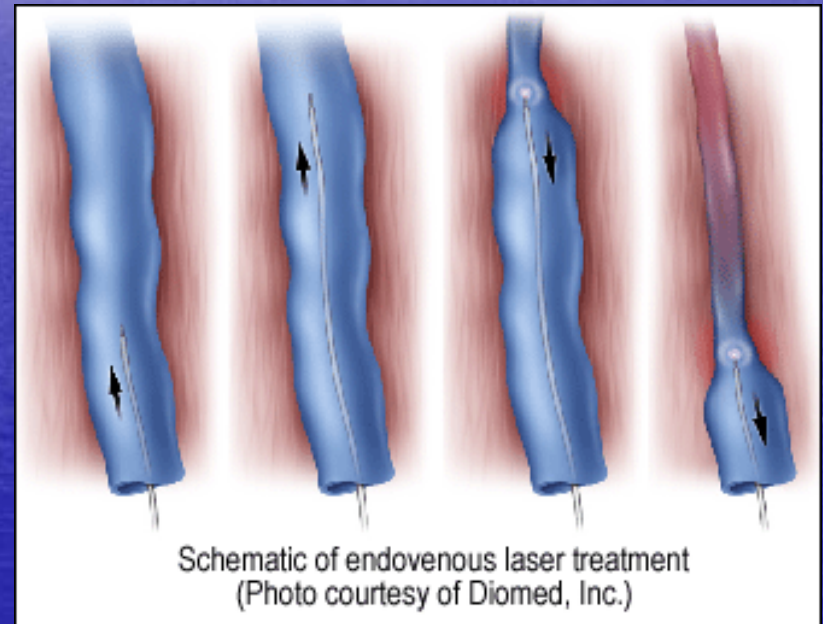


Vein Stripping Disadvantages

- Requires regional/general anesthesia
- Cost is high to payer (facility fee)
- Saphenous nerve injury
- Bruising
- Recovery time (1-2 weeks)

Endovenous Thermal Ablation

- Heat energy is used to close vein
- RFA or Laser energy is source of heat
- Usually performed as an office procedure



Endovenous Thermal Ablation



Endovenous Thermal Ablation

- Ultrasound used for entire procedure
- Access GSV
- Position Sheath at Sapheno-femoral junction
- Advance energy device (RFA/Laser)
- Tumescant anesthesia along vein
- Deliver energy as device is pulled back

Tumescent Anesthesia

- NaCl/1% lidocaine + epi/sodium bicarb.
- Creates buffer between skin and vein
- Protects surrounding structures (nerves)
- Causes venospasm (epinephrine effect)
- Anesthetic

Thermal Ablation Setup



Sheath Insertion



Ultrasound Guided Tumescant



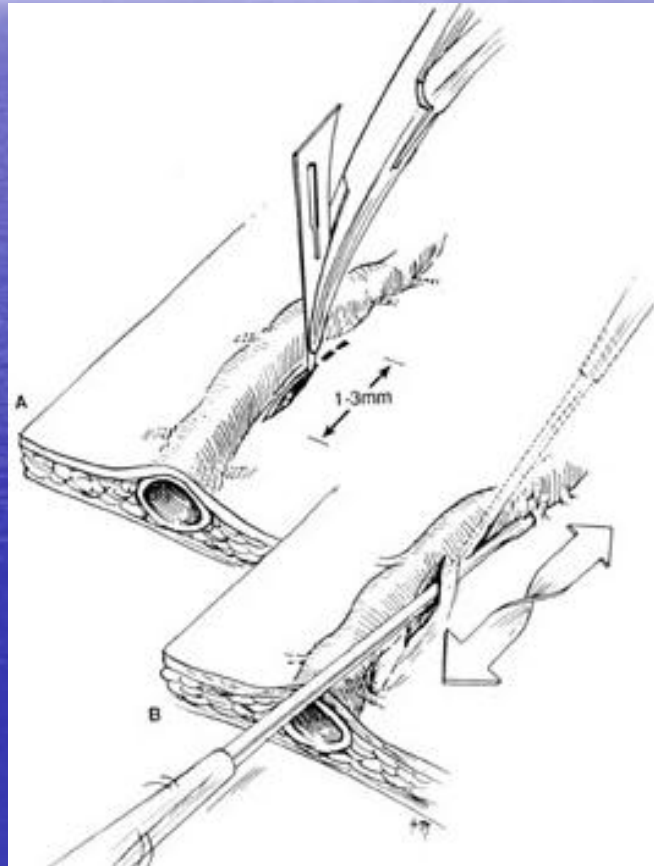
Endovenous Thermal Ablation



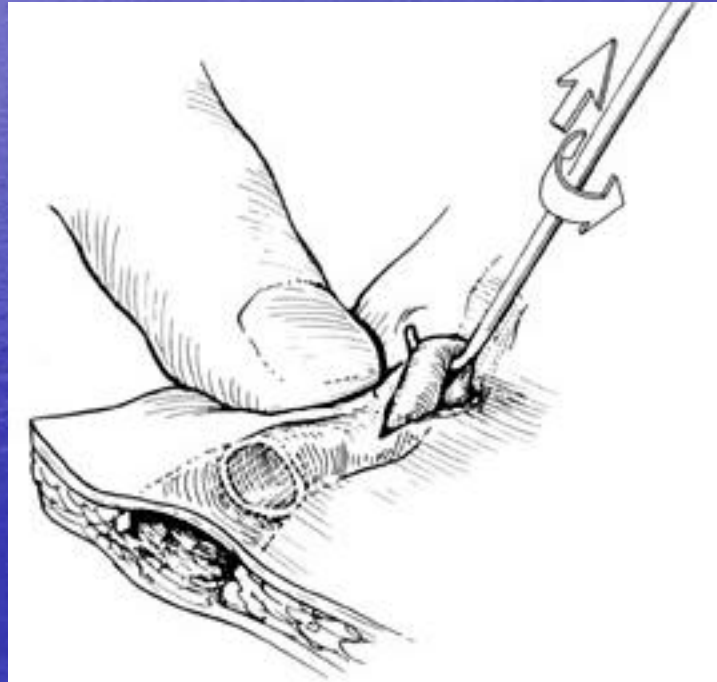
Ambulatory Phlebectomy

- Useful as adjunct to thermal ablation
 - Ablation = turn off leaky faucet
 - Phlebectomy = clean up water on floor
- Isolated branch varicosities with no GSV reflux
- Can treat perforator disease with appropriate preop. imaging
- Tumescant anesthesia/Office-based

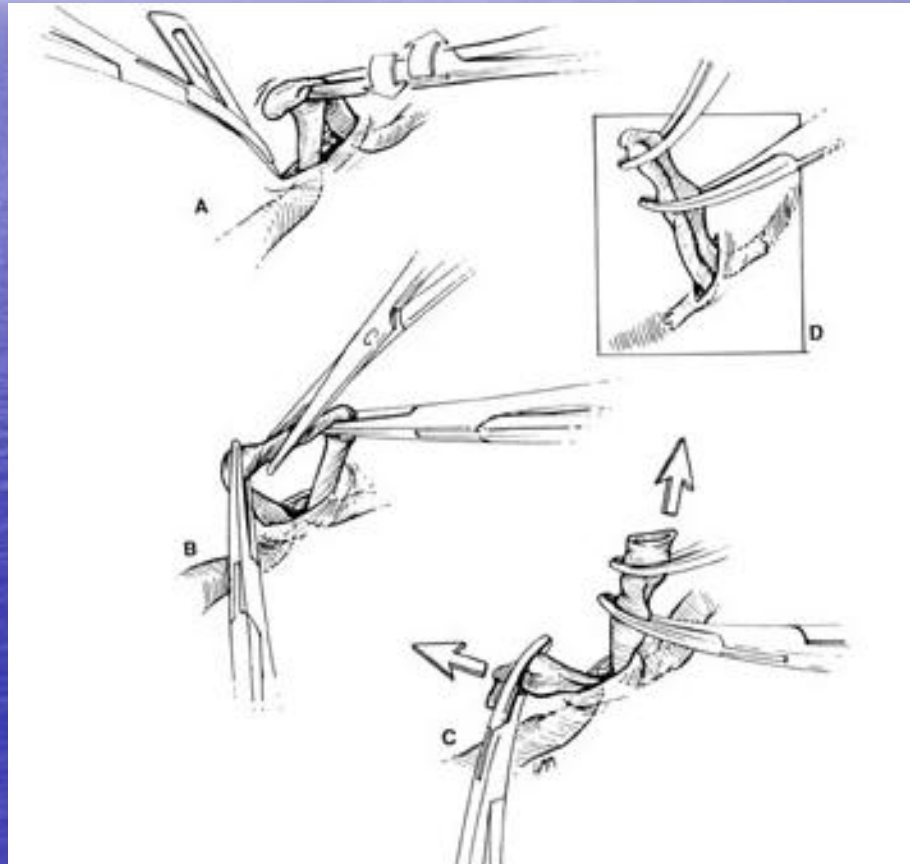
Ambulatory Phlebectomy Incision



Ambulatory Phlebectomy Hook Vein



Ambulatory Phlebectomy Remove Vein

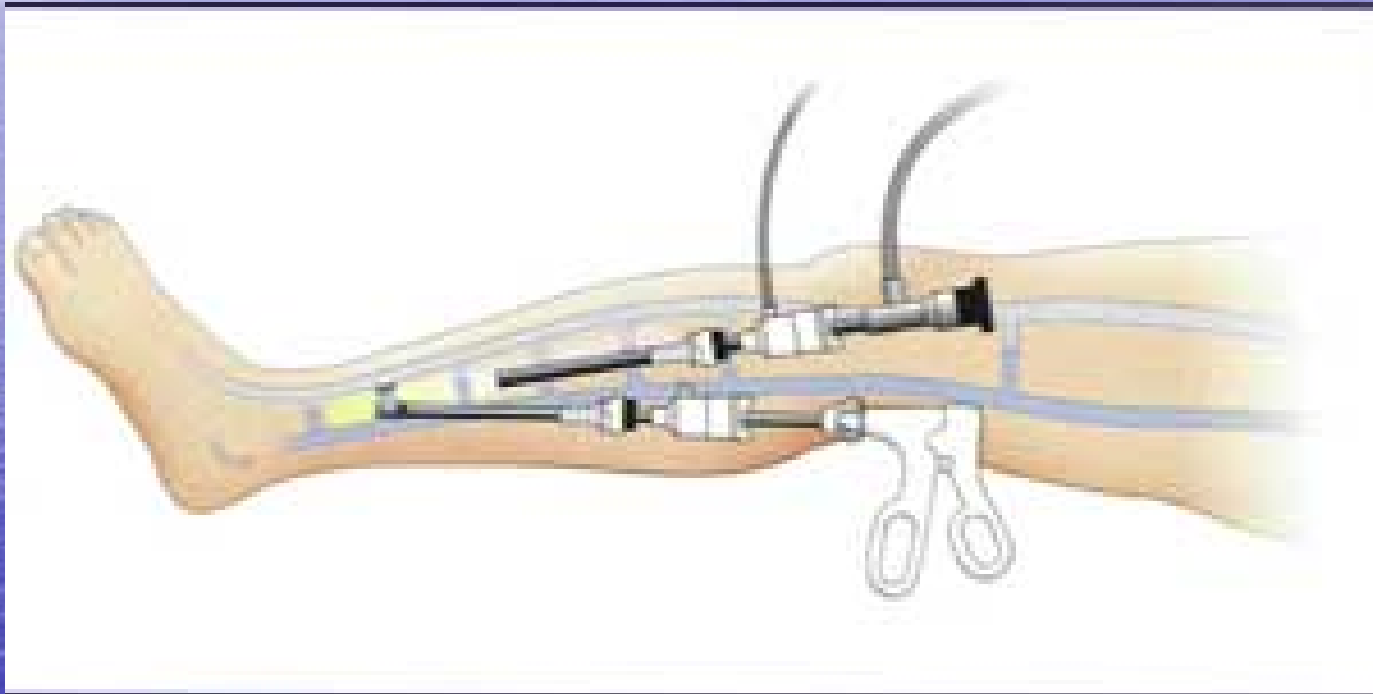


S.E.P.S.

Subfascial Endoscopic Perforator Surgery

- Treats perforator disease only
- Useful after superficial vein stripping and persistent ulceration
- Can have dramatic effects on ulcers
- Avoids incisions through ulcers

S.E.P.S.



S.E.P.S.



VENOUS THROMBOEMBOLISM

DVT/PE

Risk Factors for DVT

- Advancing age
- Immobility
- Stroke
- Paralysis
- Prior VTE
- Cancer/tx
- Surgery (esp. abd/pelv/LE)
- Obesity
- Varicose Veins
- CHF/MI
- Venous catheters
- Nephrotic syndrome
- Preg/OCP/Hormones
- Inherited clotting dz.
- Inflammatory bowel

DVT Management

- PREVENTION!
- PREVENTION!
- PREVENTION!
- American College of Chest Physicians 2008 recommendations
- Online @ chestjournal.chestpubs.org

DVT Diagnosis

- Clinical suspicion
- Ultrasound confirmation
- CTPA for suspected PE

DVT Symptoms

- Pain
- Swelling
- Tenderness
- Discoloration
- Calor (warm to touch)

Consequences of DVT

- Leg swelling
- Anticoagulation
- Pulmonary embolism
- Post thrombotic syndrome

Leg Swelling

- Usually transient
- May be severe
 - Phlegmasia alba dolens
 - phlegmasia cerulia dolens
- Elevation
- Light compression
- Compression stockings long term

Anticoagulation

- Short term
 - Unfractionated heparin
 - LMW heparin
 - Fondaparinux
- Long term
 - Vitamin K antagonist
 - LMW heparin (pregnancy)

Pulmonary Embolism

- Potentially fatal or debilitating
- Diagnosis
 - CXR, ABG, EKG (mostly to rule out other causes of acute cardio-respiratory collapse)
 - CTPA
 - VQ scan (renal issues)
- Treatment options

PE Treatment

- Anticoagulation to prevent progression
 - Untreated, mortality approaches 35%
 - Treated, mortality 8%
- Thrombolytics only for severe cases
 - Systemic vs. local administration
- Pulmonary embolectomy only in extreme cases
- IVC filter?

IVC Filters

- Indicated when the risk of bleeding prevents the use of anticoagulation
 - Recent surgery (neurosurgery/eye surgery)
 - Recent GI bleeding
 - Other bleeding diathesis
- Indicated if recurrent PE would lead to cardio-respiratory collapse (i.e. severe COPD)
- Still need anticoagulation when possible

DVT Treatment

- Follow ACCP guidelines
- Unfractionated heparin
- Low Molecular weight heparin
- Fondaparinux
- Vitamin K antagonist
- Outpatient therapy if possible
- Early ambulation
- Compression stockings (2 years minimum)

Postthrombotic Syndrome

- May develop any time after DVT but may be delayed by years (10-15)
- Obstruction vs. Reflux (probably both)
- Swelling (chronic)
- Skin changes (lipodermatosclerosis)
- Skin ulceration
- PREVENTION by compression

Surgical/Endovascular Therapy?

- Surgical venous thrombectomy
 - symptoms <7 days
 - good functional status
 - life expectancy >1 year
 - cannot undergo catheter directed thrombolysis
- Pharmacomechanical catheter-directed thrombolysis?

Pharmacomechanical Catheter-Directed Thrombolysis

- Symptoms <14 days
- Life expectancy >1 year
- Low risk of bleeding
- Suggestion **NOT** recommendation by ACCP
- ATTRACT Trial

ATTRACT Trial

- 692 patients at 30-50 sites in U.S.
- Randomized to medical therapy vs. pharmacomechanical catheter-directed thrombolysis
- Follow for 2 years
- FMC is a study site

ATTRACT Trial Key Questions

- Does PCDT prevent post-thrombotic syndrome?
- Does PCDT improve quality of life?
- Is PCDT safe?
- Is PCDT cost-effective?
- What is the mechanism by which PCDT prevents post-thrombotic syndrome?

New Horizons?

- Endovenous valve transplant
- Artificial venous valves
- New energy delivery systems
- More aggressive treatment of acute DVT by PCDT?



Questions?