Peripheral Arterial Disease (PAD)
- Near or Complete obstruction of > 1 Peripheral Artery

Peripheral Venous reflux Disease
- Varicose Veins
- Chronic Venous Stasis Ulcer Disease
- Phlegmasia Cerulia Dolans or Alba Dolans (Milk Leg)
- Deep Vein Thrombosis and Pulmonary Embolus Disease

Coronary Artery Disease
- Myocardial Infarct

Aneurysmal Disease
- Aortic
- Popliteal

Cerebral and Carotid Artery Disease
- Stroke
- TIA

Renal Vascular Hypertensive Disease
- High Blood Pressure
- Kidney Failure
Peripheral Arterial Disease

PREVALENCE

- Males > Females
- 10% of People over 60
- Race
  - AA double the rate of all other ethnicities
- High Income Countries
Peripheral Arterial Disease

RISK FACTORS

- Smoking is the #1 risk factor
- Diabetes Mellitus
- Diet
- Obesity
- ETOH
- Cholesterol
- Heredity
- Lifestyle
- Homocysteine, C Reactive Protein, Fibrinogen
Plaque
Claudication
  • Disabling
  • Intestinal

Limb Threatening Ischemia (LTI) Critical Limb Ischemia (CLI)
  • Rest Pain
  • Tissue Loss
  • Gangrene
Disabling Claudication
Intestinal Claudication
Claudication
  • Disabling
  • Intestinal

Limb Threatening Ischemia (LTI) Critical Limb Ischemia (CLI)
  • Rest Pain
  • Tissue Loss
  • Gangrene
Rest Pain/ Dependent Rubor
Tissue Loss
Diagnosis

Segmental Pressures
- Lower extremity Blood Pressures

ABI
- Nl >1.0, Diabetes will give elevated reading
- Claudication 0.7
- Rest Pain 0.3

Duplex Scanning
- Ultra sound
- Anatomy
- Flow

Contrast Studies
- Angiography
- MRI, CT Scan
Duplex Scanning
Superficial Femoral Artery Occlusion

Before

After
Cessation of Risk Factors

Exercise

Angioplasty

Saphenous Vein Bypass
  - Reverse
  - In Situ
**Stent with Balloon Angioplasty**

1. Build up of cholesterol partially blocking blood flow through the artery.
2. Stent with balloon inserted into partially blocked artery.
3. Balloon inflated to expand stent.
4. Balloon removed from expanded stent.
Post Angioplasty with Stent
## Results

<table>
<thead>
<tr>
<th></th>
<th>5 Year Patency</th>
<th>Reintervention</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stenting</td>
<td>47.6%</td>
<td>31%</td>
</tr>
<tr>
<td>Bypass</td>
<td>68-87%</td>
<td>33%</td>
</tr>
</tbody>
</table>

- Patient selected for operative intervention selected for greater severity of disease
- Smoking had a 3 fold increase in graft failure
  - Increased with heavy smokers
  - Decreased with smoking cessation
- Failure rate increased for age <65 and decreased for age > 65
Venous Disease

- Chronic Venous Stasis
- Varicose Veins
- Spider Veins
- Deep Vein Thrombosis (DVT)
- Superficial Thrombophlebitis
  - Mondor’s Disease
- Phlegmasia Cerulea Dolans
- Phlegmasia Alba Dolans (Milk Leg)
- ThromboAngitis Obliterans
VENOUS ANATOMY

Veins of the Leg

Common femoral vein
Deep femoral vein
Femoral vein
Great saphenous vein
Popliteal vein
Tibial veins
Small saphenous vein

Venous Anatomy

Femoral Vein
Greater Saphenous Vein
Popliteal Vein
Lesser Saphenous Vein
Tributary Veins
VENOUS ANATOMY

Perforating veins connect the deep system with the superficial system.
Swelling
Heaviness
Pain
Cramping
Itching
Burning
Thickened Skin (GATOR AREA)
Color Change
Restless Leg Syndrome
Spider Veins
Worse at the end of the day
Relief with elevation
Improvement in the morning
RISK FACTORS

***SMOKING***
FAMILY HISTORY
FEMALE>>>MALE
OBESITY
PREGNANCY
AGE
Virchow’s Triad
  • Stasis
  • Endothelial Injury
  • Hypercoagulability
Hypertension
Diabetes
VIRCHOW'S TRIAD

HYPERCOAGULABLE STATE
- Malignancy
- Pregnancy and peri-partum period
- Oestrogen therapy
- Trauma or surgery of lower extremity, hip, abdomen or pelvis
- Inflammatory bowel disease
- Nephrotic syndrome
- Sepsis
- Thrombophilia

VASCULAR WALL INJURY
- Trauma or surgery
- Venepuncture
- Chemical irritation
- Heart valve disease or replacement
- Atherosclerosis
- Indwelling catheters

CIRCULATORY STASIS
- Atrial fibrillation
- Left ventricular dysfunction
- Immobility or paralysis
- Venous insufficiency or varicose veins
- Venous obstruction from tumour, obesity or pregnancy

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Abnormal Venous Anatomy

Calf muscle pump with malfunctioning perforating vein connecting superficial and deep system

- Competent valve
- High velocity flow towards heart
- Contracting muscle
- Varicosity arising from pressure below
- Incompetent perforating vein valve


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Varicose Veins
Chronic Venous Stasis

Leg Ulcer and Discoloration
VENOUS ULTRASOUND
TREATMENT

- EVLA
- RADIOFREQUENCY ABLATION
- ULTRA SOUND GUIDED FOAM SCLEROTHERAPY
- VISUAL SCLEROTHERAPY
- PHLEBECTOMY
Radio Frequency Ablation

- https://youtu.be/BBVrx9xHUtU
UGFS

Abnormal Venous Anatomy

Calf muscle pump with malfunctioning perforating vein connecting superficial and deep system

- Competent valve
- High velocity flow towards heart
- Varicosity arising from pressure below
- Contracting muscle
- Incompetent perforating vein valve


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STS (SOAPSDS)

HOW TO GIVE
A SOAPSDS
ENEMA
(LIVE DEMO)
VISUAL SCLEROTHERAPY
<table>
<thead>
<tr>
<th>Procedure</th>
<th>Complications</th>
<th>Recanalization 1year</th>
</tr>
</thead>
<tbody>
<tr>
<td>EVLA</td>
<td>&lt;3.0%</td>
<td>.43%</td>
</tr>
<tr>
<td>RF</td>
<td>&lt;1.36%</td>
<td>.68%</td>
</tr>
</tbody>
</table>
Signs and Symptoms
- Pain
- Errythema
- Edema
- Cord like veins

Treatment
- Self Limited
- Symptomatic care
- Heat
- Elevation
- NSAIDs
DVT

Approximately 1 million cases/year

Signs and symptoms

- Asymptomatic
- Pain
- Swelling
- Homan’s sign

Incidence of PE (Pulmonary Embolism)

- Below the Knee
- Above the Knee
Incidence

- 6-7% of US population (Suspected)
- 60,000 – 100,000 cases/year (Diagnosed)
- 1-2/1000 people/yr
- 10-30% of deaths occur within the first month
- 50% of survivors develop post thrombotic syndrome
  - i.e. Pain, swelling, scaling, discoloration
- 1/3 recur within 10 years
- 5-8% of US population have primary blood disorders
PE
Below the Knee

- No Anticoagulation Needed
- Symptomatic Care

Above the Knee

- Full Anti Coagulation
  - Heparin
  - Coumadin
  - Lovenox
  - Eliquis

Contraindications to Anti Coagulation

- Allergies
- Recurrence
- PE while on Anticoagulation
VENA CAVA FILTER
## Table 2

### CapraH risk assessment model

<table>
<thead>
<tr>
<th>One point</th>
<th>Two points</th>
<th>Three points</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Age</strong></td>
<td><strong>Hypercoagulable state</strong></td>
<td><strong>History of VTE</strong></td>
</tr>
<tr>
<td>Age &lt; 40 y</td>
<td>Age &gt; 75 y</td>
<td>Age &gt; 75 y</td>
</tr>
<tr>
<td><strong>Surgical procedure</strong></td>
<td><strong>Surgical procedure &gt; 4 h</strong></td>
<td><strong>Pate V Ulma</strong></td>
</tr>
<tr>
<td>Laparoscopic surgery</td>
<td>Laparoscopic surgery &gt; 4 h</td>
<td>Laparoscopic surgery</td>
</tr>
<tr>
<td>ESRD &lt; 25 kg/m²</td>
<td>ESRD &gt; 25 kg/m²</td>
<td>ESRD &gt; 25 kg/m²</td>
</tr>
<tr>
<td>Dialysis access</td>
<td>Dialysis access</td>
<td>Dialysis access</td>
</tr>
<tr>
<td><strong>Vascular access</strong></td>
<td><strong>Malignancy</strong></td>
<td><strong>Anticardiolipid antibodies</strong></td>
</tr>
<tr>
<td><strong>Pregnancy or preeclampsia</strong></td>
<td><strong>Pregnancy or preeclampsia</strong></td>
<td><strong>Pregnancy or preeclampsia</strong></td>
</tr>
<tr>
<td>Confined to bed &gt; 72 h</td>
<td>Confined to bed &gt; 72 h</td>
<td>Confined to bed &gt; 72 h</td>
</tr>
<tr>
<td><strong>History of venous thromboembolism</strong></td>
<td><strong>History of venous thromboembolism</strong></td>
<td><strong>History of venous thromboembolism</strong></td>
</tr>
<tr>
<td>Immobilizing cast</td>
<td>Immobilizing cast</td>
<td>Immobilizing cast</td>
</tr>
<tr>
<td><strong>Hypercoagulability</strong></td>
<td><strong>Hypercoagulability</strong></td>
<td><strong>Hypercoagulability</strong></td>
</tr>
<tr>
<td>Control procoagulant</td>
<td>Control procoagulant</td>
<td>Control procoagulant</td>
</tr>
<tr>
<td>Other coagulopathy</td>
<td>Other coagulopathy</td>
<td>Other coagulopathy</td>
</tr>
</tbody>
</table>
Guidelines for VTE Prophylaxis

- Mechanical
- ICD
- Incentive Spirometry
- Chemical
- Ambulation
Anticoagulants

**ORAL**
- Coumadin (Warfarin)
  - 1948 Rat Poison
  - Vitamin K Reductase inhibitor
  - Decrease Vit. K, Factors II, VII, IX, X
  - Decrease Protein C, S
  - Monitor PT
  - Cheap and effective
- Eloquis (Apixaban)
  - Direct Factor Xa Inhibitor
  - Does not require blood monitoring

**INJECTABLES**
- Heparin
  - Binds to enzyme inhibitor Antithrombin III
  - Inactivates Thrombin
  - Monitor PTT
  - Antidote: Protamine Sulfate
- Lovenox (Enoxaparin)
  - Directly works on Factor Xa
  - Bleeding side effects decreased
  - No need to monitor labs
- Arixsta (Fondaparinux)
  - Chemically related to LMWH
  - Indirectly inhibits Antithrombin III
  - Highly selective to inhibit Factor Xa
  - No need to monitor Coags
Mondor’s Disease

Thrombosis of the Superficial Antero-Lateral Thoraco-Abdominal Wall Vein.
Painful, Red, Swollen Breast,
Single Linear Nodularity on palpation
Self Limited

Treatment
• NSAID
• Elevation/Support
• Heat Application
• Thrombectomy in extreme cases
• No need for anticoagulation
MONDOR’S DISEASE
Phlegmasia Alba Dolans