My Patient Has A Swollen Leg

PoCUS for DVT
Objectives

- Vascular Anatomy in the Lower Limb
- DVT Diagnostic Algorithm
- 2-Point PoCUS Technique
- Other causes of a Swollen Leg
Anatomy – Lower Limb

• The Superficial Femoral Vein is a DEEP vein
• It accompanies the Femoral Artery
• Popliteal Vein has 3 main tributaries
  • Anterior Tibial
  • Tibio-peroneal Trunk
    • Posterior Tibial
    • Peroneal
Popliteal Vein

- Formed at lower border of Popliteus
- Ascends through Popliteal fossa to aperture in Adductor Magnus where it become the Femoral vein
- Initially lies superficial to then lateral to Popliteal artery
- Receives tributaries from Geniculate veins and Small Saphenous vein
Superficial Femoral Vein

- As the SFV ascends in thigh it is initially lateral to the Femoral artery, then superficial, then medial in the groin

- Joined by Deep Femoral Vein 4cm below Inguinal Ligament
DVT Clinical

- Clinical presentation of a DVT can be very non-specific (swelling, pain, warmth)
- Clinical features depends on site of venous occlusion
- Homan's sign = pain on passive dorsiflexion of the ankle is a non-specific sign (e.g. calf strain)
- Many small DVTs are asymptomatic (e.g. post-op patients)
- Only 10-25% of patients with ‘suspected DVT’ will subsequently be diagnosed with DVT
DVT Prognosis

- Below knee DVT’s are rarely a source of clinically significant PE
- But, up to 1/3 of below knee DVT’s can propagate above knee
- The incidence of PE with untreated above knee DVT is 29-50%
- And most PE’s are first diagnosed at post mortem

Scarvelis, D. et al. CMAJ 2006;175:1087-1092
DVT Diagnosis

- Clinical Prediction Rule (e.g. Wells)
  - Risk factors, Symptoms and Signs
  - Reliably stratifies into probability of DVT being ‘Unlikely’ or ‘Likely’

- Algorithm Approach
  - Clinical Prediction Rule
  - D-Dimer
  - Compression Venous Ultrasound
  - +/- LMW Heparin

Table 1: Clinical model for predicting pretest probability of deep-vein thrombosis (DVT)*

<table>
<thead>
<tr>
<th>Clinical characteristic†</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Active cancer (treatment ongoing, administered within previous 6 mo or palliative)</td>
<td>1</td>
</tr>
<tr>
<td>Paralysis, paresis or recent plaster immobilization of the lower extremities</td>
<td>1</td>
</tr>
<tr>
<td>Recently bedridden &gt; 3 d or major surgery within previous 12 wk requiring general or regional anesthesia</td>
<td>1</td>
</tr>
<tr>
<td>Localized tenderness along the distribution of the deep venous system</td>
<td>1</td>
</tr>
<tr>
<td>Swelling of entire leg</td>
<td>1</td>
</tr>
<tr>
<td>Calf swelling &gt; 3 cm larger than asymptomatic side (measured 10 cm below tibial tuberosity)</td>
<td>1</td>
</tr>
<tr>
<td>Pitting edema confined to the symptomatic leg</td>
<td>1</td>
</tr>
<tr>
<td>Collateral superficial veins (nonvaricose)</td>
<td>1</td>
</tr>
<tr>
<td>Previously documented DVT</td>
<td>1</td>
</tr>
<tr>
<td>Alternative diagnosis at least as likely as DVT</td>
<td>-2</td>
</tr>
</tbody>
</table>

*A score of 2 or higher indicates that the probability of DVT is “likely”; a score of less than 2 indicates that the probability is “unlikely.”†In patients who have symptoms in both legs, the more symptomatic leg is used.
DVT Algorithm - Logic

- We do need to Diagnose and Treat **above** Knee DVT
- 2-Point CVU PoCUS is very sensitive (97%) for **above** Knee DVT
- We don’t need to treat **below** knee DVT
  - CVU PoCUS is not sensitive (73%) for **below** knee DVT anyway.
  - So no point looking below the knee….
- But 1/3 of **below** knee DVT will propagate **above** the knee
  - However 2/3 don't propagate….
- But we can’t rescan all the negatives (only 1-2% become +ve)….
- So we need a way to choose a smaller group who we rescan
CVU - Criteria

- Experienced PoCUS clinician
- Understands the place of CVU within the algorithm
- Quality ultrasound equipment
- Ability to interpret Full Compression
CVU - Limitations

• Depth limitations / Patient habitus
• Pelvic veins are not visualised
• Operator error
• Calf DVTs not reliably visualised
• Acute on chronic DVT
2-Point PoCUS Protocol

- 2 point CVU at proximal thigh and popliteal fossa
- Performed in ED by ED Physicians
- Sensitivity similar to standard CVU = 96.8%
  
2-Point PoCUS Protocol

• Tilt bed 20° reverse Trendelenburg

• Patient supine, Knees bent, Hips externally rotated

• Scan in transverse plane

• Place transducer distal to inguinal ligament at mid-inguinal point

• Identify superficial femoral vein (SFV), femoral artery and greater saphenous vein (GSV)
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2-Point PoCUS Protocol

- Assess from 2cm proximal and 2cm distal to the junction of SFV and GSV

- **Look for visible thrombus**

- Apply compressive pressure to SFV

- If resolution suboptimal consider colour flow to help delineate vessel

- If negative, quick sweep of thigh to look for other cause of leg swelling (e.g. muscle hematoma)
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- Turn patient onto side, etc
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- Assess 2cm distally to trifurcation
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- If negative, quick sweep of calf to look for other cause of leg swelling (e.g. Baker’s cyst, muscle hematoma)
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Proximal DVT

DVT

Normal
Proximal DVT

DVT

Normal
Proximal DVT
Proximal DVT
Popliteal DVT

DVT

Normal
Popliteal DVT

Normal

DVT
Popliteal DVT
Popliteal DVT
Differential Diagnosis

- DVT
- Cellulitis
- Subcutaneous Hematoma
- Muscle Hematoma
- Bakers Cyst
- Popliteal Aneurysm

50yr old female, recent long haul flight returning from holiday in Cuba - Swollen Leg
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84yr post op Total Hip Replacement - Swollen Leg

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60yr 3 days immobility following fall - Swollen Leg
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70yr Pain in back of Knee - Swollen Calf

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Axillary Vein

70yr Treated for Cellulitis 5 days - Swollen Arm
Differential Diagnosis

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- Cellulitis
- Subcutaneous Hematoma
- Muscle Hematoma
- Bakers Cyst
- Popliteal Aneurysm

70yr Treated for Cellulitis 5 days - Swollen Arm

Axillary Vein
Differential Diagnosis

- DVT
- Cellulitis
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- Muscle Hematoma
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- Cellulitis
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- Muscle Hematoma
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Brachial Vein

70yr Treated for Cellulitis 5 days - Swollen Arm
Questions?