Diagnostic Imaging Pathways - Deep Venous Thrombosis (Leg)

Population Covered By The Guidance

This pathway provides guidance on the imaging of adult patients with suspected lower limb deep venous thrombosis.

Date reviewed: September 2017
Date of next review: September 2020
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Quick User Guide

Move the mouse cursor over the **pink** text boxes inside the flow chart to bring up a pop up box with salient points.
Clicking on the **pink** text box will bring up the full text.
The relative radiation level (RRL) of each imaging investigation is displayed in the pop up box.

<table>
<thead>
<tr>
<th>SYMBOL</th>
<th>RRL</th>
<th>EFFECTIVE DOSE RANGE</th>
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<tr>
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<td>None</td>
<td>0</td>
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<tr>
<td><img src="image" alt="Symbol" /></td>
<td>Minimal</td>
<td>&lt; 1 millisieverts</td>
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<td><img src="image" alt="Symbol" /></td>
<td>Low</td>
<td>1-5 mSv</td>
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<td><img src="image" alt="Symbol" /></td>
<td>Medium</td>
<td>5-10 mSv</td>
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<tr>
<td><img src="image" alt="Symbol" /></td>
<td>High</td>
<td>&gt;10 mSv</td>
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Pathway Diagram
Image Gallery

Note: These images open in a new page

1a Leg Deep Vein Thrombosis

Image 1a and 1b (Doppler Ultrasound): Acute thrombosis is indicated by the distended and hypoechoic lumen of the common femoral and external iliac
1b veins with no flow.

Teaching Points

- Clinical prediction rules (e.g. Wells Criteria) may be used to categorise patients into low, medium or high risk
- Low risk and negative serum D-Dimer effectively excludes DVT
- Medium and high risk patients should undergo Doppler ultrasound without D-Dimer estimation
- Ultrasound is highly sensitive for proximal lower limb deep vein thrombosis
- US is less sensitive for deep calf vein thrombosis and for iliac vein thrombosis
- After a negative Doppler ultrasound, follow-up US in patients with high clinical suspicion may be indicated to exclude a calf thrombosis that is propagating proximally

Wells Criteria

This clinical prediction rule is designed to increase the probability of an accurate diagnosis of deep venous thrombosis 1-5

- Active cancer patient receiving treatment for cancer within the previous 6 months or currently receiving palliative treatment (1 point)
- Paralysis, paresis, or recent plaster immobilisation of the lower extremities (1 point)
- Recently bedridden for 3 days or more, or major surgery within the previous 12 weeks requiring general or regional anaesthesia (1 point)
- Localised tenderness along in the distribution of the deep venous system (1 point)
- Entire leg swollen (1 point)
- Calf swelling at least 3cm larger than that on the asymptomatic side (measured 10cm below tibial tuberosity) (1 point)
- Pitting oedema confined to the symptomatic leg (1 point)
- Collateral superficial veins (nonvaricose) (1 point)
- Previously documented DVT (1 point)
- Alternative diagnosis at least as likely as DVT (-2 points)

Score of 2 or higher = DVT likely
Score of less than 2 = DVT unlikely

Ultrasound Including Doppler

- Most accurate non-invasive test for the diagnosis of a first symptomatic proximal deep vein thrombosis 6-9
- Involves a combination of: 6, 9
  - Compression ultrasonography - starting at the inguinal ligament and generally extending to the venous trifurcation in the calf
  - Doppler imaging - particularly useful where compressibility is difficult to assess
- Advantages of ultrasound 10
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• Excellent sensitivity for proximal vein thrombosis (97%) 8
• Ability to depict anatomical variants (e.g. duplicated venous segments) and alternative causes of symptoms
• Non-invasive
• No exposure to ionising radiation
• Does not involve the use of contrast agent
• Relatively inexpensive

• Limitations of ultrasound 9, 10
  ◦ Venous compressibility may be limited by patient characteristics such as obesity, oedema, and tenderness
  ◦ False positives may occur due to extrinsic compression of a vein by pelvic mass or other perivascular pathology
  ◦ A negative ultrasound scan in moderate to high risk patients does not reliably exclude the diagnosis of deep vein thrombosis 11
  ◦ Less sensitive for detecting distal vein thrombosis (73% sensitivity) and in detecting thrombosis in iliac veins 8

• Serial ultrasound is used to detect those DVTs that were isolated distally in the calf initially and undetected but which subsequently extend into the more proximal veins 10
• Isolated distal calf DVTs rarely lead to significant embolic events 12

D-Dimer

• Is formed as a result of plasmin generated degradation of thrombin and is therefore a marker of the presence of thrombus 5, 13
• There are various qualitative and quantitative assays available for D-Dimer but in general they have a high sensitivity and negative predictive value for the presence of thrombus 5, 13, 14
• Of the various assays, the quantitative enzyme linked immunosorbent assay (ELISA) has the best negative likelihood ratio and is significantly superior to non-ELISA assays for excluding the presence of deep vein thrombosis. The sensitivity is higher for proximal, compared to distal DVT 11, 13
• A negative quantitative ELISA D-Dimer result is as diagnostically useful for excluding DVT as a negative duplex Doppler ultrasound 5, 11
• If a patient is assessed, based on pre-test probability as unlikely to have leg DVT returns a negative D-Dimer result, there is generally considered to be no requirement for a Doppler ultrasound 2, 11, 15
• An elevated D-Dimer level is non-specific for venous thromboembolism, and diagnostic imaging is required to confirm the presence of disease 16
• D-Dimer has a limited role in hospitalised patients, and ultrasonography should be performed if deep venous thrombosis is suspected

References

Date of literature search: September 2017

References are graded from Level I to V according to the Oxford Centre for Evidence-Based Medicine, Levels of Evidence. Download the document


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