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.

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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.

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<th>SYMBOL</th>
<th>RRL</th>
<th>EFFECTIVE DOSE RANGE</th>
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<tr>
<td></td>
<td>None</td>
<td>0</td>
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<tr>
<td></td>
<td>Minimal</td>
<td>&lt; 1 millisieverts</td>
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<td></td>
<td>Low</td>
<td>1-5 mSv</td>
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<td></td>
<td>Medium</td>
<td>5-10 mSv</td>
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<tr>
<td></td>
<td>High</td>
<td>&gt;10 mSv</td>
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Pathway Diagram
SUSPECTED LEG DEEP VENOUS THROMBOSIS

Outpatient

Wells criteria

DVT unlikely

D-Dimer

Negative

DVT excluded

Positive

Ultrasound with Doppler

DVT excluded

DVT likely

Ultrasound including Doppler

Positive

Appropriate management

Negative but persisting clinical suspicion

D-Dimer

Negative

DVT excluded

Positive

Repeat US in 1 week

Ultrasound with Doppler

DVT confirmed

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
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.

- 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.
- 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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