An overview of lower limb deep vein thrombosis on ultrasound

By Kathryn Adams
Curtin University ID: 17724795
What is the Role of Ultrasound?

- Suspected deep vein thrombosis (DVT) is one of the most common indications for a lower limb venous ultrasound.
- The three main goals of the ultrasound assessment of DVT are:
  - Is there thrombus present?
    - Chronic or acute?
  - How extensive is the thrombus?
    - Does it involve the iliac veins, inferior vena cava or renal veins?
  - Is there evidence of possible dislodgment of the thrombus
    - How well attached is the thrombus to the vessel wall, is there an increased risk of other thrombolytic events such as pulmonary embolism? (1)
The veins of the lower limb are separated into three parts;

- **Superficial veins**
  - Greater saphenous vein (GSV)
  - Lesser saphenous vein (LSV)

- **Deep veins**
  - External iliac vein (EIV)
  - Common femoral vein (CFV)
  - Femoral vein (FV)
  - Profunda vein (Prof V)
  - Popliteal vein (Pop V)
  - Calf veins
  - Posterior tibial veins (PTV)
  - Peroneal veins (Per V)

- **Perforating veins** (3)

---

Fig 1. (2) - Venous Anatomy of the Lower Limb
Findings on Ultrasound

• The table below is a summary of the common findings associated with a positive DVT

| Grey Scale Findings:                      | - Distended Vein (with or without internal echoes)  
- loss of compressibility                  |
|------------------------------------------|---------------------------------------------------|
| Colour Flow Mode:                        | - may be absent                                     
- in non-occlusive thrombus the flow may be seen “around” the thrombus |
| Spectral Trace:                          | - loss of phasicity                                  
- flat trace is abnormal in lower limb veins  |

Table 1. (4)

• Note: thrombus is present when echogenic material is seen within the lumen of the vein and the vein does not fully compress, echogenic material is not sufficient enough evidence to diagnosis thrombus alone (4)
Chronic vs Acute Thrombus on Ultrasound

• Chronic thrombus will be more solid compared to acute thrombus
  • Chronic thrombus will not deform under the pressure of the transducer, whereas acute thrombus will compress slightly (but not entirely)

• Chronic thrombus is more echogenic than acute thrombus and continues to increase in echogenicity as time progresses
  • Acute thrombus is hypoechoic

• The vein will be contracted (small) when chronic thrombus is present
  • Acute thrombus causes enlargement of the vessel when completely obstructed
  • The vein walls will be thickened in areas of chronic thrombus

• Thrombus is rigid and well attached to the vessel walls in chronic thrombus
  • Acute thrombus has a spongy-texture and is usually poorly attached to the vessel walls
Normal vs Thrombosed EIV:
Colour & spectral doppler assessment

Image 1 (6) - shows a normal colour doppler and spectral trace in the EIV with no evidence of thrombus.

Image 2 (7) - shows absent colour fill & spectral trace in a completely occluded thrombosed EIV.
Compressible vs Non Compressible Veins

Image 3 (8) - shows a compressible non thrombosed CFV & GSV

Image 4 (9) – shows a non compressible thrombosed CFV
Partially Occlusive Thrombus in the IVC

Image 5 (10) - shows a partially thrombosed (hypoechoic) IVC on B Mode ultrasound

Image 6 (11) - shows the same partially thrombosed (hypoechoic) IVC with colour doppler
References