Critical Care Ultrasound

*DVT*

Rohit Patel, MD
University of Florida Health
Director, Critical Care Ultrasound Surgical ICU
Center for Intensive Care
Gainesville, Florida
Clogging of the pipes

Venous thromboembolism

Focused Questions

Is the common femoral or popliteal vein fully compressible?

Probe type: Vascular probe (linear array, high frequency); 7.5 to 10 MhZ
DVT

Most unable to sit in best position to evaluate (with legs hanging off bed)

Most supine -> visualization improved by externally rotating the leg

Amount of pressure applied should be even and just enough to show some small deformity in the artery visualized

Applied perpendicular to the skin
Clogging of the pipes

Venous thromboembolism

Majority of pulmonary embolism arise from lower ext

Simple compression US has good sensitivity

Incomplete compression of anterior and posterior portions of vein

Complicated Doppler techniques add little utility

Kearon CK. Ann Internal Med. 1998
Clogging of the pipes

Bernardi et al

Prospectively randomized 2098 pts

2point + d–dimer VS whole leg color flow doppler

Study supports it is equivalent

Initial prevalence of proximal DVT was similar in both groups, suggesting most are common femoral or popliteal

Bernardi E. JAMA.
Clogging of the pipes

Proximal femoral vein evaluated first just below inguinal ligament, scanning should continue down to bifurcation into deep and superficial femoral.

Second area is popliteal fossa.

Can do upper extremity veins also, but lower sensitivity.

Can miss calf veins.
Clogging of the pipes

Lower Extremity Venous Anatomy:
- Common Femoral Vein
- Deep Femoral Vein
- Saphenous Vein
- Superficial Femoral Vein
- Popliteal Vein
- Anterior Tibial Vein
- Posterior Tibial Vein
- Peroneal Vein

Bifurcation of Femoral Vessels:
- Com Fem V
- Sup Fem V
- Deep Fem V
- Saph V

SFA = Superficial Femoral Artery
DFA = Deep Femoral Artery
DVT

“two point” – common femoral and popliteal vein
- well validated in outpatient population

“three point” – adds in superficial femoral vein
- recommended since studies show higher incidence of clots isolated to superficial femoral in asymptomatic patients
- Kory et al found sensitivity went from 88% to 82% and so recommend three point exam

Bernardi. JAMA. 2008
Ascani. Thrombo Haemost. 1996
Kory. CHEST. 2011
Perera P. "http://www.sound-bytes.tv"
Perera P. "http://www.sound-bytes.tv"
DVT

Greater Saphenous takeoff

Artery   Vein

Artery   Vein (compressed)
DVT

- artery
- superficial femoral
- deep femoral
- veins collapsed
DVT

Vein

Artery

vein collapsed

artery
DVT

artery

long axis

vein with thrombous
But I've never been trained...

EP's can perform limited US for lower extremity with good sensitivity in patients with high pretest probability

Systemic review of EP performed for diagnosis exclusion of DVT, 1162 publications reviewed, 6 studies met inclusion criteria, 132 cases detected out of 936 patients (95%\96%) pooled sensitivity/specificity

Jang T. Academic Emerg Med. 2004
Burnside PR. Academic Emerg Med. 2008
Clogging of the pipes

Venous thromboembolism

Focused Questions

Is the common femoral or popliteal vein fully compressible?

Probe type: Vascular probe (linear array, high frequency); 7.5 to 10 MHz