Upper Extremity Venous Duplex

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Upper Extremity Venous Duplex

Five top technical tips

● Know the anatomy
● Know as much as possible about patient history
● Become comfortable with central vein evaluation
● Watch for collateral veins
● Focus on Doppler waveforms and symmetry between the limbs
Upper Extremity Venous Duplex

- Deep veins of the UE
  - Superior vena cava
  - Brachiocephalic: right and left
  - Internal and external jugular
  - Subclavian
  - Axillary
  - Brachial
  - Radial, ulnar, interosseous
Upper Extremity Venous Duplex

- Superficial veins of the UE
  - Cephalic
  - Basilic
  - Median cubital
Anatomy
Upper Extremity Venous Anatomy

- Anatomy of the veins is variable
- Level of the brachial artery bifurcation varies
Upper Extremity Venous Anatomy

- Cephalic vein may drain through the antecubital vein into the basilic or a brachial vein and be very small or essentially absent in the upper arm.

- Basilic vein confluence with deep system may be in the axilla or upper arm.
Upper Extremity Anatomy

Normal bifurcation level at antecubital fossa

Identify the level of the brachial bifurcation
Upper Extremity Anatomy

High bifurcation, axillary level
Upper Extremity Venous Duplex Examination Protocol

Vessels to be examined include:

- IJV
- Brachiocephalic
- Subclavian
- Axillary
- Brachial
- Cephalic & basilic
- Forearm vessels if indicated
Examination Protocol

- Transverse views with compression
- Brachiocephalic, subclavian, and axillary cannot be typically compressed – confirm patency with color or spectral Doppler
- Spectral Doppler signals should be recorded from all major vessels
- If a unilateral study is performed, record contralateral subclavian vein
Venous Evaluation

Basilic vein 6.3 mm

Compressibility
Identify Arteries with Deep Veins
Venous Evaluation
UE Central Vein Doppler

- Pulsatile with respiro-phasicity.
- Pulsatility decreases distally
- Continuous flow pattern consistent with more central obstruction
 UE Central Vein Doppler Signals

Abnormal, continuous signal
Axillary Vein Thrombosis

Document absence of Doppler signal
Upper Extremity Venous Thrombosis

Primary and Secondary
Upper Extremity Venous Thrombosis

Primary

Idiopathic

Cancer, hypercoagulable states

Thoracic Outlet Syndrome

Compression (1\textsuperscript{st} rib, cervical rib)

Effort Thrombosis (Paget-Schroetter)

Related to strenuous arm activity
Upper Extremity Venous Thrombosis

Secondary

Central venous catheters (CVC)
- Account for 75% of all UEDVT cases
- Higher incidence if catheter tip in axillosubclavian or brachiocephalic as opposed to SVC placement

Pacemaker / Defibrillator wires
Upper Extremity Venous Duplex

Besides thrombosis…….

Fibrosis: can result from radiation therapy with subclavian and axillary involvement frequently seen in patients treated for breast cancer.
Upper Extremity Venous Thrombosis

**Symptoms and Signs**

- Shoulder or neck discomfort / pain
- Arm and hand edema
- Prominent superficial veins over the involved arm, chest or neck
- Jugular venous distention
- If SVC occluded – facial edema, blurred vision, dyspnea
Upper Extremity Venous Thrombosis

Symptoms and Signs

- Occluded central venous catheter
- Infusion difficulty with indwelling catheter
- Pulmonary embolus
- Palpable cord in the arm
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Catheter-Associated Thrombus
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Defibrillator wire

Lt Medial SCV LO
Upper Extremity Venous Duplex

Post PICC line removal

Rt BRACH V  POST-PICC LINE
Chronic changes
Venous Evaluation

Central Vein Evaluation

● Current or previous subclavian catheter placement
● Current or previous transvenous pacemaker
● Previous arm, neck, or chest trauma or surgery
● Multiple previous accesses in an extremity planned as an access site
Central Veins
Central Veins
Collateral vein
Collateral veins across anterior neck
UE Central Vein Doppler Signals

RIGHT INNOM V

RIGHT SUBCL V DIST
Central Vein Obstruction
Central Vein Obstruction
Case example
Case example
Case example
Case example

LEFT PROX IJV-INNOM
If mapping veins .....
Venous Evaluation

Explore veins > 2mm
Veins ≥2.5 mm optimal
Venous Evaluation

Cephalic vein 1.3 mm

Cephalic vein 5.1 mm

Measurement
Venous Evaluation

Hemodynamics
Venous Evaluation

Chronic changes
Venous Evaluation

Chronic changes, deep venous system
Thank you!

Questions?