**Ultrasound Vascular Access**

- Brief overview
- Static and Dynamic technique
- ASA Guidelines for CVC placement
  - Central Venous Catheterization:
    - Internal Jugular
    - Peripheral IV Placement
    - Arterial line placement

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**WHY???**

- **Complications:**
  - Pneumothorax
  - Hemothorax
  - Chylothorax – Thoracic duct injury (left only)
  - Arterial cannulation/dilation

- **Other Patient-centered issues:**
  - Multiple previous lines, ESRD, Vascular disease, deep venous thrombosis, etc...

- **Guidelines**
  - ASA Practice Guidelines for Central Venous Access (2012)

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**Further Considerations**

- Much like Regional Anesthesia:
  - In experienced hands, the most desirable technique may be the one in which the user has the highest comfort level
  - Maybe US won’t always be your first choice, but it can cut down on duration/frustration!
  - Guidelines may become more stout; some hospitals/systems already require US guided central access (IJ and Femoral)

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**Two Techniques**

- **Static**
  - Used as mapping technique prior to procedure
  - “Take a look” ...then cannulate blind.
  - Patient should already be in final position
  - Gives an idea of depth/angle/anomalies/clots

- **Dynamic – preferred technique at CU**
  - Used “real-time” to watch needle enter vessel
  - Also can visualize wire in vessel
  - May require sterile US probe

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**Dynamic Ultrasound vs. Anatomic**

- **Internal Jugular**
  - Higher first insertion attempt success rate (A1)
  - Reduced access time (A1)
  - Higher successful cannulation rate (A2)
  - Decreased rate of arterial puncture (A1)
  - Fewer insertion attempts (A2)
Dynamic Ultrasound vs. Anatomic

- “The consultants agree and the ASA members are equivocal that, when available, real time ultrasound should be used for guidance during venous access when either the internal jugular or femoral veins are selected for cannulation.”

- Subclavian – Both are equivocal

U/S Guided Vascular Access

- Central Venous Catheterization:
  - Internal Jugular
  - Subclavian
  - Femoral
  - Peripheral IV Placement
  - Arterial line placement

Internal Jugular

- Position – T’burg, head away
- prep/drape as per usual
- Ultrasound w/ sterile drape
- Identify Internal Jugular and Carotid
  - Jugular is superficial/lateral and COMPRESSIBLE
  - Carotid typically deep/medial and PULSATILE
  - Watch for External jugular
    - Going through the EJ is poor form, and a hematoma

Needle placement:
- Out of plane – 45 degree angle, to appropriate depth with constant aspiration, until flash with free-flow
- Confirm venous access (Blood gas, Transduce, U/S)
- Seldinger technique for placement
Hey, I can see it, how can I screw it up now?

**Plenty of ways! Complications will still exist**
- Through and through into carotid
- Dissect wall of Internal jugular
- No Man’s land (mediastinum, pleura, SubQ)
- Must always have free flow of VENOUS blood
- If you can’t aspirate and the patient still has blood, you’re most likely not in.
- Confirm VENOUS access prior to dilation!

**Peripheral IV access**
- Excellent for many situations:
  - Need for quick, large bore access
  - Patients with poor access (IVDA, Obesity, etc.)
  - Patients with good veins are good practice!
  - May be used in plane or out of plane
- Look for superficial compressible vessels
- AC fossa and deep brachial veins are great
- Don’t forget Saphenous, too!
- USE LONG IV CATHETERS!
  - Short catheters may go in and then pop out easily
  - Seldinger technique (over wire) may also help

**Arterial line**
- Excellent for easy or difficult access!
  - Radial, brachial, axillary
  - Dorsalis pedis, posterior tibial, femoral
- The more superficial, often easier
- In high infection areas (Ax, Fem): aseptic
- In plane or out of plane
- Long catheters for proximal A-lines!!!
- Seldinger technique (over wire) also helps
What do we practice at CU?

- Central Venous Catheterization
  - Internal Jugular – ALL placed under U/S guidance
  - Subclavian – Placed blindly
  - Femoral – Placed under U/S guidance
- Peripheral IV
  - For difficult IV access – known (will go straight to US), or unknown (after multiple attempts)
- Arterial line
  - Most placed blindly - U/S for difficult placement
  - U/S for most lines proximal to Radial or DP

Three Pearls: Vascular Access

- Position is still just as important!
- Ultrasound should be used for IJ placement
- Deep brachial veins are excellent access in difficult access patients