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CRASH 2016

Ultrasound Vascular Access



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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

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)

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)

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 U/S probe

Dynamic Ultrasound vs. Anatomic

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

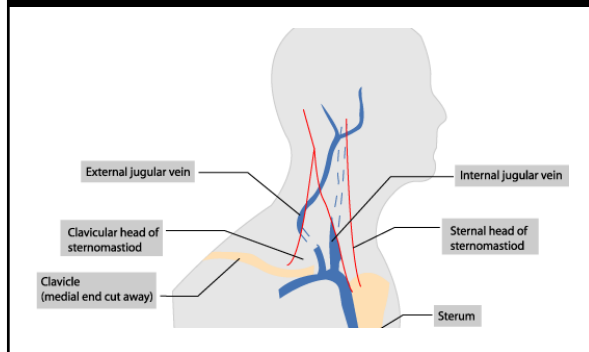
Dynamic Ultrasound vs. Anatomic

- "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

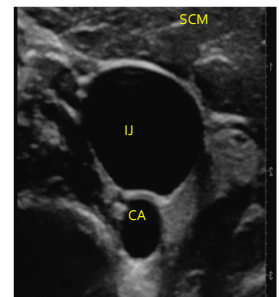
- Central Venous Catheterization:
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 - Femoral
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Internal Jugular



Internal Jugular

Transverse View Out of Plane



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



Internal Jugular

- 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



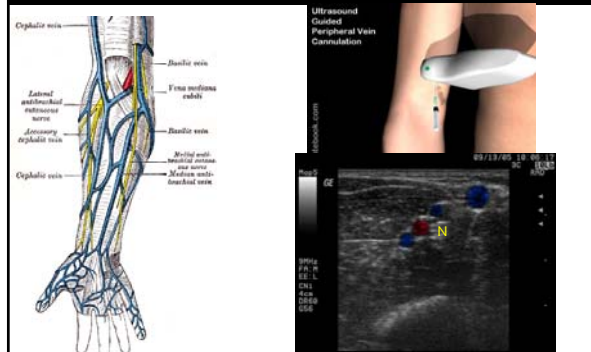
Internal Jugular, cont.

- 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

Peripheral IV access



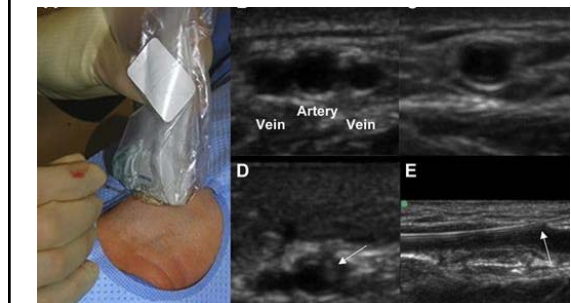
Long Catheters!



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

Arterial line



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



<http://blogs.nghn.org/how/wp-content/uploads/2010/04/Picture-63-30x125.png>