

Central Line

Time Out Checklist:

- Informed consent (3% risk of a major complication (arterial injury, DVT, pneumothorax or CLABSI).
- Monitor
- POCUS inspection of best site.
- Table for the equipment
- Place patient in trendelenberg.
- Sedate and restrain patient if necessary.
- Review contraindications:
 - Check coags/platelets (UPTODATE: consider correction of INR>3 or Platelets<20k with transfusion of FFP/platelets and avoidance of subclavian (noncompressible).
 - RV assist device
 - SVC syndrome contraindicates IJ/SC but Femoral ok
 - Pacemaker insertion or indwelling catheter at same site

Step-by-step

- Place nasal canula oxygen on the patient (may help with claustrophobia once the drape is over the patient).
- Everyone in the room wears a mask.
- Using sterile technique and sterile gloves, prepare the skin with chlorhexidine.
- Open central line bundle,
 - drop sterile US sheath on sterile site,
 - drop gloves on site,
 - put on head cover.
- Wash hands
- Don sterile gown, attaching neck Velcro first, then pushing hands to ends of sleeves but not through sleeve.
- Pick up gloves with sleeves and pull gloves onto your hands.
- Open kit and apply sterile drapes.
- Take sterile ultrasound sheath with floppy end pointing toward wrist, insert fingers into the fold of the stiff end of the sheath to control the stiffer end like the mouth of a fish. Then you can grab the ultrasound probe
Apply sterile sheath to ultrasound and leave on sterile field.
- Weingart says prepare bare minimum in kit so that emergency line and sterile line procedure are the same prep:
 - Draw up lidocaine
 - Prep thin walled introducer needle on a syringe
 - Straighten tip of guidewire in J-tip
 - Loosen wire in packaging so it flows easily



Keep hands in sleeves, grab sterile gloves, pull gloves over sleeve, push hand into gloves



Put fingers in fold of the stiff end (floppy end on palm) to control mouth of stiff end.

Probe will enter thru mouth of stiff end, ending in floppy end, slide stiff end folds down over cord.

- Take off the brown port cap on the triple lumen
- Anesthetize the skin and then you can also find IJ.
- With finder needle, insert needle at same spot and angle as the anesthetic needle.

- **MICROSKILL 1: Syringe Manipulation**

- Withdraw plunger while advancing needle under U/S guidance.



Withdraw on plunger with index and middle fingers while pushing with thumb.

- **MICROSKILL 2: Needle Stabilization**

- At point that you get flash, stabilize your needle with a pool shooter grip, spreading 3-5 digits on the patient's body. Place hypothenar eminence on the patient's body. Stable base and tight grip on the needle hub.



Stabilize needle once you get flash using thenar eminence and three finger spread resting on patient's body.

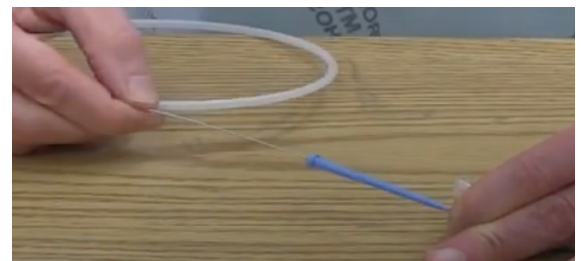
- **MICROSKILL 3: Syringe Disconnect**

- Twisting motion of syringe (not a pull) to disengage the syringe from the hub of the needle without moving the needle tip in the vessel.

- **MICROSKILL 4: Wire Manipulation**

- Grasp wire with enough length to insert tip into the needle hub and advance wire with your first pass into the vessel rather than several small passes that may move the needle tip.

- Confirm the intravenous guidewire via ultrasound.
- Beware of guidewire depth during insertion, back end of wire should not go closer than the patient's head.
- Check monitor for arrhythmias due to guidewire.
- Remove the needle while controlling the guidewire.



First pass of wire into needle should ideally be enough to enter vessel.

- **MICROSKILL 5: Dilation**

- 1) Stab incision over wire- Make a single small stab incision in the skin at the puncture site adjacent to the guidewire by resting the flat portion of the blade directly over the wire as it enters the skin, then poke in about a quarter of the way down the blade.



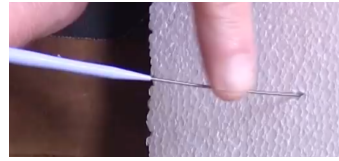
Flat portion of blade directly over wire, poke in a quarter of the blade.

- 2) Rotate wire- Make sure wire moves easily in the larger incision you made by rotating the wire around, ensures no skin tags.



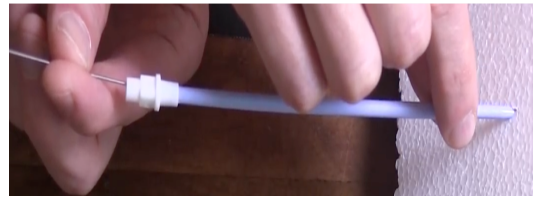
Rotate wire in stab incision.

- 3) Angle- angle of entry to the skin with the dilator needs to match the angle the wire enters skin.

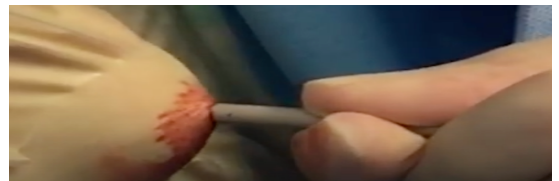


Confirm angle of dilator entry to skin matches wire

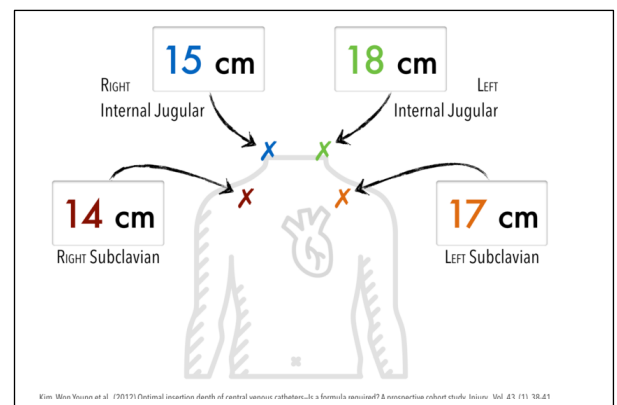
- 4) Push, twist and rack- one hand on wire at all times, other hand grips the dilator near skin and pushes and twists until you meet resistance (wire stays stationary as the dilator moves like a monorail (the dilator) sliding on a track (the wire)). Every time you feel resistance, you slide the wire back and forth to ensure there is no kinking.



- 5) Twist and rip- if you have time, instead of reaching resistance with push and twist and trying to get past it, try to twist and then pull back 2cm while maintaining the rotational tension which rips the subcutaneous tissue under the skin.



- Advance dilator until it enters the vessel, normally only needs to go in 2-3 cm. Do not advance the dilator to the hub, this may lacerate the vessel.
- After removing the dilator, thread the catheter over the guidewire, taking care to control the guidewire. Catheter length at the skin is 15cm for R IJ.



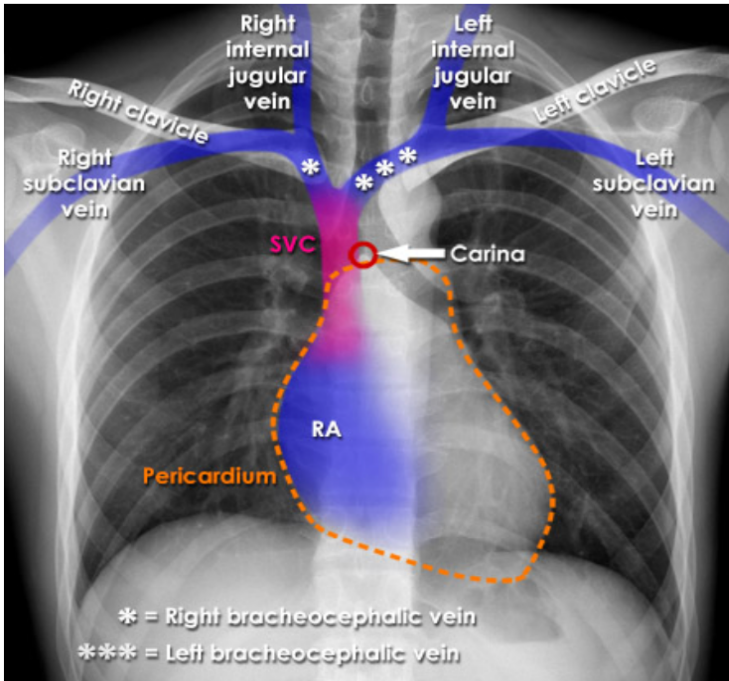
- Remove the guidewire, taking care to control the catheter.
- Sequentially aspirate blood from each access hub and make sure air in the syringe is at top of the syringe by lifting plunger side of the syringe higher and tapping the syringe to move air bubbles, flush with saline (usually 3cc is adequate) to ensure a functioning catheter.
- Secure the catheter into place, Weingart curves catheter back towards entry to skin.



- Remove the sterile drape and dress the site using sterile technique.
- Confirm the position of the tip of the catheter with chest radiography (for jugular and subclavian approaches only). See images below for acceptable position of central line tips taken from [RadiologyMasterClass](#). Right IJ should be just above the carina. UPTODATE acknowledges that the optimal position of the catheter tip is controversial.

Superior vena cava (SVC) anatomy

Hover on/off image to show/hide findings



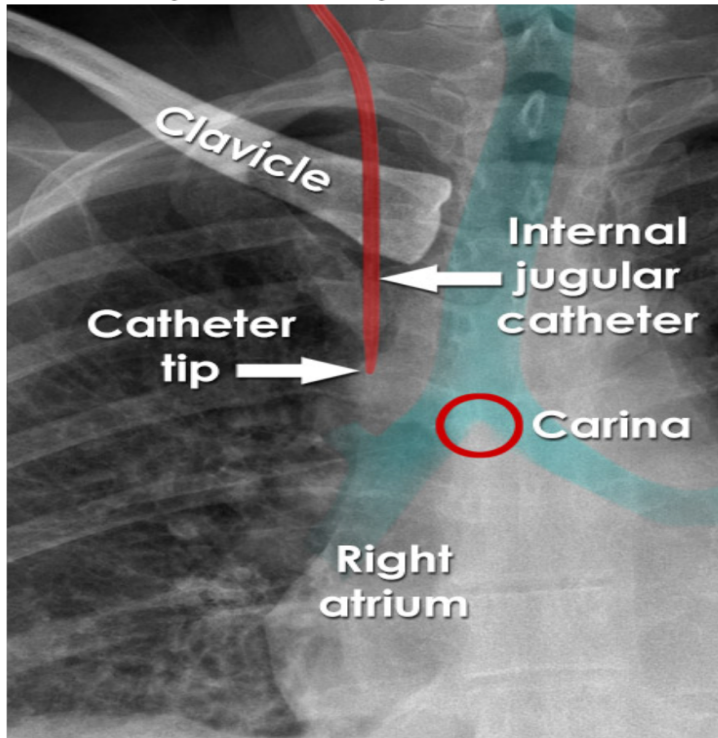
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Superior vena cava (SVC) anatomy

- ◆ The internal jugular and subclavian veins join to form the brachiocephalic veins (**asterisks**)
- ◆ The brachiocephalic veins (also known as the innominate veins) join to form the SVC
- ◆ The SVC is located to the right side of the mediastinum above and below the level of the carina

Right internal jugular vein catheter

Hover on/off image to show/hide findings

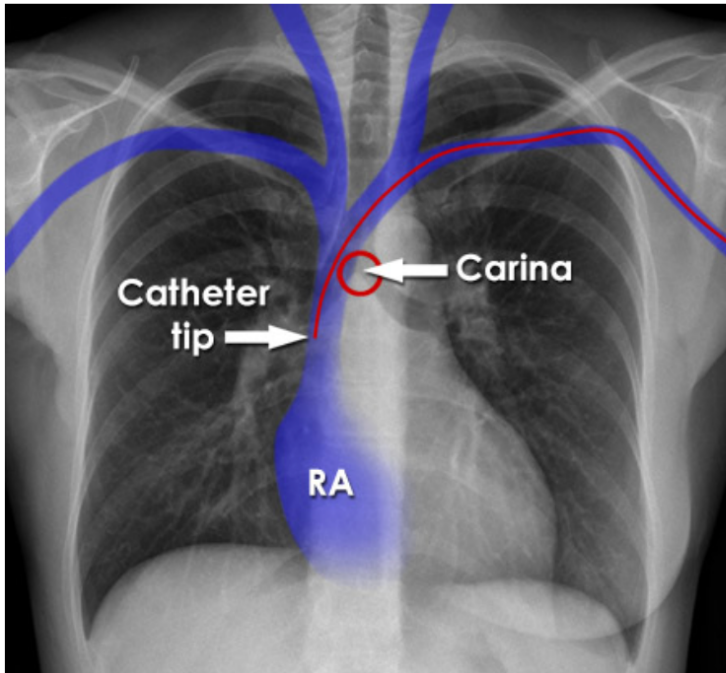


Right internal jugular vein catheter

- ◆ The catheter is orientated vertically
- ◆ The tip is projected over the anatomical location of the SVC - approximately 1.5 cm above the level of the carina
- ◆ This is an ideal position for right-sided catheters for fluid administration and venous pressure monitoring, but not for long-term chemotherapy or dialysis

Left subclavian vein catheter

Hover on/off image to show/hide findings

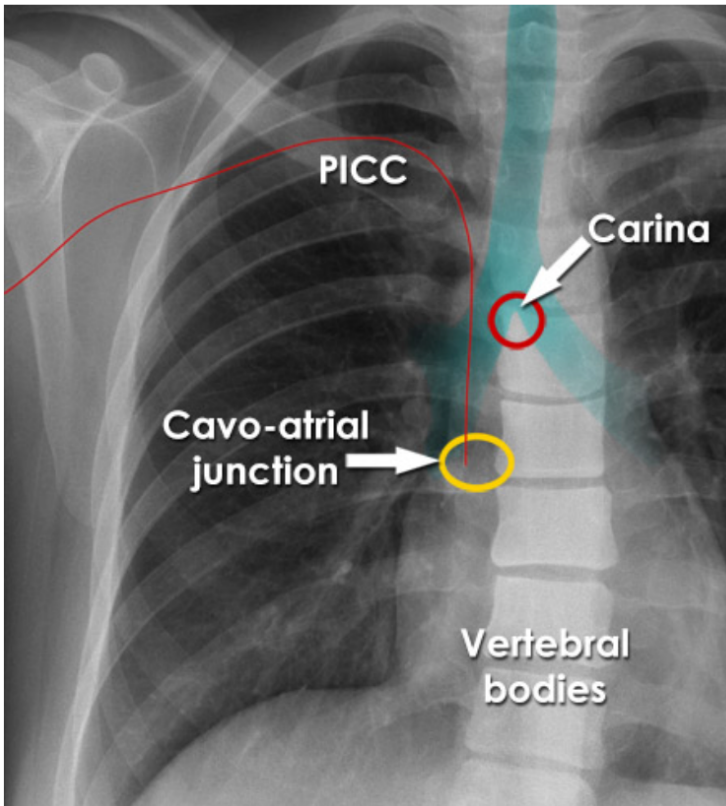


Left subclavian vein catheter

- ◆ This left subclavian catheter is located with its tip below the level of the carina
- ◆ Positioning the tube vertically avoids abutment of the tip against the right lateral wall of the SVC

Long term catheter - PICC line

Hover on/off image to show/hide findings



Long term catheter - PICC line

- ◆ This peripherally inserted central catheter (PICC) is correctly located with its tip at the level of the cavo-atrial junction - approximately the height of two vertebral bodies below the level of the carina
- ◆ This is often considered a preferable location for long-term catheters