**Intern teaching conference**

## INDICATIONS FOR CENTRAL LINE PLACEMENT

Though most patients admitted to the ICU get central lines, there are just a few strong indications to placing a central line (and ease of getting blood draws isn't one of them.)

Major Indications:

- Administration of medications — Many medications (eg, vasopressors, chemotherapy, TPN) are administered by a central venous catheter because they can cause venous irritation (phlebitis) when given through a peripheral intravenous catheter.
- Hemodynamic monitoring – transduction of CVP, or conduit for PA line
- Plasmapheresis, apheresis, hemodialysis, CVVH

Lesser Indications:

- Poor peripheral access – CVC are fraught with complications: try to get the ICU nurse IV expert, attempt to place a deep brachial IV with an angiocath.
- Volume resuscitation – 14 or 16 gauge IV's are actually superior as you can get a greater flow rate with a shorter catheter. If you put in a central line for volume resuscitation, remember to use a cordis catheter (shorter and wider) for faster infusion rates.

## CONTRAINDICATIONS TO CENTRAL LINE PLACEMENT

Strict:

- Infection over catheter site
- Clot in the selected vein

Relative:

- Coagulopathy and thrombocytopenia (relative goal platelets are >50k and INR <1.5, but lines can be placed if these goals are not reached depending on the case)
- Complications that can be life threatening (i.e pneumothorax or bleed). Do not place a subclavian line in a patient with a coagulopathy or in patient with severe parenchymal lung disease and respiratory failure with little respiratory reserve)

**Site Selection:** Could the potential complications could be tolerated by your patient?

| LOCATION | ADVANTAGES | DISADVANTAGES |
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| FEMORAL VEIN | Fast, easy, high success rate<br>Does not interfere with intubation<br>0% risk of pneumothorax | Hard to keep the site sterile<br>No CVP monitoring<br>Prevents patient mobilization<br>Higher rates of thrombosis than SCV<br>Higher rates of line infection than SCV<br>Femoral artery puncture more frequent than SCV |
| INTERNAL JUGULAR | Easy to control bleeding<br>Pneumothorax is less common<br>Straight shot into SVC | Difficult to access if pt being intubated or with trach or has a large neck<br>Dressings hard to maintain<br>Poor landmarks in obese patients<br>Carotid puncture more frequent than SCV<br>Higher rates of thrombosis than SCV |
| SUBCLAVIAN VEIN | Most comfortable for patient<br>Bony landmarks in obesity | Higher risk for pneumothorax<br>Compression of bleeding site difficult<br>Long pass from skin to vein (consider in obesity)<br>Lowest risk of thrombosis<br>Lowest risk of line infection |

## GETTING READY FOR THE PROCEDURE: C-SOAPIM

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| C: comfort, make sure you are comfortable with the environment. Assure there is enough room around the patient, get table in the right spot, raise bed for your comfort, get appropriate supervision in case of complications. Give patient appropriate medicines before procedure (i.e. intubated pt can get sedatives or narcotics) |
| S: sterility. This means full sterile gown, mask, eye protection, gloves and an additional sterile sheet to cover the ENTIRE patient. (sheet in kit is too small and not enough) |
| O: oxygen. Make sure patient has sufficient oxygen supplementation before the procedure. Intubated patient should be on 100% FIO2. |
| A: airway. Make sure the airway is secure. This is very important for spontaneously breathing patients, as you will cover their face and put them in an awkward position. Assure that they can tolerate the position for a period of time. |
| P: position. Patients' should be placed in trendenlendburg position for all neck lines. In addition, for subclavian lines a roll should be placed between the shoulder blades to improve anatomic landmarks. |
| I: IV access. In case there is a complication, it is always good to have peripheral IV access that is free flowing and available in case of a need to perform resuscitation or administer code medications. |
| M: monitors. Minimum monitoring includes a continuous O2 monitor and heart rate monitor. Blood pressure should also be cycled more frequently, about every 5 minutes, to assure patient safety. Have the volume turned up on the monitor so that you can hear the stability of your vitals and assign a person in the room to keep a watch on the vitals. |

## STEPS IN THE TECHNIQUE OF CENTRAL VENOUS CATHETERIZATION

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| Prepare the room, patient positioning, patient comfort, gather supplies |
| Identify vessel or pertinent landmark, confirm with ultrasound. |
| Prepare the site by scrubbing widely with antiseptic solution. Get sterile |
| Drape the site and patient with sterile towels and surgical drapes |
| Prep the kit (get flushes, flushing tubing, flush lines…) |
| Infiltrate the skin with 1 percent lidocaine, use the lidocaine needle to find the vein. |
| Cannulate the vein using the introducer needle |
| Confirm position of needle by easy aspiration of venous blood, to be sure you are in the vein, transduction of pressures or blood gas analysis is recommended. Do not proceed if you are concerned that you are in the artery. |
| Remove syringe from needle hub |

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| Insert J-tipped guidewire through the needle into the vein and gently advance the wire; **never** force the wire. Watch for arrythmias as wire is advanced into the RA. If so, slowly withdraw the wire. |
| Remove the needle while maintaining control of the guidewire |
| Make a small skin nick contiguous with the wire using an upward-facing scalpel balde |
| Advance the dilator over the wire using a twisting motion; always hold the guidewire |
| Withdraw dilator while guidewire is stabilized, and hold pressure over the wound site. |
| Thread the catheter over the guidewire; always hold the guidewire |
| Stabilize the catheter and remove the guidewire |
| Evaluate ease of aspiration and flushing from each port of catheter. All ports should aspirate blood back well, if not this raises the concern for catheter malposition. |
| Suture the catheter securely, dress site with sterile technique and topical antiseptic ointment |

**WHAT TO DO WHEN YOU ARE DONE**

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| Get rid of all your sharps yourself into the appropriate container and dispose of your waste |
| Order a CXR immediately to confirm no immediate mechanical complications—pneumothorax or catheter malposition. Remember tip of catheter should be at the SVC junction into the RA, which means on CXR where the trachea breaks off into the right mainstem bronchus. |
| Do not use catheter until placement has been confirmed. All misplaced catheters should be adjusted to assure correct position. If not, catheter malpositioning increases the risk for venous perforation which can present with pleural effusion and/or widened mediastinum. |
| Write a note to document the procedure. Be explicit in what happened: who supervised the procedure, how many attempts were made, was the carotid punctured and all safety assurances that were done (ultra sound guidance, water column, all ports drew blood and flushed) |
| Every day assess the line-does the site look OK, is there swelling, and is still needed? If not, take it out! Remember the risks of line complications include mechanical (pneumothorax, hematoma, vemous perforation, catheter malposition, thoracic duct injury, nerve injury, arterial puncture), infections (line infection, sepsis) and thrombosis (DVT, PE) and these happen in about 5-20% of cases. |

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