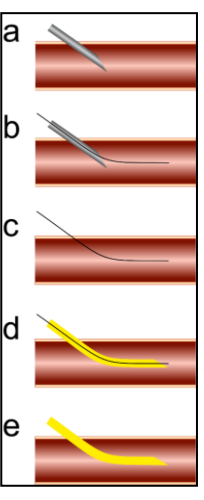
Central Venous Catheter Placement



Indication

- Deliver of critical medicine: Vasopressors, inotropes, chemotherapy, parenteral nutrition, etc.
- Monitor CVP
- Hemodialysis
- Emergency resuscitation: ACLS, volume load
- Cardiac cath: Swan, ablation, pacemaker, IVC filter, etc.
- Frequent blood draw (PICC?)

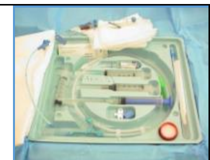
Contraindication

- Infection: The area overlying target vein
- Clot: Thrombosis of the target vein
- Coagulopathy
- Not co-operative
- Abnormal anatomy: fx clavicle, fx anterior ribs in subclavian approach

Approach

Location	Advantage	Disadvantage	Anatomy
Internal Jugular	Easy to control bleeding Less pneumothorax Straight shot to RA Compressible Excellent US target	Difficult in large neck, intubate. Poor landmark Carotid a inj Difficult dressing	Trendelenburg (head down) Head turn away Apex of the sternocleidomastoid muscle To the nipple
Subclavian	Most comfortable Easy dressing Less DVT, less arterial inj Less infection Bony landmarks in obesity	Higher pneumothorax Cannot compress malposition No not do it lung, coagulopathy	Trendelenburg (head down) Towel under spine Adducted, lower shoulder. Medial middle 1/3 of clavicle, where the clavicle "bend" 2 cm lateral & 2 cm caudal To sternal notch. "walked" deeper just under clavicle.
Femoral	Fast, easy Not interfere w CPR, intubation No pneumothorax Compressible	Dirty / infect High rate of arterial inj High rate of DVT Pt cannot mobile Cannot monitor CVP	Supine, abduct, external rotate Distal to inguinal ligament Medial to artery.

Procedure



- Consent. Patient: position, correct site.
- Operator: Sterile gown, groves, cap, mask, shield.
- Equipment: Prepackaged kit, skin-prep/drape, local anesth (lidocaine, 3 cc syringe, 25g needle), introducer needle, J-tip wire, dilator + catheter, sutures (silk, needle), dressing, gauze, scalpel, NS flushing, and ultrasound machine
- Scrub the area, drape. Check the length (SVC –RA junction)

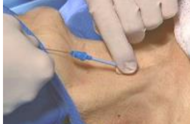
Local anesthesia
- 1% lidocaine, 25-gauge needle
- intradermal, SubQ, vessel wall
- may use lidocaine needle as a finder

Introducer needle → Access the vein
- negative pressure aspiration
- double wall, move back slowly
- no lateral movement, back to skin before change direction

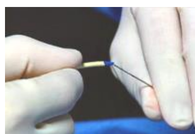
Fix the needle → Detach the syringe

Advance the wire → Remove the needle
- never force. If resistant, remove the wire and aspirate blood to confirm intraluminal needle position
- if PAC/PVC, too deep

Control the wire → Cut the skin
- blade upward, no not cut the wire then dilate the soft tissue



Dilator over the wire → Remove dilator
- rotate motion with fixed skin
- do not bend the wire
- if too much resistant, likely the skin is not big enough



Catheter over the wire → Remove the wire
- See the wire at all the time

Flush and fixed
- order CXR

Ultrasound guide

- ↑ Success, ↓ complication, ↓procedure time. Learning curve.
- Linear vascular probe. Orient the probe. Place in a sterile sheath
- Vein: Thin wall, compressible, continuous color
- Needle is "bright" – echogenic. Locate the tip of the needle at all time

Complication

- Immediate: Pneumothorax, hemothorax, bleed, arterial inj, arrhythmia, air embolism, malposition
- Delayed: Infection, DVT, catheter migration, embolization, nerve injury

Troubleshooting

- To ↓ Infection: 1.Hand hygiene; 2.Chlorhexidine skin antiseptic; 3.Maximal barrier precautions; 4.Avoid femoral vein; 5.Remove unnecessary line (Anaesthesia 2004;59:1116-20.)
- If suspect pneumothorax, stop, do not attempt contralateral side
- The only thing patient will remember is how you numb him/her.

Further reading

- See NEJM web video and Prevent complication (NEJM 2003;348:1123-33.)