
Ultrasound-Guided Placement of Internal Jugular Central Venous Catheter

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Indications

- Central venous pressure monitoring
- Delivery of sclerotic medications or agents
- Lack of peripheral venous access
- Hemodialysis (preferred location as it avoids subclavian vein stenosis)
- Administration of total parenteral nutrition

Contraindications

- Cellulitis overlying vessel
- Coagulopathy (relative contraindication)
- Thrombosed internal jugular vein
- Elevated intracranial pressure
- Cervical spine injury and the need for cervical spine immobilization

Essential Steps

1. Confirm patient identity with two identifiers (e.g., name, birth date). Review anatomy, history, and relevant lab studies to avoid predictable difficulties, i.e., neck surgery, radiation at planned site, or coagulopathy.

2. Review any local protocols or guidelines regarding central venous catheter insertion. Be sure to conform to them or to dictate the justification for varying from them.
3. Gather supplies – always get two kits. Confirm ultrasound is functioning. Gather syringes, flushes, and dressing kit.
4. Know anatomy: aim for apex of triangle formed by clavicle and two heads of sternocleidomastoid.
5. Place ultrasound machine on opposite side of planned insertion site.
6. Place patient supine, in slight Trendelenburg with the head turned to side opposite from planned insertion site.
7. Stand at the head of the bed, slightly to the side of the planned site of insertion.
8. Use ultrasound probe to confirm the vein is in expected location and is patent and compressible and has non-pulsatile venous flow. Take photos if the ultrasound machine is equipped to do so.
9. Prep and drape the patient.
10. Have the assistant pass onto the field the catheter kit, the ultrasound probe cover with conducting gel, ultrasound probe, flushes, syringes, and dressing kits.
11. Use the ultrasound probe to identify the vein again. Do not forget your traditional landmarks and positioning.
12. Anesthetize the overlying skin and soft tissue with local anesthetic.

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13. The ultrasound probe should be centered over the vein in cross-sectional view. The needle tip should be centered with the probe. While holding the ultrasound probe in the non-dominant hand (or using a fully gowned assistant), insert the 16-gauge needle at a 45° angle to the skin about 1–2 cm cephalad to the ultrasound probe, in the same plane. The operator should see the tissue of the vein move with the needle insertion.
14. Apply negative pressure to the syringe as the needle is slowly advanced. When blood returns, advance the guidewire using typical Seldinger techniques. The guidewire should be seen in the vein. Obtaining a picture at this point is a good practice.
15. Pass off the ultrasound probe, and finish the procedure as described in the previous chapter.
16. Remember that the complication rate increases exponentially with each attempt. Reassess, reposition, and request assistance early.

Variations

- Kits vary. Be familiar with the one you are using. Include kit name/manufacturer in your dictation.
- Ultrasounds vary. Be familiar with the one you are using. Include ultrasound manufacturer and probe frequency in the dictation.
- Needle guides and jigs are available but may prove cumbersome.
- Some operators use posterior, anterior, or low approaches which can also be done with ultrasound guidance. These all require slightly different patient, operator, and ultrasound monitor positioning.
- Some central venous catheters are tunneled, cuffed, or have a port attached. The technique of identifying and accessing the vein is the same.

Complications

- Pneumothorax
- Hemothorax

- Neck hematoma
- Arterial puncture, cannulation, or injury
- Vein laceration
- Venous air embolus
- Cardiac perforation with cardiac tamponade
- Cardiac arrhythmia

Template Operative Dictation

Preoperative Diagnosis This ____-year-old *male/female* requires central venous access because peripheral access is neither available nor appropriate for the medications she/he will receive (*the underlying medical condition or diagnosis might also be added here*).

Procedure Ultrasound-guided *left/right* internal jugular central venous catheter insertion

Postoperative Diagnosis As above

Indications The preoperative diagnosis can be repeated here. *Some commentary about why the IJ site (instead of the subclavian site) was chosen might be useful here.* Ultrasound guidance was used because _____.

Description of Procedure After a review of the indications, consent, and relevant medical record, time-outs were performed using both preinduction and pre-incision safety checklists to verify correct patient, procedure, site, and additional critical information prior to beginning the procedure. Patient was placed supine, in slight Trendelenburg, with the neck turned to the contralateral side. The *right/left* neck and chest were prepped and widely draped using an approved topical antiseptic and full barrier precautions. A _____ brand ultrasound machine with _____ MHz probe was used to confirm the internal jugular vein was in its usual anatomic location and was patent and pliable and had non-pulsatile venous blood flow (see attached photos). A _____ brand central venous catheter kit was used. All parts were flushed and tested prior to use. The skin and subcutaneous tissues were anesthetized with _____ ml of _____% lidocaine.

Using a 16-gauge needle, the vein was punctured, and the guidewire advanced under direct ultrasonic visualization (see attached photos). The guidewire advanced without resistance or difficulty. A skin nick was made at the insertion site, and using Seldinger technique, a dilator was passed over the wire to dilate the subcutaneous tissue. The dilator was exchanged for the catheter, and the catheter smoothly advanced. The guidewire was removed without difficulty,

and the catheter ports were aspirated, flushed with saline, and capped without complication. The catheter was secured with multiple *sutures/staples* at the desired depth, and a dressing applied. Patient tolerated the procedure well, and a post-procedure chest X-ray was ordered.

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