Internal Jugular Vein Central Line Placement with and Without Ultrasound

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Preference Card

- Three lumen central line kit
- 18 ga and 22- or 24-gauge needle
- 5 or 10 ml syringe
- Vascular access needle with syringe
- Guide wire
- 11 scalpel
- Dilator sheath
- Three lumen central venous catheter
- Antibiotic disk and occlusive dressing
- 3-0 silk or Prolene suture
- Sterile saline flushes
- Local anesthetic lidocaine 1% with or without epinephrine
- Flush all ports of central line and lock them
- Ultrasound with 9 mHz transducer

Patient Positioning

- The patient is placed supine with arms toward the side and head turned away from the implanting clinician.
- ChloraPrep is used as skin preparation.
- Maximum sterile barrier is used.
- The patient is placed in Trendelenburg position.

Nodal Points

Prep, Drape and Checking Kit

- The neck should be prepped with ChloraPrep solution over the area until a suitably sized sterile field is obtained (about 5–6″ in diameter).
- The catheter kit is opened sterilely.
- Sterile gowns and gloves should be used by those in the room.
- A sterile surgical drape should be placed over the neck centered on the marked jugular vein.
- The central venous catheter should be checked to ensure that the ports are open and not capped. All ports should be flushed.

Localizing the Internal Jugular Vein

- The internal jugular vein is located deeper to and in between the sternal and clavicular heads of sternocleidomastoid, lateral to the carotid artery (right internal jugular vein takes a straight course to right atrium, easier to position at SVC-RA junction, and avoids the thoracic duct injury on the left) (Fig. 26.1).
- Using a 22-gauge needle, 1% lidocaine is injected at the needle entrance site.
- Using the transducer, localize the internal jugular vein, and select the level of puncture (Fig. 26.2).
- Hold the transducer in place.
- The needle is advanced aiming toward the middle of the vessel; keep the needle and the barrel of the syringe in the horizontal plane (Fig. 26.3).
- If done without ultrasound, the needle is advanced aiming toward the right areolar line, keeping the needle and the barrel of the syringe in the horizontal plane.
- The entrance of the needle into the internal jugular vein is confirmed by blood return (Fig. 26.4).
- Unscrew the syringe holding the needle.

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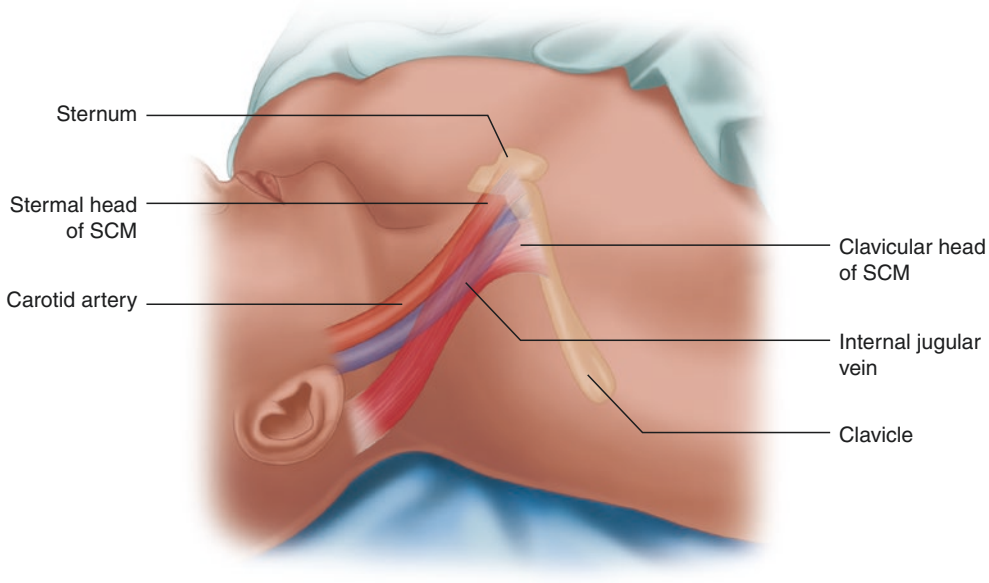

Fig. 26.1 Patient positioning and anatomy of internal jugular vein

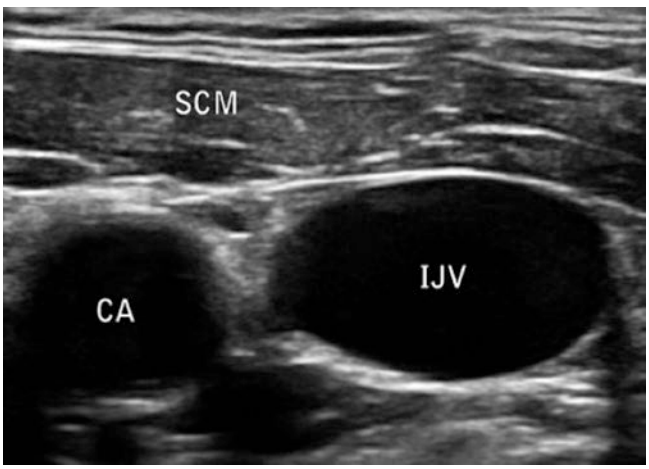

Fig. 26.2 Using the transducer the internal jugular vein is identified

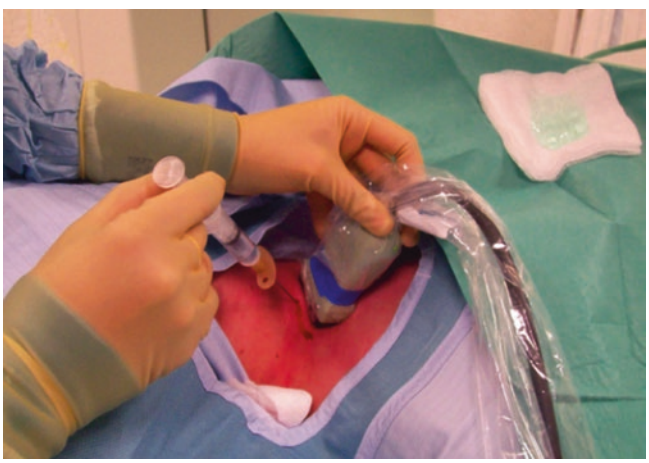

Fig. 26.3 Introduction of needle into internal jugular vein

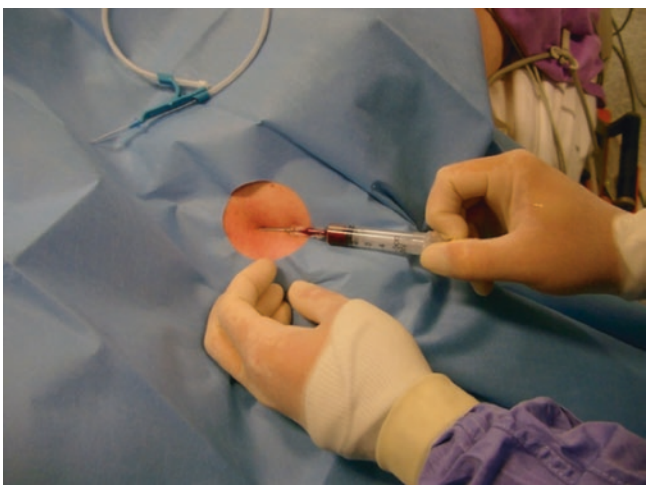

Fig. 26.4 The entrance of the needle into the internal jugular vein is confirmed by blood return

Canalizing Vein with Guide Wire and Dilatation of Vein

- The J-wire is threaded through the needle (Fig. 26.5).
- Remove needle over the J-wire, always having controlled of the wire.
- Watch monitor as guide wire is advanced. Ventricular ectopy indicates placement in RV, and guide wire should be pulled back a few centimeters.
- Using the 11-blade, the skin incision is extended.
- A vein dilator is passed over the J-wire; have control of the wire (Fig. 26.6).

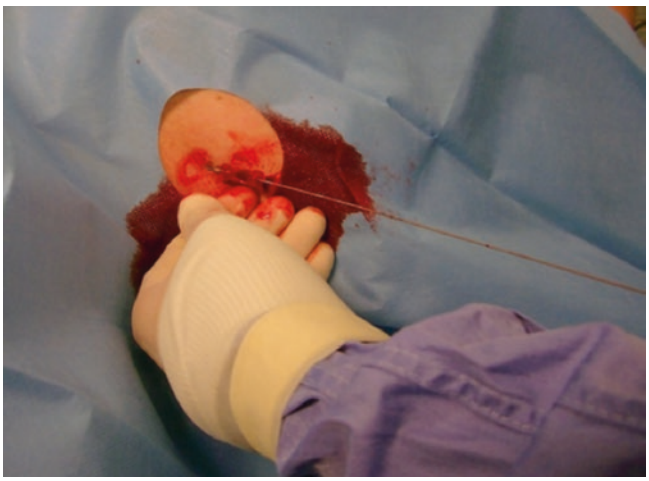

Fig. 26.5 J-wire is advanced through the needle

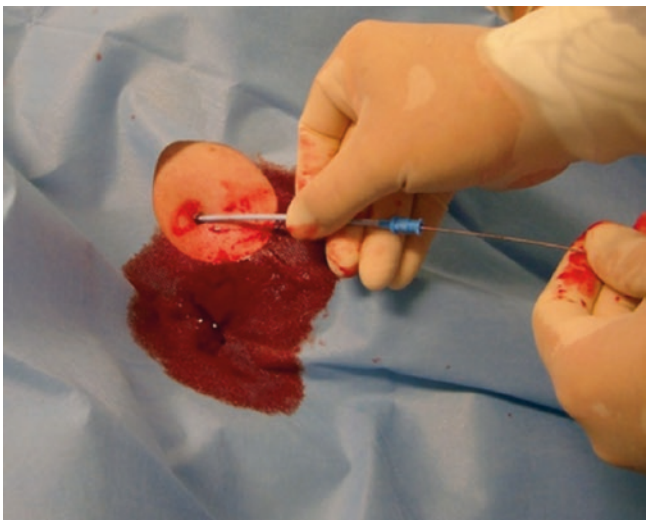

Fig. 26.6 A vein dilator is passed over the J-wire always having control of the wire

Thread of Central Line Through Wire and Fixation of Line

- The catheter is then threaded over the J-wire (Fig. 26.7).
- Remove the wire.
- The catheter is flushed with saline.
- Immediately following placement, each of the ports is aspirated and flushed with normal saline to verify patency.
- If any resistance is encountered, then obstruction of the catheter in the vein insertion site, the tunnel, or at the junction of the catheter with the reservoir should be suspected. These sites should be inspected
- The catheter is secured with 3-0 silk sutures
- An antibiotic disk is placed over the skin at the level where the catheter enters.
- An occlusive dressing is then placed over this area (Fig. 26.8).

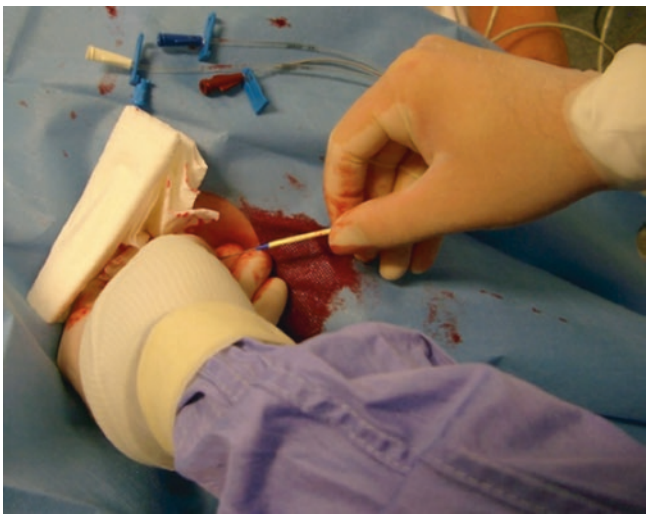

Fig. 26.7 The catheter is then threaded over the J-wire

Fig. 26.8 Central line is stitched in placed; antibiotic disc and occlusive dressing are placed

Confirmation of Line Position and Rule Out Pneumothorax with Chest X-Ray

- The position of the catheter with its tip in the right atrium should be verified.
- Pneumothorax is ruled out.

Pitfalls and Pearls

- Ultrasound guidance improves initial cannulation success.
- Positioning the patient in Trendelenburg, using Valsalva, or increasing the intrathoracic pressure by taking a deep breath and holding it in can help increase cannulation success.
- Carotid artery puncture is not uncommon. Management involves withdrawal of the needle and applying pressure over the site for 5–10 minutes. Ipsilateral access can be later re-attempted.

- Dilatation and cannulation of the femoral artery, however, may be associated with more complications such as stroke, bleeding, thrombosis, or creation of pseudoaneurysms. In that case, the catheter should not be manipulated, and the vascular surgeons are involved.
- Repositioning of the catheter is possible after placement but only to withdraw it when insertion is too deep. Catheters should be advanced any further after initial positioning as the outer part of the catheter is not sterile. Repositioning of the catheter should always be attempted in sterile conditions and over a guide wire.

Access Reader Checklist Appendix

☑ READER CHECKLIST
Internal Jugular Vein Central Line Placement with/Without Ultrasound

☑ PREFERENCE CARD

►**Instruments**
__3-lumen central line kit
__18, 22 or 24 gauge needle
__5 or 10 ml syringe
__Vascular access need (I.e. with syringe)
__Guidewire
__11 scalpel
__Dilator sheath
__3-lumen central venous catheter
__Antibiotic disk and occlusive dressing
__Sterile saline flushes
__Local anesthetic lidocaine 1% with or without epinephrine
__Flush all ports of central line and lock them
__Ultrasound with 9 mHz transducer

►**Sutures**
__3-0 silk or prolene suture

☑ PATIENT POSITIONING/ OPERATING ROOM SETUP

►**Patient Positioning**
__Patient placed supine with arms toward the side and head turned away from implanting clinician
__ChloraPrep used as skin preparation
__Maximum sterile barrier used
__Patient placed in Trendelenburg position

☑ NODAL POINTS

►**Prep, Drape and Checking Kit**
__Neck should be prepped with ChloraPrep solution over area until suitably sized sterile field obtained (about 5-6 in diameter).
__Catheter kit opened sterilely
__Sterile gowns and gloves should be used by operating room personnel
__Sterile surgical drape should be placed over neck centered on marked jugular vein
__Central venous catheter checked to ensure ports are open and not capped
__All ports flushed

►**Localizing Internal Jugular Vein**
__Internal jugular vein located deeper to and in between sternal and clavicular heads of sternocleidomastoid, lateral to carotid artery
__Right internal jugular vein takes a straight course to right atrium, easier to position at SVC-RA junction, and avoids thoracic duct injury on the left
__Using 22-gauge needle, 1% lidocaine injected at needle entrance site
__Using transducer, localize internal jugular vein and select level of puncture
__Hold transducer in place
__Needle advanced aiming towards middle of vessel
__Keep needle and barrel of syringe in horizontal plane
__If done without ultrasound, needle is advanced aiming towards right areolar line, keeping needle and barrel of syringe in horizontal plane
__Entrance of needle into internal jugular vein confirmed by blood return
__Unscrew syringe holding needle

►**Canalizing Vein with Guidewire and Dilatation Vein**
__J-wire threaded through needle
__Remove needle over J-wire, always having controlled of wire
__Watch monitor as guide wire advanced.
__Ventricular ectopy indicates placement in RV; guide wire should be pulled back a few centimeters
__Using 11-blade, skin incision extended
__Vein dilator passed over J-wire, with control of wire

►**Thread of Central Line Through Wire and Fixation of Line**
__Catheter threaded over J-wire
__Remove wire
__Catheter flushed with saline
__Immediately following placement, eachports aspirated and flushed with normal saline to verify patency
__If any resistance encountered, there may be obstruction of catheter in vein insertion site, tunnel, or junction of catheter with reservoir; these sites should be inspected
__Catheter secured with 3–0 silk sutures
__Antibiotic disk place over skin at level where the catheter enters
__Occlusive dressing placed over this area

►**Confirmation of Line Position and Rule Out Pneumothorax with Chest Xray**
__Position of catheter with its tip in right atrium should be verified
__Pneumothorax ruled out